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MINING AND SCIENTIFIC PRESS.

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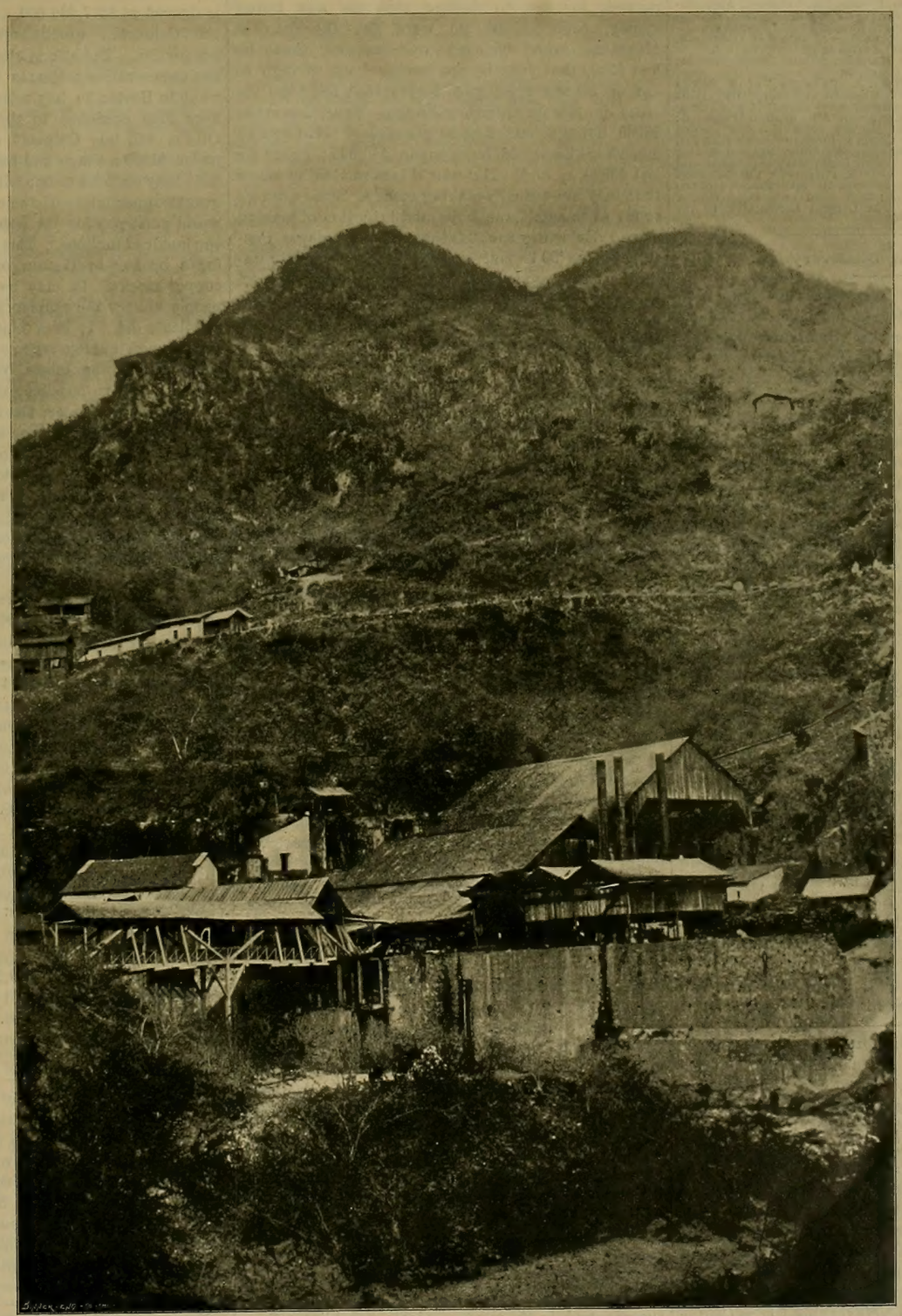
No. 2009.—VOLUME LXXVIII. Number 1. SAN FRANCISCO, SATURDAY, JANUARY 7, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mexican Mineral Resources.

The Republic of Mexico is awakening, and its industrial development is of intimate value and interest to the United States. That country's mineral yield, great though it has been in the past, is evidently to be of still greater import, as its several States secure capital for transportation and mineral development. The State of Sinaloa is one of the prominent mining provinces of the Republic and is encouraging the investment of capital. Its mining tax on gold and silver yield is 1½%; less than that allowed by the Federal law, all metallurgical works being exempt. This tax in the calendar year of '97 amounted to $62,000, the yield of Sinaloa for that year being $1,418,500 gold and $3,571,500 silver. For three hundred years Sinaloa has been sending out gold and silver, and mining is to-day, as it always was, the State's principal industry. Up to a comparatively recent date the mint at Culiacan made little effort to separate the gold from the silver, hence the reason for the Chinese partiality to Mexican dollars, the Orientals learning from experience that Mexican dollars contained an appreciable percentage of gold, which they quickly utilized.

The extreme hardness of the country rock and the difficulty of securing adequate machinery have compelled the adoption of tunneling in development of ore bodies, crosscut tunnels having been driven in places a distance of 4000 feet. Among the State's principal mines are the Jesus Maria at San Jose de Gracia, La Piramide, and El Rosario. The first half of '98 the latter mine, after paying all expenses, distributed $137,500 in dividends among its stockholders. On La Purissima over half a million dollars has been spent in development work, with the recent result of uncovering a rich vein. In an area of 180 square miles are 150 registered mines, many of which are at present in enforced idleness. The oldest and most important of Sinaloa's mines is the Guadalupe de los Reyes, which has for over twenty years produced annually 200,000 tons ore. This mine has modern machinery, employs from 1000 to 1300 men, and is in every way a leading concern. The Panuco Mining Co. operates, at Panuco, a large mining property with modern methods, employing about 600 men, and is constantly paying dividends. Herewith is presented a general view of the Panuco Co.'s principal plant, and the character of the surrounding country. For this and most of the accompanying data the paper is indebted to the courtesy of J. R. Southworth, editor of "Sinaloa Illustrado," a work that is calculated to elicit interest in that section and aid in valuable trade connections between the two countries.



GENERAL VIEW OF THE PANUCO MINING CO.'S PLANT, PANUCO, SINALOA, MEXICO.

In the issue of Oct. 22d, '98, appeared the latest semi-official statement of the progress of the work of the U. S. Debris Commission, with engravings of the apparatus, etc., used in boring at the site of the proposed dam or restraining barrier near Smartsville, Yuba county, Cal., from photographs taken by Major W. H. Heuer, U. S. Corps of Engineers. At the time it was stated that the conditions developed by Mr. Vischer in boring indicated the necessity on the part of the commission of taking into consideration another and different project which is receiving present attention. The idea now of utilizing the $500,000 appropriated by the State and Federal Government is to divert the entire flow of the Yuba river, near the edge of the foothills, carry the stream in a deep canal 200 feet wide, leveed and gradually widened into a storage basin of sufficient area to handle the thousand million cubic yards of accumulated debris, the water to ultimately flow, freed from sediment, into the basin of the Feather and the Bear.

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Not a New Discovery.

Newspaper dispatches this week report the discoveries of "vast deposits" of platinum thirty miles from Granite Creek, on the Similkameen river, B. C. This is doubtless a "New Year's" way of announcing the existence of platinum in that region, a long-known fact. Just thirteen years ago placer miners in that spot found and threw away what they called "white iron." This journal investigated, with the result that the apparently worthless by-product was found to be platinum. Prof. Dawson exploited the whole thing thoroughly, the attention of the mining world was directed to the matter, the "Tulameen Improvement & Hydraulic Co." was organganized and considerable work done. It was Dawson's opinion that the belt of diorite cut by the stream at the point where the platinum was found was the matrix of that metal, though Blake, Van Cotta, and Aaron of this paper held that, as usual, throughout this entire region, it was only an incidental product from debris of serpentine or periodite. The last we heard of the company organized was in April, '95, when it increased its capital stock to 500,000 shares, and started in with considerable show of intent to work. There is no new discovery, but it is possible that an additional deposit has been found.

Platinum is one of the metals whose demand exceeds the supply. Thirty years ago it was $4.50 an ounce; ten years ago it bounded to $17.50 an ounce; in '92 it dropped to $7.50; to-day it is worth 60 shillings per ounce in London, $15.50 per ounce in New York City, and $16 in San Francisco, (pure). It is found in several localities where placer gold is produced, but never "in place," except in two districts in the Ural mountains, Russia, the only two localities where it is mined for itself alone.

FOR the first time in British dominions came up in December, '98, for legal adjudication the "apex," the "extralateral rights," and all the accompanying confusion so dear to many mining litigants. It was the case of the Iron Mask vs. the Center Star at Rossland, B. C. Under the old law of that province, (similar to the one now in force only in the United States and Bolivia, but happily repealed elsewhere) the Center Star was located and in the present suit claimed its rights under the law in force at the time of its location. The usual attendant legal jumble resulting in estoppels, injunctions, appeals and all the other skirmishing preliminary to the main trial, has resulted unfavorably to the Center Star, the Supreme Court negativing the setting aside of the injunction. The Center Star now appeals to Canada's highest legal tribunal, the Privy Council. Sometime, in the United States, the mining community will appeal to the highest court on earth—public opinion—with the result that that mightiest tribunal will set aside the present system with its attendant delay, vexation and expense.

Changing Fashions.

"Fashion" and "habit" have a good deal to do with business matters. They are outside of real merit, apart from tangible facts, yet guide and control things. Some time ago a mine operator wrote us from London that California mines were not "fashionable" in London. That condition was more potent than any other present factor. So, also, it is the "fashion" or not the "fashion" in other things; indeed, "fashion" rules. In the business world it has been the "fashion" since the failure of the Barings in '90 to whimper. This fashion came into wider vogue after the panic of '93, and since then it has been the "fashion" to say that one was losing money; if he was not "losing money" it was because he had no property to depreciate. It was quite the thing, and in line with the general custom, for one to declare that he was losing money, even though he were like the man in Montana, who declared one season that he lost $5000 that year by not having hogs enough to eat up all the mast and acorns that fell from the trees in his immediate vicinage. True, he made $5000, but that was of no circumstance. Had he had more hogs he would have made $10,000; hence he lost $5000, q. e. d. But now it is admitted by many that they are actually making money. Some even go so far as to admit the hope and intention of making more. Evidently the "fashion" is changing. Possibly before '99 is half gone it may be decidedly unfashionable to go around whimpering about alleged losing of money. It may be that expansion shall have something to do with it, and that the acquisition of the Antilles, Hawaii and the Philippines may have started the new fashion of acknowledging moderate prosperity and a cessation of the old, familiar whine of the past eight years; but, whatever the cause, it is manifest that the "fashion" is changing. It may, indeed, even come to pass that once more California mines may be "fashionable" in London.

The cause of all these ebbs and flows in the tide of business, of the "fashion" of alleging "hard times," and subsequently proclaiming prosperity, lies deep. It is as the great swing of Life's pendulum. Men and nations and the race have periods of distrust, of fear, and inaction. After such a period something starts the confidence of individuals themself and the confidence of the nation in itself, and men feel a sudden courage to undertake all enterprises and to indulge in effort tending to progress. Each one seems to encourage the other. Each enterprise seems to be an assistance to the other. The result is that for a series of years prosperity seems to increase; men are busy, capital is busy, and prosperity without limit seems to be within the reach of the race and the nation. Suddenly, from some cause entirely unanticipated, a doubt is cast upon the reality of the progress which has been made. Something awakens the elements of caution in the race and nation, and, thereupon, rapidly and steadily, confidence disappears. Men feel that it is necessary to take an exact observation of the situation before resuming strenuous efforts. When the hour arrives there is no possibility of retreat or of change. The race, or the nation, has determined to examine into its condition, and the result is apparent disaster, misfortune, defeat, and a general paralysis of business and of labor. There is a general liquidation of human affairs. Each man discovers what he is really worth, and the nation finds precisely what its absolute wants and needs are. If the spirit of prosperity could be expressed in a single word, that word would be confidence; and if the period of "adversity," as we call it, could be expressed in a single word that word would be distrust. During the period of progress, during the period of increased endeavor, where capital is employed and every man is at work, confidence reigns supreme. Every man believes in his own success and in the success of his neighbor. Consequently, he is free to take goods and property at the general valuation; and the people who sell property are ready to take checks and instruments by which property is transferred. When the period of doubt sets in values become uncertain, because it is felt that a readjustment must be had. Checks and evidence of transfer are scrutinized with care, because men who were wealthy yesterday may be poor to-day. So, also, production ceases, because the producer has great doubts whether the productions of his mill or his workshop will be capable of sale, and, above all, whether he will gather in the proper payment.

Panic has passed away; recuperation has set in; the tide of business again begins to flood; and with '99 comes amid changing conditions the "fashion" of prosperity. It is all a matter of "fashion," but such change is sure to come, and, surely, every one is glad that it is at hand, and that it again becomes the "fashion" to go ahead.

Appreciation of Copper.

Probably no Eastern city is more interested in mining enterprises than Boston, Mass. The total current market value of Boston's mining investments is figured at $217,000,000. It owns considerable of the California quicksilver and Montana copper properties. The stir in the latter is illustrated by the conservative estimate that $25,000,000 recently went to Boston to buy copper stocks. Boston brokers give credence to the story that the Standard Oil Co. will buy Calumet & Hecla "for anything under $1000 a share and hold it for $4000 a share"—that they propose to consolidate it with all the other great copper mines of the country, fix the price the world must pay for its copper and make money by the hundred millions. This is a good enough story for a broker in Boston or anywhere else to boom copper stocks. It may be that the Standard Oil people will try the same experiment that the French syndicate did. It is a matter of history that they had enough money when they started in to buy the leading copper mines, but only bought the mines' output. It is possible that, forewarned by the Frenchmen's disaster, the Standard Oil people may think they can improve on the method by buying the mines themselves, instead of the output, but, small as the world has grown to be, they will find it too big a contract to control the copper yield of the planet.

The appreciation of the copper mining industry of the United States is marvelous. In this regard a few figures are in order.

The U. S. copper production for '98 exceeds by about 10% that of '97. Arizona and Michigan show particularly large yield. In the Lake Superior district such a producer as the Calumet & Hecla, which in '97 turned out 83,248,054 lbs. fine copper, in '98 produced 95,000,000 lbs.; its '99 output is estimated at 100,000,000 lbs. In Arizona the United Verde, which in '97 yielded in fine copper 31,355,025 lbs., last year produced 48,000,000 lbs., and the Copper Queen advanced its output from 25,953,521 lbs. in '97 to 34,000,000 lbs. in '98. It is calculated that these two Arizona mines will this year produce 90,000,000 lbs. copper. In '97 Colorado produced 11,873,033 lbs. copper and, in '98, 14,250,000 lbs. California increased its copper production from 11,987,772 lbs. in '97 to 16,500,000 lbs. in '98. The Lake Superior district in its entirety last year yielded 156,942,897 lbs. fine copper; Arizona, 113,000,000 lbs.; Montana, 229,200,000 lbs. During '97 the United States produced 536,648,015 lbs. copper; during '98, 583,142,897 lbs. It is calculated that this year this country's copper output will exceed 650,000,000 lbs.

IN addition to the stock of old worries left over, is already announced in '99 that a crack "in the bottom of the sea" is liable to occasion the immediate precipitation of the entire volume of the oceans to the center of the earth, causing so violent an eruption as to destroy all life. Sir Robert Ball of London, an astronomer of repute, announces this latest disquieting possibility, which, were it to occur, would doubtless interfere with mining and scientific progress to an unsatisfactory extent.

FROM every principal mining town in this west half of America come handsome illustrated editions of enterprising newspapers recounting the record of '98 and showing the general advance and prosperity of the gold mining industry. All are unanimous in noting the advance in mining methods, the cheapening of ore treatment, and the prophesy of even better results in '99. In no other national industry is there a more hopeful or promising outlook.

Concentrates.

THE Hall mines, B. C., smelter has shut down till April 1st, '99.

OVER 30,000 men are now in the mines on the Canadian side of the Yukon.

THE Silverton, Colo., *Standard* declares that a zinc smelter would pay there.

RANDSBURG, CAL., expects in '99 to double its million-dollar gold output of '98.

COLORADO'S gold yield for '98 is more than the U. S. agrees to pay for the Philippines.

THE Dexter Mining Co. at Tuscarora, Nevada, has raised the wages of its employes.

FOR the last fifty years California's average annual gold output has been about $26,500,000.

THE Crœsus property of Hailey, Idaho, was sold this week to W. G. Page of Spokane, Wash., for $80,000.

IT is estimated that the United States is now exporting iron and steel at the rate of 1,250,000 tons per annum.

MONTANA mining papers make just and forcible presentation of the value and necessity of a Montana State Mining Bureau.

SILVER sulphurets or sulphides can be chloridized in the pan. The chemicals required are sodium chloride and copper sulphate.

GREEN LAKE, Colorado, is said to be the most elevated body of water in the United States, having an altitude of 10,252 feet above sea level.

THERE are about 30,000 men at present actively engaged in mining, smelting and milling ore in Colorado. In California there are about 20,000.

THE California State Miners' Association has invited the American Institute of Mining Engineers to hold the fall of '99 meeting in San Francisco.

THE Puget Sound Reduction Co. of Everett, Wash., is making four weekly shipments of gold and silver bullion to Denver that aggregate $75,000.

MONTANA'S success in its mining exhibit at Omaha will probably insure a fine exhibit of that State's mineral resources at the Paris Exposition.

A CONSERVATIVE estimate of Utah's metal output for '98 is of gold, 105,000 ounces; silver, 7,544,723 ounces; lead, 91,000,000 pounds; copper, 5,335,000 pounds.

WHILE attempting to attach a belt from the main shaft to the bucket elevator at the Sunnyside mine near Eureka, Colo., last week, W. McGraw was instantly killed.

THE Boise, Idaho, assay office estimates Idaho's metal production in '98 to aggregate in gold, $2,273,700; silver, $7,740,000; lead, $5,375,755; an increase of $1,659,570 over '97.

EIGHT miles from Carlin, Nevada, M. Sholl is opening what is described as an inexhaustible deposit of keisilgore, or infusorial earth, said to run 98% pure without calcining.

THE San Francisco Mint was established in April, 1854. To Nov. 30th, '98, its total coinage aggregated $1,171,989,854. Of this sum $1,017,923,507 was in gold; $154,066,347 in silver.

MATABELELAND, South Africa, but recently a savage jungle, and Dawson in Yukon wilds—the ends of the earth—now have gas, electric lights and other adjuncts of civilization.

SO FAR reports of "jumping" mining claims are fewer than in the beginning of former years, indicating greater care in complying with all legal requirements regarding unpatented mining claims.

THE Utica M. Co. of Angels, Cal., has contracted for an electric plant of 3000 H. P. to be installed at Murphy's, Cal., to transmit power and lights along the mother lode from San Andreas to Chinese Camp.

ON the 1st inst., for the first time in two years, came a storm from the southeast, bringing rain in the California valleys and foothills, and snow on the mountains, insuring a prosperous mining season for '99.

NOTWITHSTANDING the scarcity of water last season, Placer county, Cal., expects its gold output for '98 will equal that of the previous year, which placed it third on the list of California's gold producing counties.

THE San Giuseppe mine, Sonora, Tuolumne Co., Cal., has yielded about as pure gold as any in the knowledge of "Concentrates." It has an average fineness of 985. The average of the Mt. Morgan, Australia, gold is 980.

THE closing of the Gold Coin Co.'s operations near Anaconda, Montana, is locally viewed as an instance of the folly of a 30-stamp mill on a 10-stamp mine, operations being directed from the offices of Eastern owners some thousands of miles away.

THE London Mining Exhibition begins next May, and continues until October. United States makers of mining machinery have been invited to take part, and, as comparison must result favorably, it is good business to be properly represented there.

THE legal locator of a placer mining claim has the exclusive right to the possession thereof, and a prospector cannot legally enter the bounds of a placer claim and discover a subsequent lode claim unless there has been abandonment by the placer claimants.

THE material for the Risdon hydraulic plant to partially unwater the Comstock is arriving at Virginia City, Nev. The C. & C. shaft is about ready for the installation and the capacity of the drain flume in the Sutro tunnel has been increased to 800,000 gallons in twenty-four hours.

AT the Golden Jubilee Mining Exposition in San Francisco last February Calaveras Co., Cal., exhibited some handsome crystals from the Green Mountain mine, Mokelumne Hill. From one of these crystals a New York City jewelry firm has cut a perfect sphere 5¼ inches in diameter and worth $3000.

THE Boston Exploration Co., incorporated under Maine laws, capital $2,000,000, has for secretary R. L. Agassiz. The company owns gold mining properties in Colorado and Wyoming and is said to control the Smuggler Union M. Co. of Telluride. B. B. Lawrence of Denver is the chief engineer of the company.

IN '98 San Francisco imported 11,180 tons pig iron; 9616 tons from the East, 1564 from Europe. During '98 San Francisco consumed 1,832,373 tons coal. Of this 651,208 tons came from British Columbia, 201,931 from Australia, 75,115 from England, 5,056 from Scotland, 37,560 from the Eastern States, 632,437 from Washington.

THE value of uranium in the ore is about $10 for each per cent of a ton—that is, ore carrying from 70 to 80 per cent is worth from $700 to $800 per ton. As it is found in such comparatively small quantities it takes some time for any individual to gather up a ton. The best known in Colorado comes from Gilpin county, and runs about 70 per cent.

IT is a mistake to assume that anyone can successfully operate a mining property. It takes years of experience and as much skill to make a successful miner as to make a good civil engineer or lawyer or physician. This fact is of prime importance for consideration when a man is to be selected to take charge of the development of a mining property.

IN connection with the St. Joseph Lead Co., the National Lead Co. has concluded negotiations for the purchase of all lead companies in Missouri. This is calculated to give the latter a monopoly of the business. It is reported that the two new members to be added to the directory of the Lead Trust will represent the Standard Oil interests.

THE committee on the conservation of water recently appointed by the California State Miners' Association invites co-operation from the commercial bodies of the State, and suggests three representatives from each of such organizations at a meeting of the committee to be held at the office of the Surveyor-General in San Francisco on the 21st inst.

SOME TIME ago the people of California said they wanted a dredger. Effort was made and the Legislature passed "a dredger bill" appropriating $300,000. The money is being used, but so far no dredger has materialized. Those in charge announce that the people didn't know what they wanted, and they (those in charge) do. The patient public pay the taxes.

THE San Francisco mint coinage in '98 aggregated $68,933,173.70; of this amount $63,226,500 was in gold. The mint superintendent estimates California's '98 gold yield at approximately $15,000,000. The unusual drought occasioned a stoppage of all mine and mill work in several parts of the State. Supt. Leach estimates the State's silver yield for '98 at 700,000 standard ounces.

WYOMING reports the purchase by Chicago men, for $3,000,000, of a deposit of sulphate of soda fourteen miles from Laramie. Analysis is declared to show that this native soda consists of 44% pure sulphate of soda and 54% water. The supply is said to be practically inexhaustible. Products manufactured therefrom are in general use, and large quantities of this basis salt are imported from England and Germany.

THE United States Geological Survey places the amount of lead produced in the United States in '97 at 208,192 tons. Of this total product of lead of the United States the Cœur d'Alene, Idaho, mining district extracted from its mines and put upon the market over 115,000 tons—over 55 per cent of the entire output of the United States. This lead product was shipped in the form of galena concentrates, and was above an average of 16,000 tons of ore per month, which carried from 60 to 65 per cent lead and from thirty to eighty ounces silver per ton.

IT was recently stated herein that no California county maintained a mining bureau. The statement was contradicted in the case of Tuolumne Co., but further research confirms the exact truth of the original statement. The point was, and is, that all prominent mining centers in California, or any other mining State, would find public expenditure of public money a profitable investment in the maintenance of county mining bureaus. This is an age of advertising, and an advertisement is what all such things practically are.

IN California gold ore of the value of 84 cents a ton has been worked for 78 cents a ton, leaving a profit of 6 cents. In Utah (according to a statement uncontradicted since its appearance herein) silver is produced at a cost of 23½ cents per ounce. In Michigan and Montana copper is produced at a cost of 6 cents per pound. Aluminum sheet is now made 10 per cent cheaper than brass, and cheaper than any other metals except iron, zinc and lead. The decrease in the cost of production of the metals, precious and useful, is one of the marvels of modern metallurgy.

HUBNERITE, a manganiferous variety of wolframite, occurs in considerable quantity six miles from Dragoon station, on the S. P. Railway, Arizona, in white quartz veins, containing little iron, having a manganese oxide base, of brownish-red color, in tabular prismatic blocks or thick plates, completely enclosed in the quartz, and varying in weight from 15 to 500 pounds. It is a source of tungsten of great value in steel making, being in this regard considered superior to the ordinary wolframite. Last month a carload of the ore was concentrated at the Arizona School of Mines with excellent results.

ADVICE is usually worth what it costs, and in questions involving values in the domain of mining engineering or mining law, it is best, where practicable, to get competent advice and pay for it. If anything really important to the questioner is involved, it will usually prove the most satisfactory way. In case of disputes arbitration is preferable to litigation, and even in such cases it is often requisite to have some idea of the rights of each disputant before an opinion of any value can be furnished, and such opinion can be best supplied by a mining lawyer or mining engineer according to the matters involved.

THIS answers eleven questions this week: In California, within sixty days from date of placer discovery, the discoverer must put labor upon his location or claim amounting in the aggregate to at least $10. In California, within sixty days from date of vein or lode discovery, the discoverer must put labor upon his location or claim amounting in the aggregate to $50. In California, since May 26, '97, no record of mining claim or millsite is valid unless filed with the recorder of the county in which such claim or site is situated. Full information as to the acquiring the right to the use of running water in California appeared on page 631 of the issue of Dec. 24th, '98.

PLATINUM is found in this country almost exclusively in California placers. There have been "big" platinum finds reported in Colorado and elsewhere, but erroneously, though platinum is found in Custer county, Colorado. What is sometimes thought to be platinum is nothing but titanic iron, which exists in large quantities. When primitive assaying finds a button that looks like platinum, and that it does not yield to boiling in aquia regia, it is pronounced platinum, but when sulphuric acid is applied it disappears at once. There is a good excuse for the mistake, for titanic iron has a very strong resemblance to platinum.

THE superintendent of the Denver, Colo., branch mint states that the receipts there in '98 aggregated $20,195,995, a gain of $7,822,544 over the receipts of '97. Colorado's mineral production for '98 is locally estimated as follows: Gold, $23,500,000; silver, $15,000,000; copper, $1,205,000; lead, $3,450,000, an increase of $10,000,000 over the output of '97. Of the gold yield Cripple Creek district is credited with $15,000,000. J. B. Grant of the Omaha & Grant Smelting Co., Denver, says that in the mint receipts have appeared "a great portion of the gold production of Utah, considerable from Idaho, and much from Deadwood, S. D., mines, which was purchased by our company at Omaha and deposited here."

THE first stage of a gold quartz mine figures as a fissure in the earth's crust. The fracture may extend down as far as say 5000 feet, or to a point where the crust is pasty and elastic. The second stage is the vein filling. If the matrix be quartz it is a favorite theory that it must have been deposited there from and by the extremely hot water percolating through the shattered rock below, and finding its outlet through the open fissure. With the silica came the metallic sulphides, usually iron pyrites carrying gold. According to such hypotheses, as the waters loaded with the minerals approached the surface they gradually became cooler and the minerals were deposited in the fissure and the vein making was complete.

THE general law of the jungle finds its counterpart in the Yukon region in the unwritten law of the cache. An explorer may hang his coat, boots, accoutrements or any personal belongings in a tree, and find them there when he returns, even if weeks have elapsed. A cache of provisions is similarly respected, with the modification that a hungry man may open it and take food sufficient for his needs, first building a fire as an indication that no secrecy in the place is intended. In many other sections of the United States the latch-string is significant of singular communism. A settler's cabin in any emergency is more or less the cabin of any person in distress who may pass that way. If the settler be absent, the traveler may enter and make himself at home as his needs may require, always holding himself responsible for the proper appreciation of the privilege.

PETROLEUM and its derivatives are unable to rise in the geological scale from one porous formation to another. The principal deposits are hermetically sealed in the strata that contains them. The so-called "surface indications" of gas and oil are principally due to the numberless fractures through falls by which the contents of the porous rock can reach the surface. If it is possible for this prisoned gas to escape in any measurable degree, then the present figures must indicate the remainder of pressure after millions of years of waste. If it has ever escaped it is escaping now; if escaping now the pressure must be steadily falling unless through a constant replenishment. The facts do not seem consistent that any freedom of ascent of the bituminous series from stratum to stratum. In all accumulations of oil and gas the structure or arrangement of the strata involved is the dominant feature, and this controlling influence becomes more and more clear as the gas and oil fields of the world are adequately studied. It is probable that in the fields where salt water rises from deeply porous rocks under artesian pressure the same pressure will be exerted on the gas and oil which with the salt water are the joint tenants of the rock. Doubtless the rock pressure of gas wells in certain districts is due to the salt water that follows the gas, and it can be measured by the height to which this water rises above the gas reservoir.

THE value of a water power depends upon a variety of elements; numerous conditions may reduce its value. The essential points to be considered are as follows: Quantity of water during a dry year; uniformity of flow during the year, considering the storage capacity, natural and artificial; head of fall; conditions which fix the expense of building dam and canal, and flowage of land; conditions which affect the cost of foundations for buildings; geological conditions which determine the permanency of the fall; freight charges for fuel, supplies, raw materials and finished product; how much low-pressure steam can be used for heating purposes, and whether exhaust steam can be used for those purposes; if water is needed for other purposes than power, and in what quantities; the greater uniformity of speed with steam than with water power. The value of a variable power is usually very little if its variation is very great, unless it is to be supplemented by a steam plant. It is of value then only when the cost per H. P. for the double plant is less than the cost of steam power under the same conditions for a permanent power. The value of a developed water power is usually as follows: If the power can be run cheaper than steam the value is that of the power, plus the cost of plant, less depreciation. If it cannot be run as cheaply as steam, considering its cost, etc., the value of the power itself is nothing except in connection with possibilities in the direction of electricity or compressed air; but the value of the plant is such a sum as could be paid for it new, which would bring the total cost of running down to the cost of steam power, less depreciation. That is, it is worth just what can be got out of the plant, and no more.

FURTHER Japanese mining statistics in addition to those published last week show that the gold production in 1896 reached 28,300 ounces. The nineteen existing gold mines are partly in the Emperor's possessions, partly in that of private parties. The most important are those of Sado and Ikuno. Latterly gold has been discovered near Niko, which may become the center of the Japanese production of precious metals, since, besides gold, silver-lead ore has been found. By virtue of the Japanese laws, foreigners are permitted to participate in mining undertakings. Silver is found in forty-five places in Japan, and in 1896 afforded a yield of 1,500,000 ounces—an increase of almost 650,000 ounces since 1893. There are at present seventy copper mines. During the fiscal year ending June 30, '98, 35,000,000 catties, or about 500,000 centners of copper, valued at 5,800,000 yen (about $3,000,000), were mined. Since 1875 the copper production has increased about ninefold. Most copper is sent to Hongkong, thence to China and to England, the total export amounting to 350,000 centners, *i. e.*, five-sevenths of the whole production. Coal mining has, since the war, risen to about 1,500,000 tons, and in 1897 more than 2,000,000 tons of coal, valued at about $6,000,000, were exported. The companies carrying on coal mining are in good financial condition. Altogether there are 120 coal mines, of which, however, only about 50 are of any importance. The most productive is the Miike mine, in the province of Chikugo, yielding 600,000 tons per annum. A new coal field was discovered in 1895, and work has now been commenced on it. It is situated in the province of Iburi, on the river Mukawagawa, and is said to contain 40,000,000 tons above, and 30,000,000 tons below, the level of the sea. Aside from this last discovery, however, it has been computed that the coal stores of Japan, at the present rate of production, will be exhausted in forty-five years.

"Fatigue" of a Stamp Stem.

Assuming that the term, the "fatigue of a metal," means that state where relaxation of the cohesion of the particles begins to take place, which, in its effects and consequences, is the incipient stage of beginning fracture, it can be further assumed that this relaxation of cohesion or fatigue takes place at the weakest point of the structure. It is immaterial whether the weakness is caused by the design of the structure or inherent defects of the metal. Let us apply the foregoing to a stamp stem in service. We are told that stamp stems break close to the head; that they break less freely if care is taken in their use or if a cloth is wound around the stem before forcing on the head. Let us assume the stamp to be a solid cylinder of uniform dimensions throughout, without any head, and the metal be of ideal condition in every part. If this stamp strikes the ore in its descent the under or horizontal face receives a blow and vibrates the particles forming the surface of the stem. The blow being more violent than the under layers or head can absorb, the vibratory motion is continued through the length of the stamp, is conducted away and distributed uniformly throughout the mass. In a case like this the stamp will last longest, other things being equal, and the point of relaxation of cohesion—that is, fatigue—may appear anywhere.

In the case of a stamp with a head, the stem is evidently taxed more than the head in its efforts to relieve the head of the vibrations set up by the blows. The head presenting a larger surface there are a comparatively larger number of vibrations set up than the stem can conveniently conduct away or take care of. As a consequence there is a crowding and pushing at the point where the vibrations leave the head and enter the stem. This results in irregular, in cross and counter motions of the particles at that place, and fatigue must take place long before the upper part of the stem is affected. Let us consider the third case of a stamp striking one-sided, thus causing an excessive vibratory motion of the particle on one side of the stamp, overstraining the metal in one part and causing fatigue much sooner. But we have been told that stamp stems break sometimes near the weld if they are cut off and welded together. It is said that the stem then generally breaks at about 1 foot from the weld. Now, unless the stem is carefully annealed and slowly cooled after welding, it is obvious that outside the welded part, which was thoroughly hammered in order to insure a good weld, there must be a different structure of the metal, due to the comparatively high heat necessary to make a weld, but the effects of which were not removed by subsequent hammering, as in the welded part itself.

It matters but little whether the metal, 1 foot from the weld, was at a blue, black, or white heat. The structure at that part of the stem was undoubtedly in a highly agitated and disturbed state during the process of welding. This disturbed state of the particles was hindered from assuming its normal condition by the difference in structure of the hammered portion; hence the stem was weakest in that portion, and the subsequent vibrations, due to work done by the stem, tended to a relaxation of the cohesive force, or, in other words, fatigued that portion of the stem even sooner than at the junction of the head with the stem. This last proposition, if correct in its reasoning, is also the key to such breakages of stamp stems which may be due to flaws or irregularity of structure, and which act as an obstacle to the vibrations to be conducted freely and unobstructed from particle to particle.

Having now considered what we might possibly comprehend under the term fatigue of a metal—that is, a relaxation of the cohesive force holding the particles together; an incipient loosening of the tie which holds them all together by common interests; a slowly letting go of each other's hands, as it were, and a getting tired of standing firmly and immovably shoulder to shoulder to resist the common enemy, who is incessantly hammering away at the solid phalanx of defenders of strength to make a breach, a break and a wreck. This being so, we are now ready to examine the effects produced on the appearance of a fracture of a stamp stem.

A pulling strain carried to the point of rupture will tend to break up any existing crystalline structure of the metal strained and make coarse crystals finer or produce an amorphous structure. Hence the fractures of tension pieces are, as a rule, amorphous or finely granular. Compressive forces do not and cannot well have this modifying influence on those particles on which the force acts, and hence a transverse fracture of a stamp stem or like structure will show the natural "grain" of the metal. However fibrous the stem may have been there must be, from the nature of the thing, a granular fracture, because the compressive force absolutely prevents the extension in a vertical direction of the fiber, and since the zone of most fatigued metal lies at right angles to the central or tension line of the stem or axle, or stud or piston rod, the fracture must be a transverse section and representation of the fiber, or the face of the crystal, if the structure was crystalline; and since a fiber in a piece of iron is nothing but the elongated crystal in the puddle ball, its transverse section must be the size of the fiber and cannot be larger. Should the fracture exhibit a large "grain" or a so-called crystalline fracture, then we may safely assume that there was some high heating and slow cooling done with that stem or the iron is coldshort, or both. From the foregoing we may draw the conclusion that it is the fatigue of the metal at its most unfavorable point which induces fracture, and the crystalline appearance of this fracture is merely an incident, a circumstance of the force applied and the design of the stamp, or of its unequal structure, as the case may be; as, for instance, when it breaks near the weld.

There is reason to suppose that annealing of a stamp stem after, say, six months, would largely prevent its early breaking. Careful annealing and slow cooling is a wonderful corrective of irregularities in metals, and it would seem as if the heat shows the particles of a metal to rearrange themselves according to laws of which we know little.

Electrical Transformers.

Under the title "Transformer Design and Operation" the General Electric Company has issued in pamphlet form two important papers on the subject of electrical transformers—one, from the standpoint of the central station manager, by W. F. White, Gen. Mgr. Omaha, Neb., Electric Light & Power Company; the other, by Prof. Elwell Goldsborough, M. E., deals intimately with the question of transformer economy. The first paper, which was read before the American Institute of Electrical Engineers, is the record of long personal experience with the operation of transformers under actual commercial conditions, showing the relation of the many losses, incident to the use of many small transformers, to the earning capacity of the plant, and the tangible economies realized as the result of the substitution of a few high-efficiency transformers of large capacity. Mr. White gives examples of these economies reduced to dollars and cents. In his station a saving of $6000 per annum in the cost of coal alone was realized as the result of the practical application of lessons drawn from his extended observation and experience.

Prof. Goldsborough's paper was read before the National Electric Light Association and treats of the inherent economy of transformers of various design and construction. It contains many arguments in favor of the use of high-grade transformers, and emphasizes the necessity of frequent tests as the only means of detecting leaks, losses and the general depreciation of transformers. Prof. Goldsborough urges upon station managers the wisdom of keeping as vigilant a watch upon the efficiency of their transforming apparatus as upon the items of operating expense and maintenance, if economical results are to be obtained.

To these papers the General Electric Company has added several maps, showing graphically the significance of the substitution of a few large transformers for a few small ones. The pamphlet is, as usual, well printed and illustrated, and should find a prominent place in the literature of every alternating current station and every educational institution. It will be sent free by the General Electric Company, Claus Spreckels Bldg., San Francisco.

Gilsonite in Utah.

Uintaite (gilsonite) belongs to the group of hydrocarbons. It is in color black, the streak and powder being brown. Its luster is brilliant and retained after melting. It is easily fusible in candle flame, and acts like sealing wax, adhering more closely than the wax, however, to cold paper. It is readily soluble in heavy oils and fats, but is less so in lighter oils. In turpentine it is soluble readily when the oil is hot, but less so when cool. In carbon di-sulphide it is entirely soluble, and it is also soluble in alcohol up to 54.6 per cent. In either it dissolves slowly when in powder. It is a non-conductor of electricity and is electrically excited by friction. The principal uses for the gilsonite are: For preventing electrolytic action on iron plates of ship bottoms; for coating barbed-wire fences, etc.; for coating sea walls of brick or masonry; for covering paving brick; for acid-proof lining for chemical tanks; for roofing pitch; for insulating electric wires; for smoke-stack paint; for lubricants for heavy machinery; for preserving iron pipes from corrosion and acids; as a substitute for rubber. The largest known deposit is in the Uncompahgre Indian reservation, Utah, where it occurs in numerous veins from 3 to 13 feet wide, not solid between the wall rocks, but interspersed with frequent breaks of barren rock. It is mined by ordinary pick work, about two tons being a fair day's labor. Mining it costs about $1 per ton. Its dust is exceedingly annoying to the miner, and, mixed with air, is explosive. It is shipped principally to Chicago and St. Louis, where it costs, laid down, about $35 per ton, the price being from $45 to $50 per ton.

California at the 1900 Paris Exposition.

To the Editor:—California throughout the world has been recognized as the great gold producer; her output, as yet, has not been equaled, but to-day we are confronted with unfavorable conditions, which call for active work to enable the State to maintain her position as a mineral producer. These unfavorable conditions are: First, partial suppression of hydraulic mining, which formerly produced $1,000,000 per month; second, lack of water, in consequence of the drought; third, lack of capital, for the development of the vast area of mineral lands now known to exist. The first is being gradually reinstated by the intelligent work of the California Miners' Association. The second is beyond man's control, while the third—the lack of capital—is all our own fault, and it is this fault we should start in and correct. The present, we must understand, is an illustrative, an advertising age; if the merchant or manufacturer wants to get the benefits of trade he must advertise his wares and advantages, for the public to ponder over and act upon. If a State wants to build up in population and material wealth, she must put forth evidences of what she may claim for the great benefit of both capital and population. At no exposition in Europe, where any amount of capital is obtainable at 3 per cent per annum, has California been properly placed before the vast mass of people who visit them to see the attractive features, advantages for the investment of capital, as well as the advancement in arts, science and mechanics.

At the Paris Exposition of 1878 there were over 16,000,000 admissions, and this was twenty years ago. How much the world has grown since! how much more boldly America stands before all Europe! and how much more important California stands before the eyes of capital, facing as she does the "Far East" and the Pacific ocean—the coming field of commercial greatness! California, with her 800 miles of sea coast, must take her position, in this new period, as pre-eminent on the Pacific; to do this we must step forward, and "wake up" to the advantages to be gained through the coming exposition by letting the world know what we have for capital to engage in, and population to be benefitted from. To the Paris Exposition of 1900 there will possibly be 30,000,000 visitors; the advantages of placing our State before such a vast concourse of people needs no comment; the benefit is apparent, especially when we can show that we have only commenced to mine for gold, that we have mountains of iron, and enough copper undeveloped to line the "Far East" with the West. Metallic wealth, and the development of it, means business progress and prosperity for every pursuit outside of it. It means more population for the farmer, merchant and manufacturer to supply. It means more commerce, more interchange of products. I speak of minerals, as in their great variety they are attractive to the multitude and draw more largely on capital than anything outside of U. S. bonds, but the argument as to display applies to all our products. The opening of the 20th century is a propitious period for California's second step in material progress. Fifty years ago the pioneer commenced the carving out of her destiny, the result of his labor is before us, and now it is for the native sons to take the future and place before the European world what we have, and what the possibilities are with ample climate and immigration. No matter how old, we are all kindergarten scholars, as what we see impresses our minds, while what we read is fleeting. Hence, we should impress by display. Much must be done for California to maintain her status. We must remember she will stand in a field of the many States of this great American Union. What should be done, by the way of appropriations, for the coming great exposition, our legislators no doubt will fully canvass; it is not my province here to even suggest, but I will say the occasion and the new era now dawning calls for no meager sum; we should show that we grasp the present advantage and the future's expansion.

I speak of a new era. Is it not a new era for the Pacific States when we realize the fact that over Hawaii, the Ladrones and the Philippines will float the stars and stripes, giving a guarantee for future great activity in all departments of industry? Under such an outlook for business, it is not for our legislators to figure closely, but to think and act broadly. A liberal appropriation for a proper display at the exposition of 1900 will, no doubt, receive the approbation of the people, while a meager one will be derided as mere pretence. Let us do credit to ourselves.

Almarin B. Paul.

San Francisco, Cal., Jan. 3rd, '99.

The bringing into use of the heavy steel railroad car has done much to increase the consumption of steel, as heavier tracks have become a necessity and the wooden bridges which have been in use so long in many parts of the country are giving way to steel bridges. Figures at hand show that almost 800,000 tons of steel was used during the year in replacing lighter wooden bridges, and the change has but begun. Lately, too, piping and tubing of all kinds have been made of steel, until it is estimated that

about 75 per cent of the entire production of the country is of steel. The old lapweld joint is a thing of the past, and steel tubes have been found to be more durable in every way.

Temperature of Battery Water, Etc.

TO THE EDITOR:—I have noticed several articles lately in your paper regarding the proper temperature of the water for amalgamation in batteries. I will state briefly my own experience in this matter through a period of thirty-five years, not only in battery but also in pan amalgamation.

Your correspondents at Baker City, Or., and Sonora, Cal., advocate a high temperature as essential to effect proper amalgamation. The most careful tests made by myself in a battery mill in California and pan mill in Nevada proved conclusively that the amalgamation was not in the least promoted by heat between the range of 40° and 90° Fahr. This is in accord with the well-known fact that chemical action is promoted by heat, but it does not apply to an amalgam which is not a chemical combination, but a mechanical compound—an alloy.

The tests were as follows: In the 10-stamp Big Canyon Creek mill one battery of five stamps was supplied with water of natural temperature (40°), and the other battery with water heated in furnace to 90°. The ore was thoroughly mixed and the shovelfuls fed alternately to the batteries.

This test was continued for five days, and I will add here that the gold was free—quite free—and readily yielded to amalgamation. There was no difference in the result per ton of ore. If there was any advantage to either mode, it was for the water at 40°, for the reason that with warm water (90°) the quicksilver on the plates was found to trickle and flow away, and it required close and constant attention to prevent loss from that cause; and for the additional reason that warm water at 80° to 90° was also found to deleteriously affect the outside plates by the formation of oxide of copper, which seldom occurred in the use of cold water, and then only in slight degree. And this bad effect had to be closely guarded against to prevent any serious loss.

In pan amalgamation on the Comstock ores we soon found that high heat (180° to 185°) was required. This was necessary not because it promoted amalgamation, but for the purpose of effecting the decomposition and reaction of the chemicals used (chloride of sodium and sulphate of copper in the presence of sulphide of silver, mercury and the iron of the pan).

On free gold ores worked by the pan process I could not discover any increase in the yield of gold by using warm or hot water. I made long-continued comparative tests for the purpose of reaching a conclusion, with the result stated. These pan tests were made under the same conditions, viz., on the same ore, in two pans of the same size and construction, having the same speed and time of charge, and the same degree of thickness of the pulp, the only difference being that one was cold and the other hot.

I will say nothing more on the question of temperature as affecting amalgamation, but will pass to a point made by your correspondent in the same article, to-wit: that the brush or broom, when used on the outside plates of a battery, should be drawn lengthwise of the plates. This statement is an error for obvious reasons. He used his brush or broom in the wrong direction. The broom should be drawn across the plates, so as to form slight ridges, which serve to catch and hold the particles of free gold, especially the fine gold, as they flow down and across the edges of the ridges or corrugations. The effect is exactly the reverse if the brooms are drawn longitudinally from bottom to top of the plates. The gold particles in such case flow down the hollows or troughs formed by the brooms, and not over the ridges. The difference in result is very observable in favor of the cross movement as shown by careful comparative trials of two 5-stamp batteries.

Sonora, Cal., Dec. 26th, '98. LOUIS BLANDING.

How Aluminum is Produced.

Aluminum is now made at Niagara Falls about as cheap as brass, bulk for bulk, but not pound for pound, for aluminum is very light, its specific gravity being only about one-third that of iron. Native aluminum is found in clay and silicate, mixed with red oxide of iron. When separated from other substances it is a white powder. Electricity is the chief factor in the production of metallic aluminum. The powdered aluminum is placed in vats lined with carbon. Immediately over the vat is constructed a metal framework, through which are constructed a number of carbon rods 18 and 20 inches long and from 2 to 2½ inches in diameter. This framework is insulated electrically from the iron crucibles. The framework and the carbons are connected with the positive conductor of the electric current, and the vat or crucible with the negative.

These conductors are 1 foot wide and 1 inch thick, they carry a current equal to 3050 H. P., of great volume, but very low voltage, the electro-motive force at each vat or crucible being only about seven volts. As the process is electrolytic, and not simply a heating process, the direct current must be used and therefore must be transformed twice, first to bring it to a proper voltage, and second to change it from an alternating to a direct current. These iron vats or crucibles are connected in series, electrically, and then filled with the alumina and other materials, which act either as a flux and as a means of increasing the conductivity of the mixture. When all the crucibles are filled with the mixture the current is turned on and kept on continuously, day and night, seven days in the week. All of the materials in the different crucibles are heated to redness when the process of separation takes place. The oxygen of the alumina is thrown off as gas, and other residuum floats to the top of the crucible and is skimmed off. Metallic aluminum in a melted state sinks to the bottom of the crucible, where it is dipped out from time to time with large iron ladles and poured into sand and molded into blocks similar to that of pig iron. Aluminum is most useful as an alloy with other metals; it being extensively used in many directions, and would be vastly more used except that up to date no satisfactory way has been discovered to solder it. In different compounds it is estimated that aluminum forms about one-twelfth of the crust of the earth.

Treatment of Mercury and of Battery Plates.

TO THE EDITOR:—It is gratifying to note the tendency of men skilled and experienced in stamp mill practice to give to their co-workers the benefit of their knowledge of the subject. To them its rapid advancement during the past fifteen years is largely due, and not to those who strive to appear wise as the work-ox with the concealed knowledge of mysterious nostrums which each considers his exclusively.

The warning given in your issue of Dec. 3rd is heartily seconded by the writer of the article therein referred to. The suggested possibility of some of the acid used in cleaning the mercury finding its way to the amalgamated plates seems to warrant giving more details of the method used, which were omitted for brevity's sake. The mercury in a shallow vessel was covered to the depth of about half an inch with a solution of one part nitric acid to three parts water. This was allowed to stand from six to ten hours, when it was poured off, and the mercury thoroughly washed by submerging in it the end of a small hose and carefully turning on a small amount of water, which was allowed to flow over the edges of the vessel into a pan, in which it was placed to catch any particles that might escape. The mercury was then covered by a solution of one ounce of cyanide of potassium to two quarts of water to the same depth as before. This was allowed to remain about ten hours, poured off, and a fresh but weaker cyanide solution used, to barely cover the mercury until it was used. It was then impossible for any trace of the acid to reach the plates, where it certainly would have a ruinous effect.

A strong solution of cyanide of potassium is nearly as bad; though it is less generally used than before the introduction of the cyanide process, by which its solvent action on gold became more generally known.

Occasionally, however, we meet with a mill man who still clings to its use for removing the green oxide of copper which appears on plates too thinly covered with amalgam, or silver plating. The remedy will be found to be worse for the plates than the evil it is intended to cure, for, by its continued use, the plates will soon become so "hard" that the mercury will not adhere to them, but gather in globules, and finally disappear with the pulp passing over them.

Cyanide solution, when used on plates, should be so weak as to barely show its repellant action on their surface. In fact, save in exceptional cases, we believe the less used the better for final results. A saturated solution in a bottle, conspicuously labeled, will be found convenient when cyanide is needed, as a very small amount of this added to some water will make a solution as strong as should be used on the plates.

Feeding lumps of cyanide of potassium in the mortars is another pernicious practice still followed by some mill men, by which a portion of the gold is dissolved, and, passing off in the water, escapes detection by the ordinary assay of the tailings. The interesting article by Mr. Matt W. Alderson, in your issue of Oct. 29th, seems to support this view. We know of mills in which a marked discrepancy appeared between the assays of ore and tailings, and the amount of amalgam won, which gave rise to suspicions of the millmen's honesty. Investigation disclosed the fact that they had been feeding lump cyanide in the mortar at frequent intervals. In two recent instances we know that this discrepancy disappeared when the practice was stopped. The mill man had not known his reputation for honesty, as well as skill, was being dissolved along with the gold by cyanide of potassium fed in the mortars.

Baker City, Or., Dec. 25th, '98. MILLMAN.

Not a Sucked Orange.

TO THE EDITOR:—At a recent gathering of representative and influential men of California in San Francisco, no less a personage than President Jordan of Stanford University made the following statement: "In a few years Alaska will have no resources left. Then we may throw it away, like a sucked orange."

Not one voice was raised to challenge this assertion, though among those present was Senator Perkins, whose interests lie largely in this country. President Jordan commands my highest admiration for his great ability, and his statements usually are indisputable, but in this he is most certainly mistaken.

Can he deliberately say that "in a few years" the fisheries of this vast country will be exhausted? If, as a scientist, he can say this, then those who have invested their millions in this business had better begin to dispose of their holdings.

Upon the matter of the mining interests here I speak with less hesitancy. Any one acquainted, even superficially, with the mining industry of the coast portion of this district will recognize the indisputable fact that in a thousand years of active work the extraction of the precious metals from the mountains of Alaska will have but commenced. From the conditions existing in Alaska the development of all its resources, mining more especially, must proceed slowly, and for that reason they will last the longer; but, if we may judge the future by the past, we may confidently expect that Alaska will continue to pour into our common country increasing streams of gold for many centuries to come.

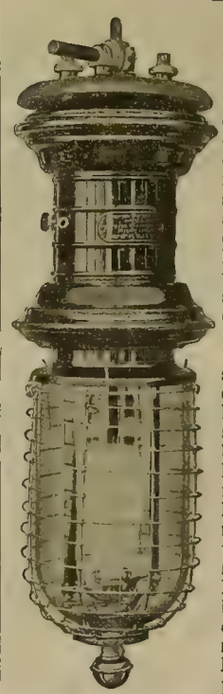
Then the timber wealth of this country must not be ignored. It is now little thought of because of the supplies of better timber nearer the markets of the world, but, in time, the practically inexhaustible supplies of timber in this district will prove of inestimable value.

Dr. Jordan surely does not intentionally desire to injure Alaska, but his statement will carry with it such authority that many will be influenced to our hurt. Great men cannot be too careful of their facts when making positive statements.

N. S. TROWBRIDGE.

Sumdum, Alaska, Dec. 10th, '98.

Marine Enclosed Arc Lamp.



Adequate electric illumination of wharves, docks, warehouses, dry docks, ship yards, with their adjacent iron working shops, and the holds of vessels, while loading or discharging, demands a type of lamp somewhat different from that used for street or store lighting. It must be strong, compact and durable, or it will not withstand the hard usage which such service will naturally give it. It should give a large volume of clear, white light, which will not dazzle the eyes of the workmen nor throw heavy shadows in already obscure corners; it should require little attention, and be so simple that it can be attended by an average lamp trimmer; lastly, it should require trimming not daily, but only at long intervals. A lamp which meets these requirements is the marine enclosed arc lamp, manufactured by the General Electric Company. It has been made the object of special design to adapt it to marine usage on shipboard or land. The mechanism is compact, simple and reliable, and is protected from injury or the effects of the weather by a stout metal casing. It is only necessary to renew the upper or long carbon once in 100 to 150 hours, the lower carbon, after the first run, being the unburnt remainder of the upper carbon. With open arc lamps it was necessary to renew the carbons daily. The outer globe, shown as of clear glass in the illustration, is cylindrical in shape, of glass, and protected from injury by a heavy wire guard. The globe can be lowered by a half turn of the thumbscrew at the side, and when pushed back in position is automatically and securely locked. The lamp is only 28 inches long. It can be carried from place to place if necessary, and hung by the metal ring at the top to any convenient hook, or may be permanently fixed in place like an ordinary arc lamp. The lamp can be used on a 110-volt circuit and can be adjusted for 4. 4 5, or 5 amperes, the latter being the standard. Many of these marine lamps have been installed in locations such as those mentioned above, and have given satisfactory service.

Mining Summary.

ARIZONA.

Development continues at the Del Monte group of thirty-seven claims near Harrisburg, owned by the American Exploration Co. A large amount of ore is on the dump.——A number of claims are being developed in Mesquite district, near Yuma. The Bay Horse Co., it is said, proposes to soon run a pipe line to the Colorado river, eighteen miles, and erect a stamp mill.——Last week the new copper smelter of the Azurite Mining Co., near Tucson, was blown in and is turning out eight tons of ingots daily. The company owns a number of claims and has developed sufficient ore to justify immediate erection of a fifty-ton stack in addition to that of thirty tons capacity, which they now have ——Two copper smelters have recently started in Pima county which give a combined yield of ten to fifteen tons of bullion daily. It is believed the Rosemont and Duquesne will be in operation during the year, and the output of both combined will be no less than twenty tons daily.

Globe *Times*: On the Lucky Charlie property, Pinto Creek, a tunnel 240 feet has been run on ledge matter and low-grade copper ore. Ore which assays 16 per cent copper, $8 in gold and two ounces in silver has been found. ——In the Brewery mine development work is 300 feet.——In the Pinto mining claim the assays average 15 per cent copper and $6 in gold ——The Great Republic group has 200 feet of work done.

Bisbee *Orb*: The Cochise Copper Co.'s claims, near Bisbee, have three eight-hour shifts sinking a shaft. Several small bodies of oxide of copper and iron ore have been found the past few days.

Phœnix *Republican*: The Helvetia mine in the Santa Ritas near Tucson was transferred last week to the Calumet-Hecla Co., Mr. T. H. Dwyer of El Paso, acting as agent for the Michigan Co., for $50,000, of which $5000 was paid down. There are twenty-seven copper claims included in the property. Ore in value 40 and 50 per cent has been shipped during the 80's from the Helvetia, and the body to-day shows ore averaging 15 per cent. The Helvetia has been fairly well developed in the past twelve years. The Michigan Co. will put $100,000 in on further development before a plant is established.

CALIFORNIA.

Amador.

A good strike was made in the Valparaiso mine near Jackson last week.——Sinking, drifting and shaft repairing are in progress at the Zeila mine.——Drifting is in progress at the Amelia mine.——The temporary hoist for the new shaft at the Kennedy mine is approaching completion, and sinking is in progress. It is stated that a depth of 3200 feet is to be reached by the new shaft.——At the Amador Queen No. 2 the shaft is down 400 feet below the tunnel level and 740 feet below the surface workings. Sinking continues.

Sutter Creek *Record*: At the Oneida mine near Jackson the shaft is down over 1700 feet. ——The Potazuba mine last week completed a crushing of 180 tons of ore at the Baliol mill; result, $7000—$500 in sulphurets. —— Supt. Thomas has put on a crew at the Central Eureka and will unwater the mine.——At the Wildman – Mahoney the Emerson shaft is down 370 feet. The big reservoir is nearly completed. The company has laid 1800 feet of 22 and 18-inch iron pipe.——At the Keystone at Amador City a 32 H. P. gasoline engine will furnish power to run twenty stamps. The forty stamps are running.——Four men are doing work at the Gover mine near Amador City.

Calaveras.

The Utica mine, at Angels, is running on full time. C. D. Lane, one of the owners, is superintending operations. The company is sinking a shaft between the Madison and Gold Cliff properties for the purpose of working the former, as the old shaft can no longer be used. The new shaft will be sunk 2000 feet.

Mokelumne Hill *Chronicle*: The Moser mine, near Mokelumne Hill, has been bonded to the Demarest M. Co. of Angels, and operations are to begin at once.——Operations have been resumed at the Green Mountain hydraulic mine in Chili gulch.

El Dorado.

The recent crushing of 500 tons of ore at the Sunrise mine, at Kelsey, yielded satisfactory returns.——Unwatering the Grand Victory was finished last week, and as soon as the cold weather is ended the mill will be started up.

Placerville *Nugget*: At Sand Mountain the Blue Bird mine is again started. Their 10-stamp mill is running full time on paying rock, after several years of idleness.——W. H. Hall is opening the Jaspar mine, near Lotus, with good prospects.

Fresno.

Ore in the Copper King mine, thirty miles east of Fresno, is now reported rich enough in gold to pay for the smelting of the copper. The Heiskell copper mine, eighteen miles north from that city, is being developed. Thirty miles from Fresno the Donahoe dredger is now at work.

Inyo.

(Special Correspondence).—The Ratcliffe M. Co. have for some time been developing a property which is yielding fair returns. They have sunk several shafts and opened a ledge that is over 5 feet wide and plates $15 a ton. The company is building a 10-stamp mill, which will soon be in operation. Steam power will be used. The property is near Ballarat. The gold belt that has been opened here in the Panamint mountains is about twenty miles long, and the encouraging prospects are rewarding the people who are developing the mining interests of this section.

Ballarat, Jan. 2d, '99.

Kern.

Chase & Co. have a group of claims near Randsburg in which have been opened paying ledges on each of the claims and on one of them, the McKinley, there are three.——The Little Butte is taking out high-grade rock, which is being worked in the company's mill, and the low-grade is being shipped to Barstow with satisfactory results.——The Ruby mine keeps fifteen men at work and has blocked out about 900 tons of ore which will be shipped to Barstow this month.——The Eureka mill has been running day and night the past month on Panamint, Stringer and G. B. rock, and has turned out several thousand dollars in bullion. The mill is now busy with low-grade ore from the Wedge.——The Cuddeback mill concluded its run last week on fifty tons of Black Hawk ore, which netted about $15 a ton.——Machinery for the big Harrison plant at Panamint is arriving at Johannesburg daily, and from there it is being transported to Panamint by team.——The Johannesburg mill is running on eighty tons of Windy ore, which will probably net $60 per ton.

Randsburg *Miner*: Vice-President Tinker reports the dry concentrator of the Hard Cash near Randsburg a success. The company has bought five additional claims contiguous to the Hard Cash group, which gives the company about 200 acres of mining property in a single group.——De Reamer & Richards are successful in their venture with a cyanide plant at Coso. They have 3000 tons of tailings. Their plant works about eight tons a day and they are clearing $1500 as the result of the first three weeks run. They expect to double their capacity.

Madera.

(Special Correspondence).—The mines of Fine Gold, Coarse Gold and Grub Gulch districts are resuming activity. Assessment work has been thoroughly done.

The Mud Springs mine is sinking below the 400-foot level and is in good ore.——It is reported on good authority that the Abbey mine at Hildreth will be reopened during the coming spring. This mine has produced over $1,000,000. —— The Baker-Henderson mine, near Central Station, has been sold for $8500. Arrangements are being made to resume work at once.——The Waterloo mine at Coarse Gold has started up with twenty men.—— Representatives of a San Francisco company are examining the locations of Aram and Spargur on the Magnet lode, near Central Station, with a view of bonding the property and developing it to a depth of 200 feet.

Gold, Jan. 3rd, '99.

Mariposa.

Mariposa *Gazette*: The Merced G. M. Co.'s mill started up last week and its forty stamps are crushing Mary Harrison ore. It is locally reported that the mine will start up this month.

Nevada.

(Special Correspondence).—There is a reasonable certainty that work will be resumed this spring on the Bullion mines near Grass Valley. The property has been idle eighteen months. It is owned mostly by a San Francisco company.

Work has begun on the Erie Con. mines near Graniteville. The group comprises five claims, one of which was operated through a shaft thirty years ago. The present plan of work will be by tunnel, to cut five parallel ledges at a depth of about 300 feet.

Grass Valley, Jan. 3d, '99.

A company has been organized to develop the Metropolitan mine near Moore's Flat, and work will soon begin.——The new dam near Lowell Hill has been accepted by the U. S. Debris Commissions. It is the property of the Excelsior M. Co. of San Francisco. Everything is in readiness to begin work when water comes.——At Liberty Hill the Liberty Hill mine employs thirty men.

Nevada City *Herald*: At the Eagle Bird, Maybert, mine thirty men and eight power drills are doing development work with encouraging results. In the 300 level they have a ledge 10 feet wide, and at the 600 an ore body was struck recently. This mine is owned by Wilkesbarre, Pa., people.——F. Meister has bonded his claim to a company represented by J. Cohoe. Work will begin on the property at once.——The Gaston Ridge mine, near Graniteville, is running full capacity.——O. M. Eastman struck gravel in his mine.——The Last Chance mine, working under a bond by C. W. Porterfield, is doing development work.——At the Lindsey mine, Maybert, eight men are employed. Chadbourne & Co. of St. Louis are running a tunnel under the old workings which were abandoned fifteen years ago.——Tiernan & Richards have finished another run at the Gray Eagle mine, with good results.

The Grass Valley *Union* says it is locally reported that the Lucky mine, owned by the estate of G. D. McLean, has been sold to E. Creller, who will resume operations upon it in the spring.

Nevada City *Transcript*: Grizzly Ridge district, near Columbia Hill, is receiving new attention in the development of abandoned properties. P. Curnow is taking out good ore.——J. A. Jones continues work with success.——The Grizzly Ridge Co. have encountered a new ledge and have the union of three veins. The tunnel has a depth of 300 feet.—— The Con. St. Gothard Co.'s 20-stamp mill, which was shut down for a few days on account of freezing, is running again.——At the Golconda, Helm, Hothersall & Co. are sinking and drifting.——The upraise in the Live Oak is completed; good ore is being taken out. The ledge is 3 to 4 feet thick.

Grass Valley *Union*: The pipe line from the Spanish mine to the Champion reservoir is completed and the water turned in. It will be utilized for power at the Champion. The pipe line is 3400 feet long.——The price paid for the controlling interest in the Omaha mine to the Empire Co. is locally stated to be $45,000 for 26,000 shares.

Placer.

Auburn *Herald*: Brye, Lozano & Co. have sunk the shaft on the Bellevue 170 feet and have found the same rich shoot of ore they had in the upper levels. They have 125 tons of ore on the dump which will be crushed at the St. Lawrence mill as soon as water can be had. The owners contemplate erecting a mill.——In the Gold Blossom mine, owned by Reed & Wiltsee, the new shaft has reached 437 feet and levels are being driven at 220, 320 and 420 feet. The ore is dumped onto grizzlies, through which the fine dirt drops into a bin below; the balance is put through a rock breaker. From fifty-five to sixty tons of ore are crushed daily and the mill has been running since April 1. Sixty men are employed. The sulphurets are shipped to the Selby Smelting & Lead Co. once a month.—— The Hathaway mine was not obliged to close down on account of the scarcity of water. The drifts are being driven on the 200, 300 and 600 levels. Good ore was recently struck in the 600-foot level. Twenty-four men are on the payroll and the 20-stamp mill is running steadily. —— The shaft at the Marguerite has reached 500 feet depth. At 475 feet a crosscut is being driven.——In the Three Stars mine the shaft is down nearly 700 feet, while a second shaft has reached 300 feet. Machine drills, driven by compressed air, are used and thirty-five men are employed.

Plumas.

From their gravel claim near Quincy, W. S. Bryant & Son in two months took out over $300 in gold.

Riverside.

The old Good Hope mine is said to be again producing rich ore.

San Bernardino.

At Virginia Dale 100 ounces of gold was produced in twenty days from the O. K. mine. There are 800 feet of work done, nearly all in paying ore.——The Rose mine's new shaft at Victor is down over 300 feet and is opened into the 400-foot level of the old works. The management is erecting a cyanide mill with a capacity for sixty tons of ore a day, which will soon be completed.——J. Arbois has a force at work on the Jean mine, in the Virginia Dale district, and is taking out some good ore.—— Reitz & Sherman are running their mill on high-grade ore from the Brooklin.——The Meacham mill is crushing ore from the Noble Grand, and Ferguson's mill on rock from the White Star.——The Deseret G. M. & M. Co. have three mines in working order. They are taking out ore running from $18 to $165 to the ton.——Ore is being taken from the Golden Chariot mine, the Summer Queen and the Gold Belt mines, which assays $235 a ton. The new 2-stamp mill disposes of ten tons of this per day.——J. J. Arbois milled out $1000 in November and December.

San Diego.

The mill on the American Girl mine near Yuma is running on ore yielding from $35 to $40 a ton. This property is owned by a company headed by ex-Gov. Markham.

Shasta.

(Special Correspondence).—The Mt. Shasta mine near Shasta, operated by a San Francisco company, is producing a good grade of ore, most of which is hauled to the smelter at Keswick. The output is large.

Near Keswick a strike of high-grade ore was made last week in the Black Spider mine, which is being developed by local people.

Near Shasta a French company has begun work on the old Phœnix mine, which has a large body of low-grade ore.

Near Whitehouse the Evening Star and Garfield mines are shipping ore by rope tramway to the railroad and thence to the smelter at Keswick.

The outlook for success in mining in this county is encouraging, more so than it has been in twenty years.

Keswick, Jan. 5th, '99.

G Berr is developing the Bavaria and Old Aunt mining claims near Redding. Last week he shipped a carload of ore to the smelter at Keswick.——The new quartz mill on the Washington mine at French Gulch started up last week, crushing rock for leasers. There are about 400 tons of ore on the dump.—— On the Bunker Hill mine near Shasta work of new discovery and development is going on.

The Marina Marsicano Co., composed mostly of San Francisco men, that bought the old Sunny Hill mine and resumed operations, is pushing work in reopening the old property. They have found an ore body and made a two-carload shipment to the Selby smelter. The ledge has been exploited for 300 feet.——The Mount Shasta mine, near Shasta, employs fifty men. The ore is hauled to the smelter at Keswick.——The Salt Creek mine is being extensively developed; twelve men are employed.

Sierra.

B. H. Brown & Co. are making progress at their claim at Chaparral hill. They have the mine timbered in 200 feet, and there remain 100 feet of the old tunnel to be cleaned out.

Downieville *Enterprise*: Fifteen men are employed at the Oriental mine near Alleghany. Work is being pushed. A pump capable of raising 30,000 gallons per hour has been placed.——L. M. Bovee struck an encouraging prospect in his claim near Alleghany.——The Good Year M. Co., near Downieville, has not yet paid the lien-holders, who have over $5000 in judgments against the property. Ten of the lien-holders, under A. Bergen, are doing the assessment work to protect their judgments.——The Cayot Con. quartz mine on Fall river has been bought by a San Francisco company. The new owners intend building a mill soon.——At Forest City, in the South Fork mine good progress is being made.

Siskiyou.

Yreka *News*: On the Commodore mine, near Yreka, tunnel No. 3 is being extended. Sufficient ore is being taken out to keep the 6-stamp mill running.

Yreka *Journal*: J. W. Downing has bought C. Coles' interest in the Klondike mine, near Yreka, and will put men at work.——The Roberts & Jillson mill is running day and night. ——A company has men to work at the Black Jack mine.——J. & G. Main have the Horn mine for next season.——J. Reeder of Fool's Paradise struck a 4-foot ledge in his mine that goes $20 per ton.——The Miner and LaFlesh mill has shut down on account of the water being frozen.——The claims near Honolulu are paying. The China claims will continue work until the high water drives them out.——Jillson & Roberts have been short of water at their quartz mill near Henley, owing to cold weather, and are running five stamps.——The river miners on the Klamath are unable to do much work on account of the cold weather.

Trinity.

W. R. Thomasson of Igo has bought the property of the Squirrel Gulch Placer G. M. Co., near Trinity Center. The property is said to yield from $8 to $10 a day per man.

Tuolumne.

The Merced M. & M. Co. have put an injunction on the Shawmut-Eagle Co., at Jacksonville, and stopped progress on the big ditch, which was being cleaned and repaired. There are gravel deposits in this section that could be worked if this ditch could be opened up, and numerous small placer claims could be worked, and a number of low-grade quartz mines could be operated that cannot be profitably worked by steam power.

Jamestown *Magnet*: At the Columbia E. & T. Co. near Columbia progress is made; bottom of the gravel bed has not yet been reached. The company is satisfied with the prospects.——At the Anaconda mine sinking has resumed.——Good rock has been struck in the old Experimental mine near Columbia. ——Five men were put to work at the App mine last week. It is calculated that it will take ten days to unwater the mine.——During the idleness of the Santa Ysabel mine, caused by the lack of water, development has progressed. A body of ore has been opened on No. 4 level of No. 1 shaft.——In the Dutch mine on the 8th level they are stoping in the new ore body. The mill is running steadily on a fair grade of ore, steam power being used. The management has decided to add twenty additional stamps, making a total of forty. It has also been decided to use electricity for power as soon as the Tuolumne Power Plant Co. starts up. Supt. Trittenbach is shipping three carloads of sulphurets monthly.——The Mexican Co. is preparing to develop its mines at Big Creek on an extensive scale. The new machinery will soon be in working order.—— The Elgin mine is being worked by the Argili Bros. A large arrastra has been erected.—— At the Longfellow mine the mill will soon be running again.——At the Big Oak Flat mines Nos. 1 and 2 a new 10-stamp mill is being put up. A new shaft is being sunk on the No. 2 and a body of sulphuret ore is being opened up. It is locally stated that ten stamps are soon to be added.——In the Gold Bug mine the ledge is 9 feet wide and will average $6 per ton.——Butternut & Gillespie, in the Boynton mine, have a 24-inch vein that gives an average mill test of $20 per ton.——In the Grapevine mine a chute of mill rock has been opened.——The Hall Bros., from a mill test of twenty tons, obtained $7 a ton in gold and $12 a ton in sulphurets. They have a 3-foot ledge. ——At the Dreisam mine, Arrastraville, they are putting in an air compressor. The company is also putting in water power. The mill is awaiting water.——Work at the Trio mine was resumed last week after a two weeks' shutdown.

Sonora *Independent*: In the Sunshine mine near Sonora the lower tunnel has been driven in 146 feet and the upper one 126 feet. The surface ore assays $11 per ton.——At the Bluebell mine a body of ore which prospects well has been struck.——At the Bonita mine near Grizzly, owned in part by the Fair estate, operations will begin April 1st. They will sink and tap the vein at depth.——At the Goldwine mine the tunnel is in 800 feet. The owners contemplate building a mill next summer.——At the properties of the Ribbon Rock M. Co. the lower tunnel has been run 900 feet. ——Twenty-five men are doing development work at the Grizzly. The 20-stamp mill is running day shift.——Local report says that the Seminole group of mines will put in a new mill this summer.

Sonora *Democrat*: The Philadelphia gravel mines will be started up this month. The new ditch, almost completed, has cost about $25,000. —— The new mill on the Densmore near Columbia is ready for starting up, awaiting water.——At the Buchanan mine eighteen miners are at work. The shaft is down 450 feet.——At the Republic two shifts are drifting at the 200 level. The shaft is down 270 feet.

COLORADO.

BOULDER COUNTY.

The Boulder County mine, near Nederland, was recently sold to the London Expl. Co., for $250,000.

CLEAR CREEK COUNTY.

The Griffith mine, near Silver Plume, shipped about 100 tons of ore last week. The Maxwell & Hood portion of the mine has about 50 feet of ore stripped for a height of 10 or 12 feet, which is about 18 inches in thickness. The mine gives employment to fifty men.——Ore running six ounces of gold to the ton is being taken out of the Gold Dirt mine at Empire.

EAGLE COUNTY.

Ore shipments last week from Red Cliff were nine carloads, making a total for the year of 413 carloads.

EL PASO COUNTY.

The December output from the Modoc, at Victor, is estimated at forty carloads of ore, ten of smelting grade of 7½-ounce value and the remainder about two ounces to the ton. ——Last week a strike was made in the Legal Tender of the Golden Cycle Co. at Goldfield at depth of 600 feet. The vein is 3 feet in width and carries an average value

of two ounces a ton.——The Ocean View, near Victor, has been leased for twelve months for $30,000 to Cummings & Co. An electric hoist will be put on the claim immediately.——The gross value of ore produced the past year from the Hull City Placer is officially placed by the management at $744,760.98, the net smelter returns $581,935.30, and the amount of royalty paid to the company $158,135.19. Dec. 22, the cash on hand amounted to $71,000.

GILPIN COUNTY.

The Denver mint reports the value of bullion received from Gilpin county for the year up to Dec. 23rd: Gold, $732,749 51; silver, $4640 36; total, $737,389.87.——The shipments of smelting ore from Central City for the year were 3587 carloads of ore. Rating the cars at fifteen tons each, there were shipped 53,805 tons.

HINSDALE COUNTY.

Lake City *Times*: Last week an 8-inch streak of copper ore was uncovered in the Cherokee group near Lake City. Six men are at work.

LAKE COUNTY.

On the Vivian shaft of the Nisi Prius M. Co., Leadville, a large body of lead carbonate has been opened up, the grade of which is about $12 net from the smelter.

Seven thousand tons of argentiferous iron, lead carbonate and lead sulphides were shipped the past year from the Carnahan and Keith lease claims of the Iron Silver Mining Co.——The Maid of Erin Silver Mines Co., owning the Henrietta and Maid of Erin, and working the Brooklyn, Clontarf and Moyamensing claims of the Adams M. Co., under lease, produced, during '98, 33,000 tons of ore. This ore is of greater variety than that produced by any other mines in the district, consisting of oxide iron, lead carbonate, iron and copper sulphides carrying values in gold, silver, copper, lead and iron. The lessees are conducting all operations above the 700-foot level.

Leadville *Miner*: Near Leadville the Maid of Erin Silver Mines Co. has resumed work and is shipping 3500 tons per month, worked on the tribute system. The Morning and Evening Star consolidation is worked on the same system, with eighty men employed. The Catalpa Mining Co. is shipping heavily, both steel and fluxing iron.——The Ibex Mining Co. has marketed 100,000 tons of dry, siliceous and iron sulphide ores the past year which carries gold, silver, lead, copper and iron. Two-thirds of the large force is engaged in development and one-third in producing ore. The payroll carries 500 names. The building of the Rio Grande to the mines will cheapen transportation.——The Resurrection G. M. Co. owns more than 500 acres of patented ground. It is shipping 150 tons daily. The D. & R. G. Railroad has been extended to the mines.——From the Little Ellen mine forty tons daily is shipped.

Leadville *Chronicle*: The Ruby mine at Weston Pass is shipping fifteen tons daily of iron ore.——If the pumps at Leadville succeed in lowering the water another 140 feet in the Penrose shaft, the pumping proposition will have been solved. At that point below the present water line are the submerged station pumps, and with those in action in co-operation with the present operating pumps the water can be handled.

Leadville *Miner*: The Ballard group of mines in December marketed $25,000 worth of ore.

MINERAL COUNTY.

Last week the ore shipments from Creede were 149 cars, 2831 tons.——The output for Mineral county for the year ending Dec. 31st, '98, was 111,712 tons. The value of the output was as follows: Silver, $2,396,100; gold, $97,660; lead, $534,205; zinc, $2,000; total, $3,047,955.——J. W. Westlake is pushing work on his Last Chance lease, which is outputting forty tons per day.——The Commodore mine, to transport its output to the smelters, uses fifty ore cars of twenty-five tons capacity. There are 300 miners employed. The tram is run night and day and handles 300 tons of ore every twenty-four hours.

OURAY COUNTY.

It is locally reported that the assignees of the Cleopatra M. & M. Co. at Ouray, are making arrangements to start up the plant. The intention is to clean up the ore on hand, and if the operations warrant they will continue work.——The Camp Bird mine near Ouray put in running order a tramway two and one-half miles in length.

SAN JUAN COUNTY.

Silverton *Standard*: The Ridgway mine, near Silverton, produced in 1898 about $30,000.——The Iowa mine last year milled 27,000 tons of ore, the output of concentrates from which amounted to $295,000.——The Silver Lake mines employ 200 men; they break and mill about 600 tons of ore per month. The tramway has been extended an additional 6000 feet and delivers concentrates from the mill to the railway, 14,700 feet.

SAN MIGUEL COUNTY.

Telluride *Examiner*: The Tomboy mine at Telluride has a force blocking out a portion of ground in the lower level, where an electric hoisting plant will be installed. This accomplished, the company will begin sinking from this level on the vein for exploitation purposes. The mine is easily furnishing all the ore the mill can handle.——The Euclid Avenue M. Co.'s mill started last week on a run of Euclid Avenue ore. The mill is equipped for handling eighteen tons every twenty-four hours until spring, at which time it is the intention to increase its capacity commensurate with the output of the mine. A large two-bucket tram has been built between the mine and the mill. It is a gravity tram, with capacity of about three tons per hour. It is one span, 2700 feet long, the longest single span in Colorado. The Euclid Avenue property consists of five claims. It has a 4-foot vein of ore with 2 to 2½-foot pay streak. A mill run of 100 tons of the ore, made two months ago, plated $15 a ton and yielded a good grade of concentrates.

The Silver Pick mine, near Telluride, in 1898 produced seventy-five cars of concentrates of from ten to twelve tons each and twenty-two cars of crude ore of like tonnage. Each ton of these concentrates contained four tons of crude ore ranging from $40 to $80 a ton in value.——The Nancy Hanks mine at Saw Pit is shipping five cars a week to the smelters.

IDAHO.

S. I. Silverman & Co., who lately bonded the Jumbo claim at the Hump, have let a contract for a 200-foot tunnel and crosscut, work to be started immediately.

At Hailey, the sale of the Cræsus group of mines was made last week for $80,000. The purchasers, represented by W. G. Page of Spokane, are said to be Spokane and Nebraska capitalists. This property in the early eighties was operated for a time, but on account of the crude method of treating the ore, was not a success. It finally passed to H. Lewis, who developed it, uncovering large bodies of ore.

The Jumbo mine, in the Buffalo Hump district, was sold recently to Spokane men for $75,000, of which 12½ per cent was paid down.——Baird, Williams & Rice sold a Buffalo Hump prospect for $6000 cash.——The Big Buffalo is in litigation.

Several big placer mines are being operated on the Snake river, the largest of which is the Cariboo mine, Bingham county, owned by Thomas & Son of Chicago, who are said to have taken out $35,000 this season in eight days. They have twenty-eight miles of ditches, control about 10,000 acres of placer ground and have 10,000 feet of iron pipe, using eight nozzles. Their gravel runs from 6 to 20 feet in depth.

Near Kendrick, E. Johnson bought a half interest in the Mongrove claim. From a mill test of eleven tons he netted $1300. Fourteen men are developing the mine.——At Burke the Mammoth's air compressor will be ready to run Jan. 15th.——At Boise, the strike in the Checkmate mine, at a depth of 250 feet the vein shows ore worth $100 in gold per ton.

Near Lewiston the Iron Crown mine has 200 tons of ore ready to be milled, which will go $50 a ton. The mill is closed down on account of the freeze-up. The company of which W. H. Walp is Supt. contemplates before spring to put in a crusher and new mullers.——Near Moscow a strike was made last week in the Golden Gate mine of a ledge 4 feet thick of high grade ore.

Wallace *Free Press*: The year '98 was a prosperous one for the Cœur d'Alenes. The ore and concentrates shipped during the year will not miss 150,000 tons by many pounds. This mass of ore yielded approximately 180,000,000 pounds of lead, 90 per cent of which the smelters paid for an average price of about $3.60 per cwt. Besides this the mine owners were paid for 4,500,000 ounces of silver at an average price of within a cent or so of 60 cents per ounce. This would make a grand total of $8,000,000 as the output of the district. Of this amount $3,000,000 went for freight and smelter charges, $2,500,000 was paid to the miners as wages and the other $2,500,000 went for repairs, machinery, development work and dividends.

Wallace *Press*: The Tiger-Poorman mine, which made Burke and has kept the town moving in the dullest times, has reached 1800 feet depth below the apex of the ore chute and shows no signs of failure, but is turning out better ore than at most of the higher levels.——The long tunnel upon which the Bunker Hill & Sullivan M. & C. Co. is working is to run to the large ore bodies upon which this company has been working for years, and which have been producing from 500 to 800 tons of ore daily for years past, cutting them 700 feet below the deepest point which has yet been reached in them. This tunnel will be about two miles long and will have cost upwards of $200,000. More than one-half is done. New machinery has been added to the mill costing $50,000.

MONTANA.

The November output of the Montana M. Co., Butte, was 4090 ounces of gold and 20,540 ounces of silver, from 7050 tons of ore crushed and 11,337 tons of tailings from the dams. The tailings plant closed for the winter Dec. 1st. The value of bullion from the 11,337 tons of tailings was $49,100 and the cost of treatment $16,032. The total bullion produced is valued at $93,900; the expenses were $60,800, leaving a net profit of $33,100.

Clancy *Miner*: Butte people have taken a bond on the Golden Gate property near Clancy and will put up a steam hoist and sink the shaft an additional 200 feet, which will make it 400 feet. The Golden Gate is generally regarded by mining men as a good property, and has shipped considerable ore in the past.

NEVADA.

The Cuyahoga M. Co. of Cleveland, O., has bought the Little Bonanza group of gold mines in Alkali district in Smith valley, Lyon Co., for $5000.——The Eastern Slope Gravel M. Co. have taken up eight miles in claims in and about Silver King valley. Tunnels are being run and cabins, roads and a ditch are being built.——The Dexter of Tuscarora last week made a shipment of gold bullion and another of auro-cyanides that amounted to $4000, the result of a run with five stamps. The starting up of the forty stamps is promised within twenty days.——The Comstock Pumping Association the past week has been stripping the pump compartment of old air and small hydraulic pipe. This work is nearly completed. The pump bob on the 1750 level is being taken out and the station repaired. The pump hoist is being put in condition for heavy work. One of the compressors is being prepared for work and all steam pipes in use are being covered. The temporary bulkheads put on the 1650 and 1750 levels are found to be effective.——At Pioche in the Horseshoe claim work is meeting with success and will be continued all winter, and suitable reduction works will be erected in the spring.——J. S. Laken made the final payment on the property of the Tuscarora M. Co. at Tuscarora, amounting to $15,000. The company will sink to a depth of 300 feet and will push the work.——At Ely miners were put at work in the Robust mine last week and sinking the shaft has resumed.——M. Davis has secured a lease on the old Chainman mill and the stamps will be dropping probably within two weeks. A boiler and engine are being installed to furnish power. The cyanide tanks will also be put to use.

NEW MEXICO.

The Copper Hill Co., operating near Rinconado, is working twenty men. The vein is 8 feet wide. The average value is said to be $40. The company contemplates erection of a plant for treatment of the low-grade ore.——The St. Louis United Copper Co., operating near El Paso, is making regular ore shipments to the smelter.——The Cullen mines, near Golden, are shipping regular to the Graves mill.——There are 1000 tons of ore on the dump.——At Socorro the Timber Peak M. Co. has eleven carloads of machinery on the ground for their new Water canyon mill. The process to be used will include both amalgamation and cyanide and the daily capacity will be 150 tons.——The Santa Rita Copper & Iron Co. is shipping five cars of iron ore per day.

Ashton & Roach, leasers on the Romero, are making shipments to the Silver City smelter.——In the Aztec, at Elisabethtown, a 12-foot vein has been found which runs from $8 to $100 per ton. Twenty stamps are at work on this ore.

OREGON.

The Rose Valley Borax Co. has incorporated. The borax mine and works are in Harney county, the headquarters in Reno, Nevada. R. M. Fulton is secretary.

Near Grant's Pass the quartz mine recently developed by Knight & Co., was sold last week to Berry & Rolfe for $2000 cash. The new owners will erect a cyanide plant which will be operated with a new extracting compound, instead of zinc filings as used in similar plants.

Near Baker City, on the Magnolia mine, a chute of ore has been found, exposing 14 feet of ore, 4 feet of which averages $60 per ton. Assays range from $30 to $250 a ton. Fifteen men are employed and development is being pushed.

Baker City *Democrat*: The Deer Lodge M. Co. near Baker City is pushing development work with a view to erecting a big mill plant in the early spring.——Representatives of capital, with a view of introducing dredgers on the gravel beds of Baker and Grant counties, are in Baker City.——It is locally said that the E. & E. mines have adjusted their financial complications. There has been no cessation of operations.

Baker City *Republican*: The Richmond mine near Baker City, consisting of seven claims, has been sold to a French company of Montreal, Canada. E. D. LeClare is Gen. Mgr. The company contemplates erecting a mill in the spring.

Sumpter *News*: D. Weaver, in his Golden Gate group of mines near Robinsonville, is taking out good ore. He has three ledges, one of which is 28 feet wide and assays from $8 to $10 per ton in free gold; another is 4 feet and yields about the same.——The Banzette mine is under lease to Osborn & Co., who are taking out good ore.——Powers & Co. are developing the Tiger mine.——Kelly & Cradlebaugh have a force working their Imperial group.

SOUTH DAKOTA.

The Golden Gate Co., Blacktail district, are daily shippers of twenty tons of ore. Extensive works are planned for this property. Twenty-five men are employed.

At Ragged Top were sold to the American M. Co. nine mining properties for a total of $194,500, payable Dec. 16, 1900. The company will begin work at once. Hoisting machinery will be put in of sufficient capacity to sink 1200 feet. The hoist and boiler will be of 150 H. P. capacity. There is no water in the Dacy shaft at its present depth, 430 feet, but the company expects to put in pumps and air drills later. D. S. Kilpatrick is Pres. of the company.

UTAH.

The South Eureka, at Mammoth, will at once begin sinking the shaft to a depth of 1000 feet.——Recently C. M. Henrotin and his Chicago and Salt Lake associates secured a bond on the Deseret G. M. & M. Co.'s mine in Piute county. Last week the bond, $100,000, was taken up.

Ore shipments from Park City last week were 1,155,830 pounds.

The Park City *Record* learns that the Daly-West Co. has decided to start the mine up with a full force, the long-deferred reconciliation between the incorporation and those who refused to go on with their half of the property has been practically adjusted.

G. B. Langley of Millerville, N. J., bought a half interest in five claims near Bingham for $9000.

Ore running 30 per cent copper, $5 in gold, 35 per cent lead and some silver is found in the Star Con. M. Co. at Tintic.

The Old Telegraph mine at Bingham is shipping 300 tons of first-class ore.——At Sunshine the Sir Victor group consisting of five claims was sold under bond to B. T. Lloyd for $50,000.

It is estimated that about 110,000 tons of ore have been put through the crushers at the Manning mill near Mercur during the year and that the product amounted to $500,000 in gold.——Tanks to increase the capacity of the Daisy mill fifty tons are being built.——The Cannon ground at Mercur was bought last week by J. Dern and associates for $150,000.——Immediately after the transfer arrangements were begun for the incorporation of the property under the name of the Ingot G. M. Co., with a capitalization of $350,000.

At Silver City last week ore was discovered in the property of the Four Aces which assayed 8.2 per cent copper, twenty ounces silver and 40 cents in gold ——In the Alaska at Tintic ore has been exposed at 500 feet depth.——The Lower Mammoth, Tintic, made a good strike in the shaft from the tunnel level at a depth of 500 feet. Samples put through the furnaces show 130 ounces silver, 30 per cent lead, 15 per cent copper and $3 in gold.——The production of ore has begun at the property of the Cuba Co. at Bingham and the first shipment has been made. The ore carries silver, gold and copper of the value of $40 per ton.——The Joe Bowers Extension Co. at Eureka contemplate placing a steam hoist. Their shaft is down 300 feet and crosscutting shows a 40-foot vein, with 18 inches of high-grade ore. Sinking the shaft from the 300 level will be resumed immediately.——The Golden Gate mill at Mercur will be ready to begin operations early next month. Meanwhile the old mill is handling about 300 tons a day.——At Vernal the Uintah Summit is making preparations for extensive shipments and contemplates putting twenty four-horse teams on the road to transport the ore ninety miles to the railroad. The ledge is from 6 to 14 feet. The two carloads that have been shipped returned copper 50 per cent, gold $6, and silver sixteen ounces to the ton.——The Geyser-Marion at Mercur employs 100 men. An average of over 150 tons of ore is going daily through the crushers.——W. A. Clark of Montana, who recently paid $75,000 for the Ophir Hill mine and mill at Ophir, will soon begin the erection of a pyritic smelter. The crude ore in the mines there that has been handled by the former owners in the form of a concentrate contains, on an average, eight ounces silver, 25 cents in gold, 5 per cent copper. Further analysis shows 8 per cent zinc, 20 per cent iron, 20 per cent silica and 40 per cent sulphur.——The Martha Washington M. Co. at Silver City will put in a pump and continue the shaft to a depth of 350 feet.——In the Bullion-Beck at Eureka a streak of good ore has been exposed.

WASHINGTON.

At Republic the Republic M. Co. is erecting an experimental plant for the treatment of tailings. Tanks are being built to receive the tailings direct from the large mill.

Near Tacoma a strike was made at the Leola copper mine recently of a 5-foot vein of ore, which runs 20 per cent copper, twenty ounces of silver and some gold to the ton. The property is owned by Tacoma capitalists.——Extensive placer mining is being conducted on Snake river, though few claims are regularly located, as the gold is found chiefly in small bars that produce about $500 each. This mining is carried on for hundreds of miles on Snake river. Several hundred miners were engaged this year, making from wages up to $20 a day. The Klondike rush caused many Snake river miners to leave, but they are coming back.

WYOMING.

Lander *Clipper*: The Carissa mine, near Lander, is producing good ore. The 10-stamp mill is nearly completed.——The Empire State mine is extracting some fair-grade ore.——The St. Louis mine is being worked under lease by Westfall & Co. The vein is 2 feet wide.——Ferris & Deal last week bought a quarter interest in the Rufedeha copper mine at Battle Lake for $35,000.——Culleton, Nichols & Co. are going in on a vein of copper 8 inches wide of a grade that will pay to mill.——The Charter Oak is getting out a good grade of ore and will soon be producing enough to supply a reduction plant of their own.

FOREIGN.

BRITISH COLUMBIA.

For the half year ending Dec. 31 the Slocan ore shipments will total 18,000 tons, valued at $2,000,000.

The North Star mine, near Fort Steele, a silver-lead property, comprises about 850 acres. Development consists of 1800 feet of 1800 feet of tunnels, shafts and drifts, and about 1200 feet of this is in solid ore, showing a large amount of galena lying nearly flat on a diorite footwall, which carries from 40 to 60 ounces in silver and will average 60 per cent lead. On the Stemwinder, one of the company's claims, a tunnel is being run to tap the ledge at a depth of 1000 feet. The tunnel will be about 4000 feet long.

LOWER CALIFORNIA.

From Ensenada was shipped recently $2300 in gold bullion.——M. Phillips of San Bernardino county has bought an interest in the Juarez placer mines on a valuation of $40,000 for the property. The hydraulic plant on the property cost $12,000. The Piramide Co is also hydraulicking and a third company is working. The placer ground is extensive and averages well.——The Fortuna G M. Co has determined to reopen its mines at Agua Dulce. The 10-stamp mill was started last week. A number of Eastern people interested make complaints that these mines had been operated for stock jobbing and not for legitimate mining. The mines consist of the Fortune, Tesoro, Guadalupe and other properties, which are considered profitable if handled properly.

MEXICO.

The Carmen mine near Hermosillo is working on a vein 4 inches wide of ore running 200 to 300 ounces of silver to the ton.——The Purisima has various veins—one a foot wide running 1000 ounces and another with 200 to 250 ounces of silver to the ton.——La Cruz has been running on ore paying 2400 ounces.

ONTARIO.

The Sultana mine near Rat Portage is locally reported to have been sold by J. F. Caldwell to a British corporation for $2,250,000. The property comprises seventy acres. At 350 feet depth the ledge is said to be 30 feet wide and from top to bottom averages $7 a ton.

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Industrial Notes.

—An iron smelter and foundry is talked of at San Diego, Cal., in connection with the new Japan-China steamship line.

—The City Hall Commission has resigned. The City Hall was to cost $1,000,000. The corner stone was laid Feb. 22, '71. The total cost to date of the building is $5,723,794.18.

—The Los Angeles, Cal., Oil Producers' Trustees ceased operation on Dec. 31. The oil in storage —70,000 gallons—has been turned over to the Oil Storage & Transportation Co.

—The Los Angeles & Pasadena, Cal., Railway Co. has been bought by the Southern Pacific Co. for $1,000,000. The road consists of forty miles of track; extensive improvements will be made.

—San Francisco mint coinage for December, '98, was the largest ever recorded: Double-eagles, $8,053,500; eagles, $690,000; half-eagles, $502,500; half-dollars, $16,000; dollars, $800,000; total, $10,062,000.

—It is understood that the Union Pacific and the Oregon Short Line are back of the Utah & Pacific, and are engineering its way through to the Pacific coast, Los Angeles, Cal., being the presumable objective point.

—During '98 twenty-eight sailing vessels, representing 3506 tons; fifty-seven steam vessels, with a tonnage of 18,564; sixty-two barges of 6704 tons, making a total of 147 vessels and 28,774 tons, were built in the State of Washington.

—The Pittsburg Reduction Co., has a telegram from the Standard Electric Co. ordering 180 more miles of aluminum wire, additional to the first order. This last order will comprise about 240,000 pounds and will cost about $60,000. The company is building an electrical power plant at Snoqualmie Falls, Wash.

—The Krogh Manufacturing Co. of San Francisco suffered severe loss by fire on the 1st inst., their newly fitted up establishment at 9-17 Stevenson street being destroyed. The loss is estimated at $30,000. The firm will continue manufacturing pumps and hydraulic machinery as soon as a new outfit can be set up and, meanwhile, go on with the business at their other establishment, 136-140 Main St., San Francisco.

—In connection with the picture and data of America's biggest locomotive on pages 14 and 15 is interesting to note that on the night of the 2nd inst. began a contest to last for a week between two big locomotives with 7-foot drivers, owned by the Chicago, Burlington & Quincy Railroad and the Chicago & Northwestern Railway, for the fast mail contract between Chicago and Omaha, the prize being the contract for carrying the Oriental mails between Chicago and Omaha, estimated to be worth $1,000,000 a year.

—The progress of manufactures in California is shown in the following:

	Employes.	*Wages paid.*	*Value of Product.*
1860	6,400	$ 5,550,000	$ 23,500,000
1870	25,400	13,136,722	66,593,556
1880	43,700	21,065,905	116,2 8,973
1890	71,000	35,000,000	165 000.000
1900	75,000	38,000,000	190,000,000

—Gen. Mgr. Nevin of the Santa Fe states that through trains from Los Angeles to San Francisco will not be operated on the Valley road until the line has been completed from Stockton.

—Not since the American occupation was there so dry a year in California as '98. Yet, during the past year that State produced of wheat, 5,800,000 centals; wine, 19,000,000 gallons; wool, 26,000,000 pounds; canned fruit, 2,000,000 cases; oranges, 4,640,000 boxes; raisins, 70,000,000 pounds; beet sugar, 55,000,000 pounds; hops, 8,000,000 pounds; dried apricots, 5,500,000 pounds; dried prunes, 70,000,000 pounds; dried peaches, 6,000,000 pounds; made interstate shipments of fresh fruits, 110,000,000 pounds and interstate shipments of dried fruits, 115,000,000 pounds. The exports from San Francisco aggregated $40,000,000.

—Gen. Mgr. Sinclair of the Southern Cal. Power Co., estimates 50,000 H. P. possible of development from mountain streams between San Bernardino mountains and the ocean, not including the Kern river plant. His company is about ready to generate nearly 5000 H. P. The San Gabriel Power Co.'s plant is completed. The Redlands Co. is extending its plant to about double its present capacity. Below the Southern Cal. Co.'s plant A. G. Hubbard is at work on another plant, and below this plant preliminary work is being done on a third. In Lytle creek work is under way on another plant, and two other systems are proposed for the San Gabriel river.

—According to a contemporary, constructors and shipbuilders throughout the East have been investigating the cause of the remarkable record of the Oregon, Olympia and Farragut, and say they have at last found out why these vessels are superior. They were built in a climate of little variation. The thermometer seldom goes below 58 in San Francisco, and seldom above 78. Its normal range is from 58 to 68. Delicate parts of a steamship built in such a climate at different times of the year do not suffer from expansion and contraction, caused by heat and cold. That is, parts of the ship built in summer and in winter fit. Two delicate pieces of mechanism or two plates for the hull, the one built in the winter and the other in summer, are of the same size, and when placed in the ship they expand and contract with heat or cold to the same degree. That is, the variation of climate is so little that the expansion or contraction of the steel is the same the year around, or so very near the same that no difficulty is experienced. In Wilmington, Del., where the Cramps are located, the variations of the thermometer are more than 100 degrees, from zero to 104. It may thus be seen that machinery constructed in the winter at zero would not fit that constructed in the summer at 104 above. The pieces which are delicate, notwithstanding their great weight, will not fit. This is a recognized principle among Eastern shipbuilders. They have never been able to figure the contraction and the expansion to such a nicety that they could overcome the bad results.

Personal.

S. W. DORSEY is examining mining property near Phœnix, Arizona.

E. M. RAY becomes Supt. Hull City P. M. Co., Cripple Creek, Colo.

J. J. CRAWFORD has returned to San Francisco from El Dorado county, Cal.

J. BRESNAHAN succeeds J. P. Harvey as Supt. Republic mine, Republic, Wash.

J. W. FRANCK, a mine owner and operator of New River, Cal., is in San Francisco.

W. J. SUTHERLAND, Pres. Holmes M. Co., Candelaria, Nevada, is in San Francisco.

JOHN HAYS HAMMOND prophesies that Africa's gold yield for '99 will be $100,000,000.

C. W. GOODALE is now in charge of the Great Falls smelter of the Boston & Montana Co.

H. A. HOWARD is appointed Gen. Mgr. Fortuna G. M. Co., Aqua Dulce, Lower California.

F. W. WILMANS, Pres. Rose Creek M. Co., Sonora, Cal., has returned from San Francisco.

L. C. PARKE, mining engineer, has removed his office to the Claus Spreckels Bldg., San Francisco.

GEO. MAINHART, Grass Valley, Cal., owner Erie Con. mines, Graniteville, Cal., is in San Francisco.

T. A. RICKARD, State Geologist of Colorado, is visiting San Francisco with his bride on their wedding trip.

C. A. HAMILTON of San Francisco is examining copper properties in Shasta county, Cal., for New York capitalists.

CHAS. HOFFMAN of Oakland, Cal., has charge of an engineering corps, who have started on a scientific prospecting tour on the West African coast.

G. KARTSCHOKE, Pres. Champion M. Co., Nevada City, and Vice-Pres. Con. St. Gothard M. Co., Columbia, Cal., is visiting both mining properties.

J. P. HARVEY has been appointed Gen. Mgr. of the Clark mines in Republic, Wash.; the Republic, Jim Blaine, Lone Star, Rebate and Number Six.

NORMAN A. ROOT succeeds D. B. Hanson as San Francisco agent of the E. P. Allis Co. The latter will in future represent the company at Seattle, Wash.

MAJ. MYERS, Pres. Siskiyou Co, Cal., Miners' Association, speaking of the outlook in his section, says: "Mining has never been better in Siskiyou. There has been more earnest work than in years. We have practically given up tunneling and scratching the mountain sides, and are going in for sinking and deep mining. The scarcity of water has driven the hydraulickers into the mountains, and they have made the change in their style of mining pay. Eight or nine years ago tracts which were as barren as a marble floor are now covered with mining villages, and stamp mills are being erected everywhere. We are getting down to ore bodies. We never went down at all before. If this season is wet, as we hope it will be, there will be abundance of power, and a great number of new mines will be opened, so that our output will be extraordinary. On the Klamath and Scott rivers the copper veins, sulphides, are being developed, and we are going to have another Anaconda there. Smelters will be necessary, but when the mining men see that we have in the shape of copper as fine as any in Butte, they will put up the smelters."

DWIGHT L. CLOUGH, the electrician who was recently reported to have survived a shock from an electric current of 11,000 volts received at the power house of the Lockport, N. Y., railway, has recovered sufficiently to be able to tell how it feels to be struck by a strong current of electricity. He says: "The report given out that a current of 11,000 volts passed through my body was erroneous. The correct measure of the current was 1000 amperes under a pressure of between 800 and 900 volts. You see the ampere is the measure of volume while the volt is the measure of pressure. With this correction, however, it remains a fact that the chance of living after such a current goes through one is about 1 in 100. As to my sensations, I had none. I was filing a brush ring on one of the converters. I stood on a rubber mat to insulate myself, as the machine was running. Unnoticed by me, the mat slipped about, and in changing my position a little, I slipped with one foot into the well under the machine. That threw me against the machine and my foot came in contact with the machine frame, completing the circuit. I saw a blinding flash which seemed to play about my wrists. There was an explosion. I was lifted from the floor an instant and then was hurled back. I was conscious all the time and knew what had happened, but I felt nothing. Apparently every nerve and function of my body except the brain was for the moment paralyzed. I lay for a few moments and then managed to get to my feet and attempted to get to the door, but I seemed unable to control my movements and feet again, this time losing consciousness. The next I knew was when I regained my senses for a time in my room in the hotel." He was badly burned about the hands, arms and ankles.

Calendars.

IN these progressive days, when everything published is artistic, combining the useful and ornamental in an eminent degree, it is interesting to note the elaborate way in which so many trade accessories are produced. In calendars, the one received at this office from the Gates Iron Works, Chicago, Ill., is a thing of beauty and a joy for—as long as one wants to use it, indicating the day of the week and month for 100 years, with a striking scarlet and silver face, and no more advertising thereon than is justified by the facts. Though they don't say so, it is possible that a request to the Gates Iron Works, 650 Elston avenue, Chicago, might secure one.

THE Wm. Powell Co, 2525-2531 Grove avenue, Cincinnati, O., send the prettiest catalogue received from that section. It is for '99 pure and simple, and incidentally advertises that firm's regrinding star valve. As in the preceding case, it is likely that the Wm. Powell Co. would send one of these handsome catalogues to any one asking for it.

Commercial Paragraphs.

THE Abner Doble Co. of San Francisco has a contract for the hydraulic installation for the Mount Whitney Power Co., Visalia, Cal. It consists of three 700 H. P. steel wheels, cast iron housing, direct connected to three alternating current generators, running at 514 revolutions under a head of 1300 feet. The Abner Doble Co. will also furnish the cast steel pipe. The weight of the pipe will be about 60,000 pounds.

THE Truax Car Co. of Denver, Colo., has established a branch plant in San Francisco, for manufacturing its ore cars. These are in great demand on the Pacific coast, and the new plant, fitted with the latest machinery, will enable the company to supply this demand. The latest improvements on the Truax cars have just been patented during '98, and a catalogue will be sent to every one sufficiently interested to write for it from either the Denver or San Francisco factories.

THE Colorado Iron Works Co. have just finished at their works and shipped to the Smelting Corporation, Ltd., Cheshire Port, England, a complete 42x140-inch modern zinc-lead water jacket smelting furnace, with two spiral forehearths. They are also now making for the Nederlandische Indische Mijnbouro Maatschappij of Batavia, Island of Java, one of their latest improved copper matting furnaces, 42x120-inch, with Nesmith patent hot-blast stove, including blowers, slag cars, forehearths, all to be erected in the Celebes islands. For George Mitchell of Jerome, Arizona, they are making a 42x120-inch copper smelting furnace of latest designs, including blowers, slag cars, etc., which is to be erected in Old Mexico. The fact that this inland manufacturing concern, subject to all the disadvantages of high freights, etc., are booking orders from abroad, is evidence of the excellent standard of work they turn out.

THE Edward P. Allis Co. of Milwaukee, Wis., report the following sales of "New Leyner" drills during the past week: Three drills and compressor to Wm. Owsley & Co. of Butte, Mont.; three drills and compressor to Gaddis M. Co. of Oronogo, Mo.; two drills to Fayal Iron Co. of Eveleth, Minn.; two drills to Homestake M. Co. of Lead, South Dakota; one drill to Golden Reward M. Co. of Deadwood, South Dakota; one drill to the United Verde Copper Co. of Jerome, Arizona. The Allis Co. also report sale of two water-jacketed blast furnaces to Guggenheim Sons for the Monterey, Mexico, plant. These furnaces are of 175 tons daily capacity and are duplicates of an order for five which was filled by the Allis Co. early last year. This company have also received a contract for a 20-stamp cyanide plant for the Thayer M. & M. Co. of Miramar, Costa Rica, Central America. Several carloads of material for the three "Wethey multiple deck roasting furnaces," which this company is building for the Highland Boy smelter of Salt Lake City, have gone forward. Each of these furnaces has four hearths 10x83 feet.

DURING the year '98 the Link-Belt Machinery Co. of Chicago were very busy, necessitating running of their plant night and day for seven months and full time the balance. Representative contracts executed, were for the complete power transmission machinery, link-belt elevators and conveyors installed in the new plant of the Producers' Cotton Oil Co., Yazoo City, Miss.; Hoosiac "B" Elevator, Boston, complete grain elevator machinery; Chicago Virden Coal Co., Virden, Ills., one K. W. dynamo, engine, switchboard, and eight "Link-Belt" chain breast mining machines; McCormick Harvesting Machine Co., Chicago, sand handling conveyors for their foundry; Tuscaloosa Wadding Co., Tuscaloosa, Ala., wadding elevator; Colorado Fuel & Iron Co., Sopris, Colo., large coal conveyor, used in connection with their coal washer; Stineman Coal & Coke Co., South Fork, Pa., engine, 100 K. W. dynamo, switchboard, and 10-ton H. P. locomotive; Mandell Bros., Chicago, merchandise elevator extending eight floors; National Malleable Castings Co., Chicago, sand handling conveyors; Clearfield Coal Co, Tyler, Pa., one 150 K. W. dynamo, two 60 H.P. locomotives, switchboard, and three low "Link-Belt" mining machines; Albert Schwill Malting Co., Chicago, conveyors for handling coal into storage room and from same to boilers; Chicago City Railway Co, Chicago, coal elevator; Summit Coal Co., Linton, Ind., boiler, engine, 100 K. W. multipolar dynamo, switchboard, and one "Link-Belt" mining machine; Coxe Bros. & Co., electric coal scrapers; Consolidated Coal Co., St. Louis, one 100 K. W. dynamo, switchboard and 10-ton 26 gauge locomotive; Northwestern Gas & Coke Co., Evanston, Ills., coke elevator; International Packing Co., Chicago, complete system of hog conveyors; University of Illinois, Champaign, Ills., coal and ashes handling machinery; Patton Coal Co., Parron, Pa., one 100 K. W. dynamo, engine, and ten "Link-Belt" mining machines; Julius Knack, Detroit, Mich., retail coat pocket and conveyors; Morrisdale Coal Co., Morrisdale mines, Pa., engine, 100 K. W. dynamo, 10-ton 80 H. P. locomotive; American Glucose Sugar Refining Co., Waukegan, Ills., char. filters; Chase Elevator Co. Chicago, machinery for Chicago & Grand Trunk Ry. grain elevator, Elsdon station; Wisconsin Grass Twine Co., St. Paul, conveyors for handling hay; Deering Harvester Co., Chicago, sand elevator; Frankfort Chair Co., Joliet, Ills., rope drive; Paterson & Busby, Memphis, Tenn., log haul.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING DECEMBER 27, 1898.

616,819.—PUMP—E. S. Barzee, Minto, Or.
616,567.—APPARATUS FOR SUBMARINE MINING—C. Brown, S. F.
616,994.—BEER PRESSURE REGULATOR—C. Christian, Orland, Cal.
616,533.—SIDEHILL PLOW—G. Gerow, North Temescal, Cal.
616,535.—HOOP-LUG—D. C. Henny, Alameda, Cal.
616,710.—BOTTLE—M. F. Hudson, Oakland, Cal.
616,553.—JAR—D. L. Newcomb, San Diego, Cal.
616,724.—VALVE—T. A. Noble, Seattle, Wash.
616,638.—EVAPORATOR—H. B. Schulte, San Jose, Cal.
616,646.—ROTARY PUMP—P. K. Wood, Los Angeles, Cal.
616,757.—NOZZLE—J. Wright, Roslyn, Wash.
29,868.—DESIGN—S. G. Marshutz, Los Angeles, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PRESSURE REGULATOR FOR BEER.—C. Christian, Orland, Cal. No. 616,604. Dated Dec. 27, 1898. This invention relates to a device for regulating and controlling the pressure of gas in beer and other effervescent liquids. It consists essentially of a body piece having a plurality of independent passages opening through the rear end and each connecting at its forward end with a transverse passage. These passages are provided with controlling cocks and connections are made between the inner ends and corresponding casks so that pressure from any one of the casks may be transferred to the other in case the beer has become flat and it is necessary to revivify it.

BOTTLE.—M. F. Hudson, Oakland, Cal. No. 616,710. Dated Dec. 27, 1898. This invention relates to an improvement in bottles, and it consists essentially of a device introduced into the neck and adapted to render the bottle non-refillable after once been used. It consists of a cylinder integral with the neck having upper and lower ridges and introduced intermediate portion forming an annular chamber, said cylinder having a centrally disposed opening in the top with holes leading transversely therefrom into the annular chamber and an opening into the bottom forming an internal chamber having oppositely disposed conical ends, an elastic washer or cone fixed into the lower conical end of the chamber and a disk or plate within the chamber is adapted to normally rest upon the washer to close the inlet to the chamber. A second series of holes lead from the chamber to the surrounding annular chamber and a ball in the internal chamber normally rests on the disk or plate to retain it on its seat, the inclined walls of the upper conical end of the internal chamber serving to hold the ball against the disk when the bottle is partly inverted or laid on its side.

EVAPORATOR.—H. B. Schulte, San Jose, Cal. No. 616,638. Dated Dec. 27, 1898. This invention relates to an apparatus which is especially designed for desiccating various fruits and food products. It consists of an arrangement of trays upon which the product to be dried is distributed and an enclosing exterior casing and means by which the latter is heated, and a device by which the trays are carried horizontally around in the casing with a means for rotating the trays periodically upon vertical axes to change their position with relation to the source of heat. The heating apparatus is disposed in the lower part of a vertical cylindrical casing and an upwardly and outwardly diverging deflector acts to throw the heat outwardly and toward the upper part. A vertically journaled central shaft has radial arms and supports at the ends, tray carriers with yokes having central vertical journals carried by the support and about which they are turnable. A stop or vertically journaled roller is fixed within the casing so that the angles of the trays contact with it during their revolution and they are thus turned upon their own axes at each revolution about the common center.

Recent Mining Incorporations.

Hale & Norcross M. Co., San Francisco; capital stock $336,000, subscribed $2100; M. W. Fox, E. Barry, A. W. Moore, G. C. Sneider, W. J. Dale, F. Mahon, G. P. Thurston.

Bean Creek G. M. Co., San Francisco; capital stock $100,000, subscribed $1200; W. Ayers, O. F. Willey, G. S. Folsom, G. H. Waggoner, B. S. Hill.

Recently Declared Mining Dividends.

Gold Coin, Colorado, 1 cent per share, extra, $20,000; Dec. 25.

Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000; Jan. 4.

Mill Practice of the Utica Mills, Calaveras Co., Cal.*

By W. J. LORING, Angels Camp, Cal.

It is proposed to describe in this paper as accurately as possible the present practice at the Utica mills, of which I am superintendent. The Utica Co. operates three mills, the Madison (40 stamps), the Utica (60 stamps), and the Stickle (60 stamps). My description will be based on the last named, in which I have experimented more than in either of the other two; but the practice is the same, under the same management, in all three.

Everything is run by water power, under about 420 feet fall at the Utica mill, and 425 feet at the Stickle mill, giving a pressure of about 185 pounds to the square inch. The Madison mill is situated about three-quarters of a mile below the Utica and Stickle mills, and has only some 100 feet fall from one place and 38 feet fall from the other. The water that runs the Utica and Stickle mills, and all machinery connected with the corresponding mines, is conveyed through ditch and pipe to the Madison mine and mill, where it develops power for the air compressor and the 40-stamp mill. The mill is run by a double turbine, made by the James Leffel Co., Springfield, Ohio. Of course, by using the water repeatedly, as we do, we get our power very cheaply.

As the result of many experiments, I have arrived at a very satisfactory practice in crushing rock at low cost per ton. This object, taken by itself, would simply require us to crush as much rock as possible for each unit of power, plant and time; but we must also keep the loss of gold per ton as low as possible. We have succeeded, I think, in securing both results to a creditable degree.

The rock, as hoisted from the mines, consists of massive quartz, schistose and slaty diabase, with iron sulphurets. At the head of the shaft it is passed ver a grizzly made of 3-inch round iron bars, 10 feet long, placed 1¾ inches apart, and set at an incline of 40°. These bars are supported at each end by a casting made for the purpose, with recesses to receive them. Worn out and discarded stamp stems are used, and answer very well.

At the lower end of the grizzly is situated the 10x16 inch Blake crusher, which is connected with the grizzly by a sheet steel hopper, set at the same inclination as the grizzly bars, and thus feeding the crusher by gravity. One Blake crusher of this size handles all the rock for the 60-stamp mill, aside from that taken out by the grizzly. The amount will be given below. One man on each ten-hour shift furnishes all the labor required at the crusher.

The crusher and grizzly are both set over a bin holding 50 tons, from which the rock is conveyed to three bins in the mill—one for each 20 stamps. The capacity of each bin is about 200 tons. These discharge into Challenge ore feeders, of which one supplies each 5-stamp battery.

The stamps, when newly shod, weigh 835 pounds each, and drop from 7 to 8 inches 100 times per minute. The 10 stamps, in two adjacent batteries, numbered consecutively, drop in the following order: 1, 5, 9, 7, 3, 2, 6, 10, 8, 4.

*Trans. Am. Inst. Min. Engs., Buffalo meeting, October, 1898.

(To be Continued.)

U. S. Gold Product For 1898.

Director of the Mint Roberts has received from the officials and agents of the bureau preliminary estimates upon the production of gold in the several producing States and Territories of the United States for the calendar year 1898. These estimates, although subject to revision, are deemed to be approximately correct. Nearly all of the States show an increased production. Colorado maintains and increases its lead by a larger addition to its product than in any previous year. The product in California was considerably reduced by prevailing drought, which affected the output of the placers, but the increase from lode mining has slightly more than offset this reduction. Returns are given below as compared with the final estimates for the production of the same States and Territories in 1897:

State.	1898.	Director Mint Estimate for 1897.
Alaska	$2,039,930	$1,778,000
Arizona	3,185,490	2,096,900
California	14,883,721	14,618,300
Colorado	24,500,000	19,104,200
Idaho	2,373,902	1,701,700
Michigan	65,000	62,000
Montana	5,209,302	4,373,400
Nevada	2,959,731	2,976,400
New Mexico	360,000	356,500
Oregon	1,343,669	1,353,100
South Dakota	5,841,406	5,694,900
Texas	7,500	7,400
Utah	2,174,513	1,726,100
Washington	509,483	419,900
Wyoming	5,168	11,200
South Appalachian States	33,382	283,300
Totals	$65,782,677	$57,363,000

A Misstatement Corrected.

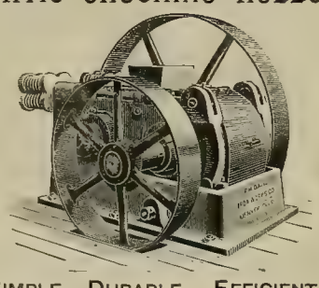
TO THE EDITOR:—I note in your issue of Dec. 24th the following from your San Diego correspondent: "A recent strike in the Ranchito is turning out some specimen ore which mills well. This mine has recently gone into the hands of a receiver, a Mr. Lane having been put in charge to represent the Julian Mercantile Co., which had Supt. Couts ousted and Mr. Lane substituted."

On behalf of Mr. Cave J. Couts, the owner of the Ranchito mine, I beg to inform you that the alleged information contained in the foregoing paragraph is entirely without foundation. Mr. Couts was not the superintendent of the mine, but was owner of the same and is still such owner. The mine has not gone into the hands of a receiver, and there is no expectation that the same will go into the hands of a receiver. Mr. Lane was temporarily appointed foreman of the mine, but was subsequently relieved of duty.

FREDERIC W. STEARNS.

San Diego, Cal., Dec. 31st, '98.

THE
DAVIS CRUSHING ROLLS



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BOILER FEEDERS,

Deep Well, Tank and Vacuum Pumps.

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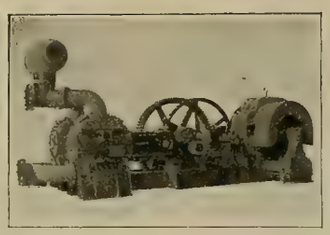


Electric Mine Pump.

MINING APPARATUS.

HOISTS, PUMPS, LOCOMOTIVES.

MOTORS FOR STAMP MILLS.

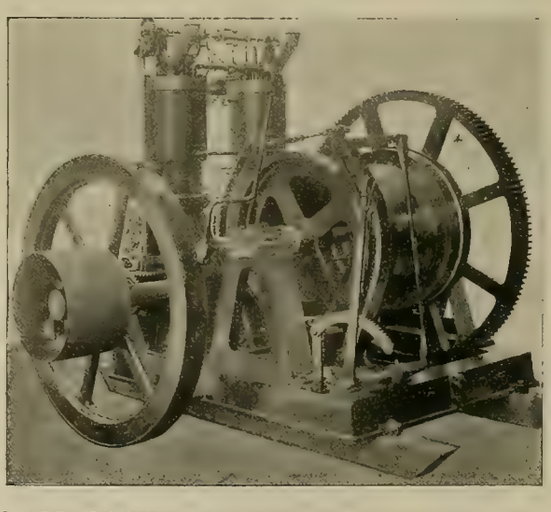
GENERAL ELECTRIC COMPANY,

SAN FRANCISCO, CAL., Claus Spreckels Building.

DENVER, COL., Kittredge Building.

PORTLAND, OR., Worcester Building.

Improved Mining Hoist.



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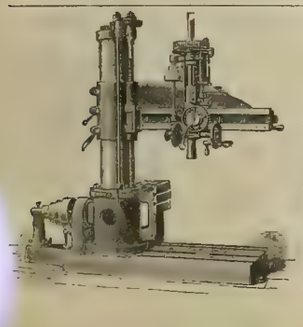

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HENSHAW, BULKLEY & CO., Agents, San Francisco, Cal.

UNFAIR COMPETITION.

Our recent announcement that inferior goods had been sold and billed on the coast as our goods, and that our trade-mark numbers had been counterfeited, has disclosed an even greater extent of these practices than we had supposed to exist. To make the resulting damage to the reputation of our goods as small as possible and to protect our would-be patrons we repeat:

All our catalogue goods, except those listed by us as manufactured by others, are stamped with our name "Keuffel & Esser Co." or our initials "K. & E. Co" and where there is room for it, with our trade mark Our German drawing instruments bear only the trade marks or

We never stamp our goods with catalogue numbers only, and goods so stamped are therefore not ours. All our goods are fully warranted to conform to the description we give of them in our catalogue and to be of the quality and grade specified. We make some lines of cheaper goods for the jobbing trade, but they differ from our catalogue goods in quality and appearance. These inferior goods are not stamped with any of our trade marks. Our catalogue goods are not furnished to any dealer or agent without our complete stamp as described above, and any claim that we furnish our catalogue goods by special arrangement without our stamp is therefore an attempt to deceive. Our special papers in rolls or sheets

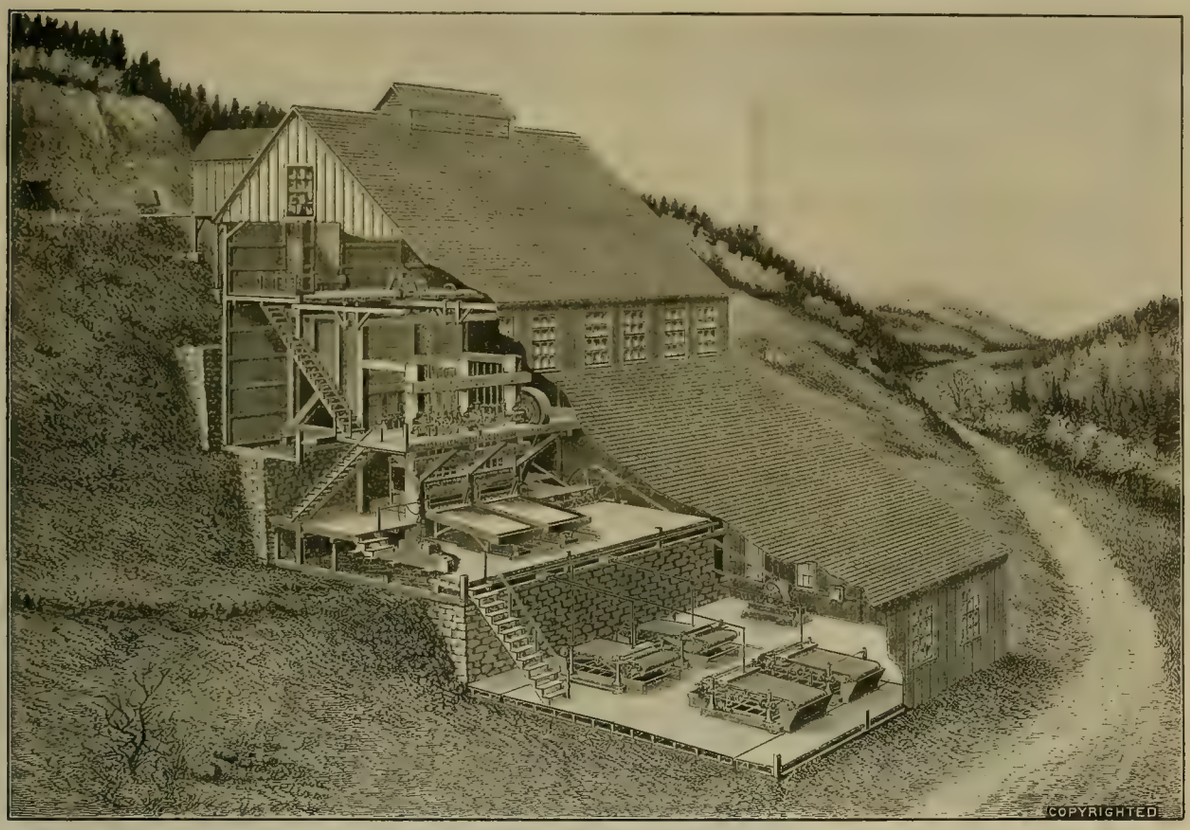
Duplex Universal Anvil Paragon Normal

are watermarked or stamped along the edge with their name. Any claims that our papers are furnished by us in bulk without these names or that these papers have been obtained otherwise than through us, are absolutely false. We will thankfully accept any information bearing on the counterfeiting of our trade-mark numbers or the palming off of other goods as ours.

Very respectfully, KEUFFEL & ESSER CO.

UNION IRON WORKS,

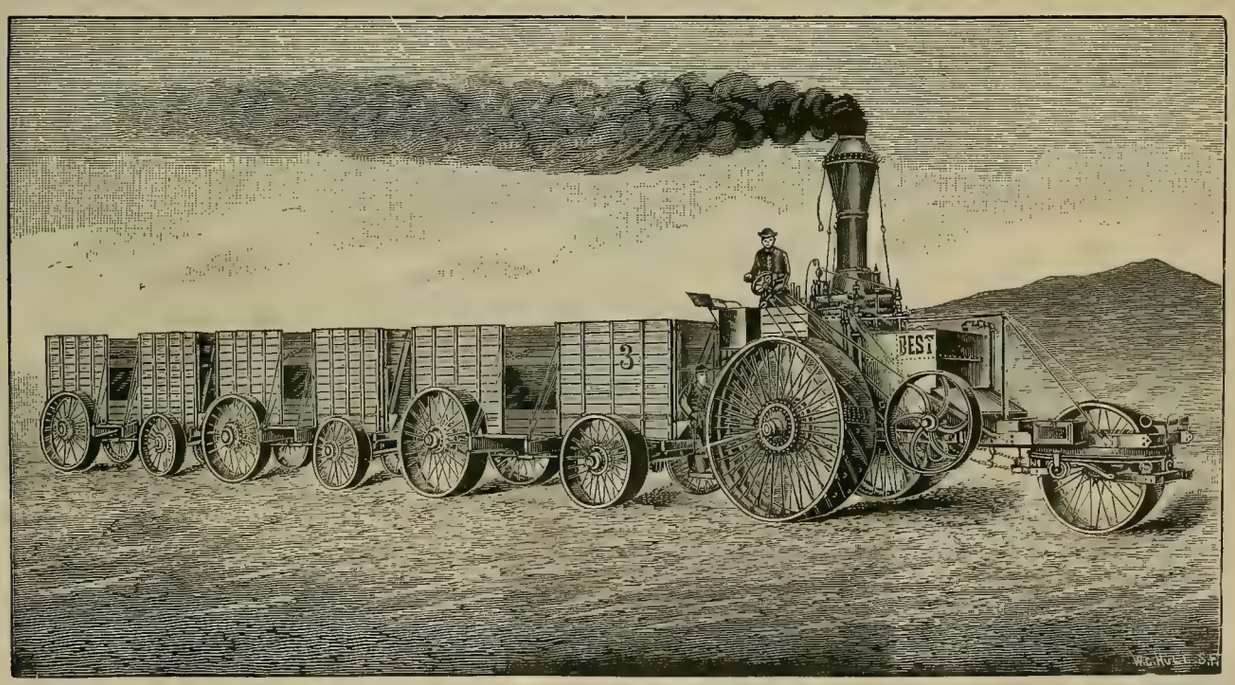
222 Market Street, San Francisco, Cal.



Builders of All Classes of Mining Machinery.

The above is an illustration of a First-Class Modern 10-Stamp Gold Mill. For particulars, send for Catalogues.

A REVOLUTION IN FREIGHTING.



THESE WAGONS ARE ESPECIALLY ADAPTED FOR STEAM FREIGHTING; CAPACITY OF TRAIN 50 TONS.

"The Daniel Best" 50-Horse Power Traction Engine.

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The work is being done **FIFTY PER CENT** Cheaper than it is possible to do with Animal Power. They can be operated over any ordinary road where it is practicable to use mules or horses, doing the same work. They can ascend or descend grades as much as 20 to 30 inches to the rod, hauling their loads of 35 to 40 tons, depending upon the condition of the roads; loads may be increased to even greater amount on moderately level roads.

Send for descriptive Circulars and price List of Wagons and Engine. We solicit correspondence. No trouble to answer questions.

Estimates made for complete Steam Freighting Outfits. Address

THE BEST MANUFACTURING CO., SAN LEANDRO, CAL., U. S. A.

The Largest Locomotives in the World.

On this page appears an illustration of a 23″ x 32″ locomotive, recently delivered to the Union Railroad Co. of Pittsburg, Pa., showing the engine, with a small locomotive in the foreground. The line over which the engine operates extends from Munhall to North Bessemer, Pa., twelve miles. It is a part of the Carnegie system, connecting the Duquesne furnaces, Homestead Steel Works, and Edgar Thomson Steel Works. About four miles of the line has a grade of 70 feet to the mile, and about 2000 feet a grade of 2 4-10 per cent, or 126.72 feet to the mile.

The cylinders are of the half saddle type, made heavy, and have great depth, longitudinally. A steel plate 1⅜ inches thick, and of same width as bottom of saddle, extends across and is bolted to lower frames, and to this plate, as well as to the frames, the cylinders are securely fastened. Heavy bolts passing through top frame bars, front and back of saddle, form additional transverse ties, and relieve the saddle casting from all tensile strains. Longitudinal strains usually transmitted to cylinders through frames are largely absorbed by the use of a casting extending from bumper beam well up to saddle, securely bolted to top and bottom front frames. This casting also acts as a guide for the ...lster pin of truck. The frames are 4½ inches wide, ... from rolled steel slabs, and weigh 17,160 pounds ... pair finished.

This locomotive is in daily use, steaming well, not extravagant in the use of fuel and water, and appears to have ample grate surface for the work required. A detailed description is as follows:

GENERAL DESCRIPTION.

Type	Consolidation
Road number	95
Name of builder	Pittsburgh Locomotive Works
Name of operating road	Union Railroad
Gauge	4 feet 8½ inches
Kind of fuel used	Bituminous coal
Weight on drivers	208,000 pounds
Weight on truck wheels	22,000 pounds
Weight, total	230,000 pounds
Weight of tender, loaded	104,000 pounds
Weight, total, of engine and tender	334,000 pounds
Tractive power	53,292 pounds

DIMENSIONS.

Wheel base, total, of engine	24 feet
Wheel base, driving	15 feet 7 inches
Wheel base, total (engine and tender)	54 feet 9¼ inches
Length over all, engine	39 feet 8¾ inches
Length over all, total, engine and tender	65 feet 3¼ inches
Height, center of boiler above rails	9 feet 3¾ inches
Height of stack above rails	15 feet 6 inches
Heating surface, fire box	205.5 square feet
Heating surface, tubes	3116.5 square feet
Heating surface, total	3322 square feet
Grate area	33.5 square feet

WHEELS AND JOURNALS.

Drivers, number	Eight
Drivers, diameter	54 inches
Drivers, material of centers	Steeled cast iron
Drivers, material of main centers	Cast steel
Truck wheels, diameter	30 inches
Journals, driving axle, size	9 x 12 inches
Journals, truck axle, size	6 x 10 inches
Main crank pin, size	7 x 7 inches
Axles and crank pins	Carnegie steel

CYLINDERS.

Cylinders, diameter	23 inches
Piston, stroke	32 inches
Piston rod, diameter	4¼ inches
Piston and valve stem packing	Metallic
Main rod, length center to center	9 feet, 10½ inches
Steam ports, length	20 inches
Steam ports, width	1⅝ inches
Exhaust ports, length	20 inches
Exhaust ports, width	3½ inches
Bridge, width	1¼ inches

Cylinders and valves oiled by sight feed lubricator.

VALVES.

Valves	Balanced
Valves, greatest travel	6 inches
Valves, outside lap	1 inch
Valves, inside lap or clearance	0
Valves, lead in full gear	1-16 inch

BOILER.

Boiler, type of	Straight, with sloping back end
Boiler, water test	300 pounds
Boiler, steam test	220 pounds
Boiler, working pressure	200 pounds
Boiler, material in barrel	Carnegie steel
Boiler, thickness of material in barrel	⅜ inch
Boiler, diameter of barrel at front sheet	80 inches
Boiler, diameter of barrel at throat sheet	83¼ inches
Boiler, diameter of barrel at back head	74⅝ inches
Seams, horizontal, butt joint, double welted and	Sextuple riveted
Seams, circumferential	Double riveted
Thickness of tube sheet	⅝ inch
Dome, diameter	32 inches
Safety valves, two 3-inch open pops and one 3-inch muffler	32 inches

Water supplied through two No. 11 injectors.

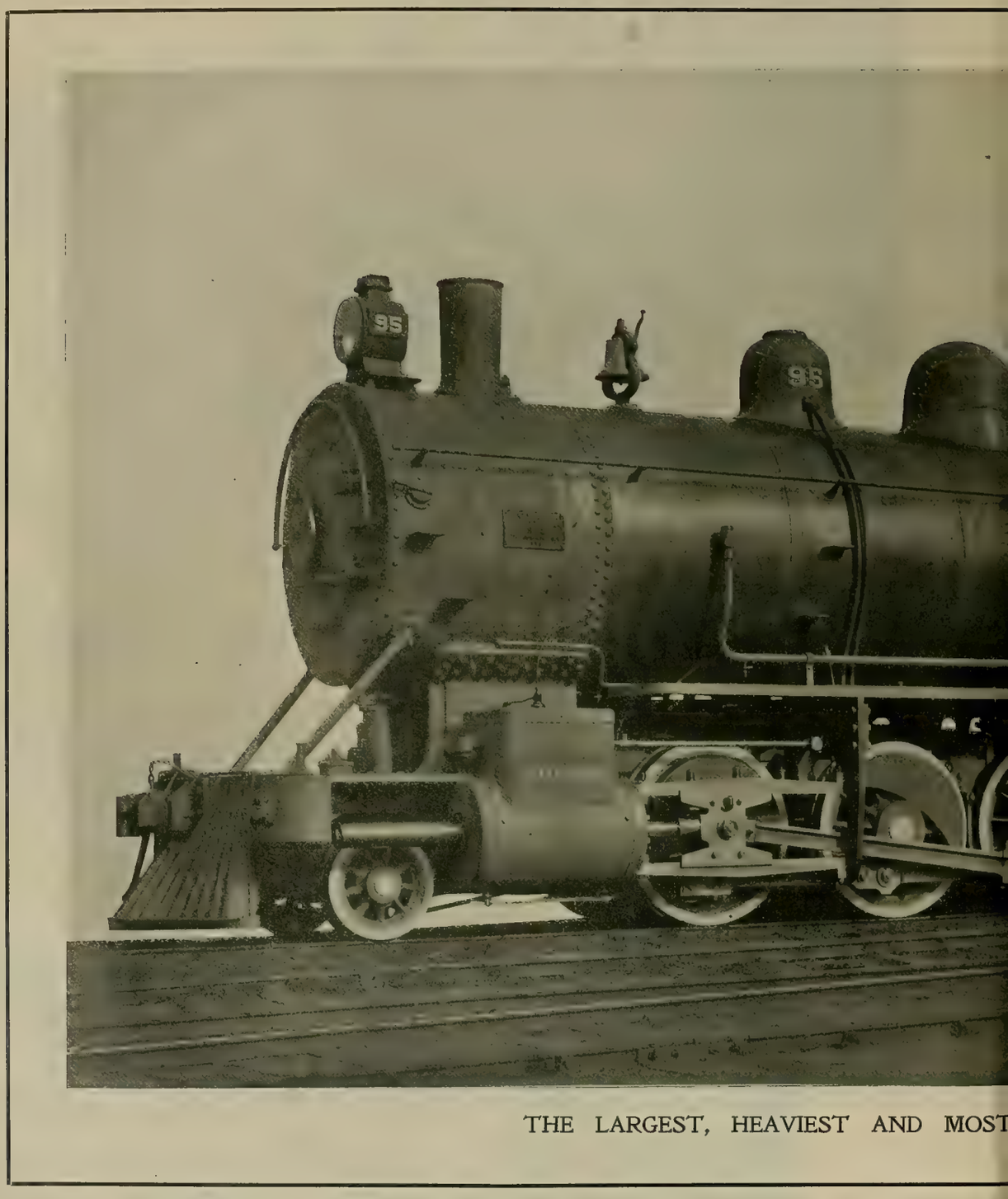
Crown sheet supported by stays	1⅛ inches diameter

TUBES.

Tubes, number	355
Tubes, material	Knobbled charcoal iron
Tubes, diameter, outside	2¼ inches
Tubes, length over sheets	15 feet

FIRE BOX.

Fire box, length	10 feet
Fire box, width	3 feet 4¼ inches
Fire box, depth, front	76⅜ inches
Fire box, depth, back	69 7-16 inches
Fire box, material	Carnegie fire box steel
Fire box, thickness of sheets, crown	7-16 inch
Fire box, thickness of sheets, sides and backs	⅜ inch
Fire box, thickness of sheets, tube	½ inch



THE LARGEST, HEAVIEST AND MOST

Fire box, water space, width, front, 4 in.; sides, 4 in.; back, 4 in.	
Fire box, brick arch	Supported on studs
Grates, cast iron, rocking pattern.	
SMOKE BOX.	
Smoke box, diameter	83¼ inches
Smoke box, length from tube sheet to end	68⅝ inches
OTHER PARTS.	
Exhaust nozzle	Single
Exhaust nozzle, diameter	5½ inches
Exhaust nozzle, distance of tip below center of boiler	5½ inches
Netting, size of mesh	2 x 2 inches
Stack	Taper
Stack, least diameter	17 inches
Stack, greatest diameter	18 inches
Stack, height above smoke box	2 feet 9 inches
Track sander	Pneumatic
Power brakes	Westinghouse American
TENDER.	
Type	With swivel trucks
Tank capacity, water	5000 gallons
Tank capacity, coal	10 tons
Kind of material in tank	Carnegie steel
Thickness of tank sheets	1-4 and 5-16 inch
Type of under frame	Steel channels
Type of truck	Diamond
Truck with rigid bolster.	
Type of truck springs	Double elliptic
Diameter of truck wheels	33 inches
Diameter and length of axle journals	5 x 9 inches
Distance between centers of journals	76 inches
Diameter of wheel fit on axle	6⅜ inches
Diameter of center of axle	5⅜ inches
Length of tender frame over bumpers	22 feet 11¼ inches
Length of tank	20 feet 6 inches
Width of tank	9 feet 8 inches
Height of tank, not including collar	56 inches
Height of tank over collar	68 inches
Type of back drawhead	M. C. B. coupler

POWERFUL LOCOMOTIVE IN AMERICA.

In connection with the above it will be interesting to note the dimensions of the largest locomotive in Europe. It belongs to the Belgian State Railroad. Both the big engines—the one illustrated herewith, and the Belgian—are designed for freight service on heavy grades; as their weight is about the same, a comparison is notable.

The heaviest grade on which the American engine must work is 2.4 per cent; that for the Belgian engine is 3.1 per cent. The American is of the consolidation type; the Belgian has six driving axles. The first three are on a truck, with the cylinders connected by means of flexible joints; the rear three axles are rigid in the frames, so that while the services required are similar, the Belgian engineers have adopted an entirely different and what seems to be a more expensive method of attaining their results. The engine is really a four-cylinder compound, the two high-pressure cylinders being applied to the rear set of drivers and the low-pressure to the drivers set in the truck. This has the advantage of using solid steam-pipe connections for the high-pressure and the flexible joints for the reduced pressure, bringing the exhaust under the stack, as desired. Herewith is tabulated the principal dimensions and weights of these locomotives:

Data.	**American.*	†*Belgian.*
Gauge	4 ft 8½ in.	4 ft. 8½ in.
Weight on drivers	208,000 lbs.	218,255 lbs.
Weight truck	22,000 lbs.	
Weight, total	230,000 lbs.	218,255 lbs.
Tractive power	53,292 lbs.	29,700 lbs.
Wheel base, total	24 ft. 0 in.	30 ft. 17½ in.
Wheel base, rigid	15 ft. 7 in.	9 ft. 10 in.
Center boiler above rails	9 ft. 3⅜ in.	8 ft. 2¾ in.
Top of stack above rails	15 ft 6 in.	14 ft. 5 in.
Heating surface, firebox	205.5 sq. ft.	159.5 sq. ft.
Heating surface, tubes	3,116.5 sq. ft.	1,574.5 sq. ft.
Heating surface, total	3,322 sq. ft.	1,734 sq. ft.
Grate area	33.5 sq. ft.	86 sq. ft.
Drivers, number	8	12
Drivers, diameter	54 in.	51¼ in.
Cylinders, diameter	23 in.	19¾ in. and 32 in.
Cylinders, stroke	32 in.	25½ in.
Valves	Bal. slide.	Piston.
Boiler pressure	200 lbs.	220 lbs.
Boiler, diameter at front ring	80 in.	60½ in.
Tubes, number	355	164
Tubes, outside diameter	2¼ in.	2¾ in.
Tubes, length over sheets	15 ft. 0 in.	13 ft 6 in.
Tubes, kind	Plain, iron.	Serve, brass.
Firebox, length	10 ft 0 in.	9 ft. 8 in.
Firebox, width	3 ft. 4½ in.	8 ft. 9 in.
Smoke box, length	68⅝ in.	79 in.
Smoke box, diameter	83¼ in.	62 in.

*Data for the American locomotive from the *American Manufacturer and Iron World*, Pittsburg, Pa.

†Data for the Belgian locomotive from *Revue Generale des Chemins de Fer*, through *Railway Gazette*.

The great discrepancy in the tractive power is caused by the early cut-off used in the compound engine. Using the formulæ

$$\frac{p\,d^2\,s}{D} \text{ and } \frac{2\,p\,d^2\,s}{(r+1)\,D}$$

the simple and compound engines, respectively, where p=boiler pressure, d=cylinder diameter (low pressure in compound), s—stroke, D—diameter of drivers, and r—s=stroke, D=diameter of drivers, and r=cylinder ratio, gives a theoretical tractive power of 62,000 lbs. for the American and 56,000 lbs. for the Belgian locomotive. These values are 30 per cent and 26 per cent, respectively, of the adhesive weights, but as the steam is allowed to follow only about one-third stroke in the compound, the effective pressure is reduced. The values allow a mean effective pressure of 86% of boiler pressure in the American and about 53% in the Belgian allowing, of course, for the relative action in the compound cylinders.

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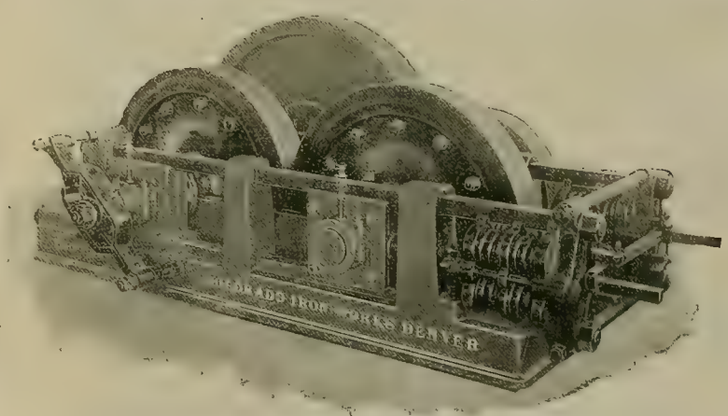

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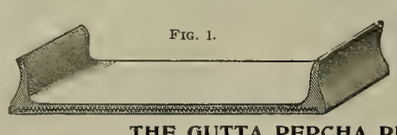

FIG. 1.

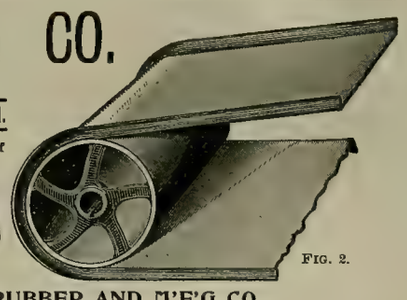

FIG. 2.

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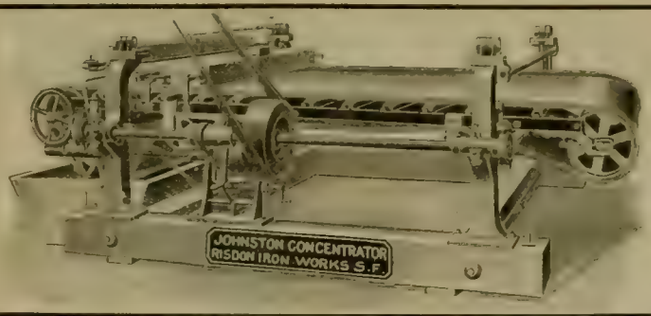

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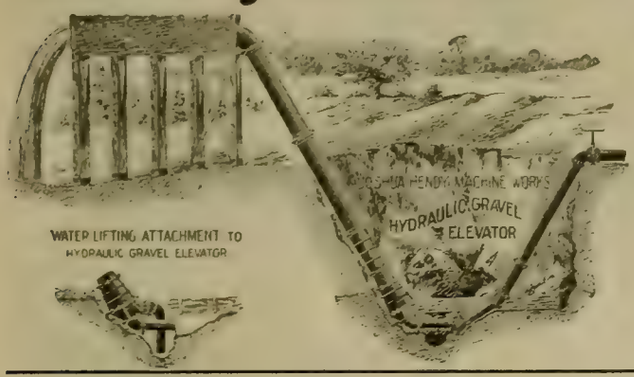

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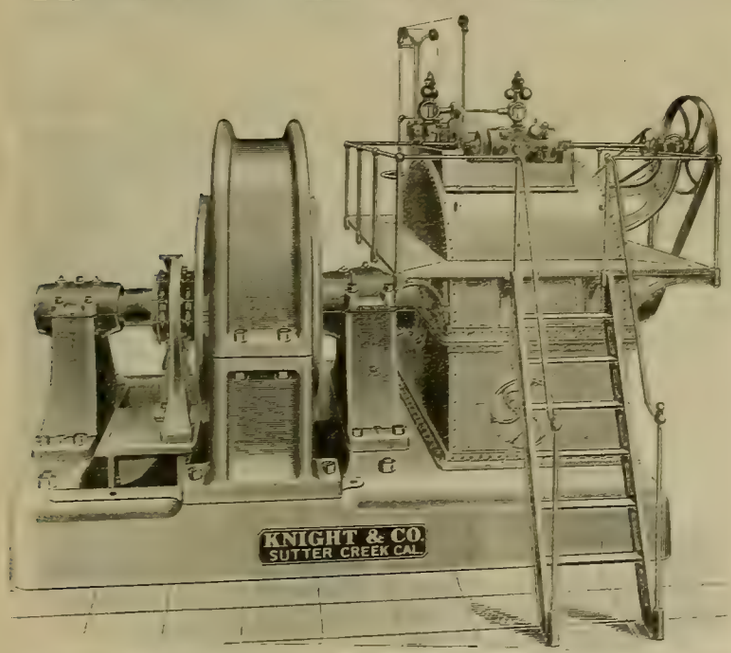

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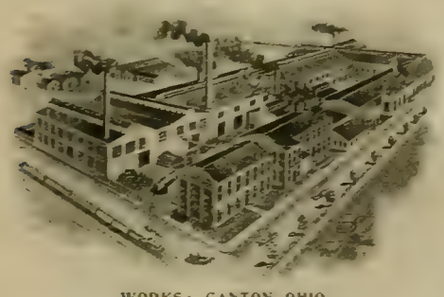

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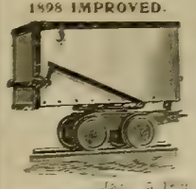

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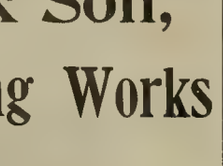

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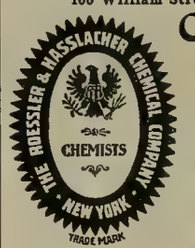

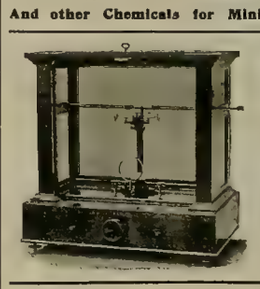

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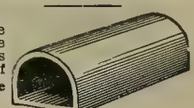

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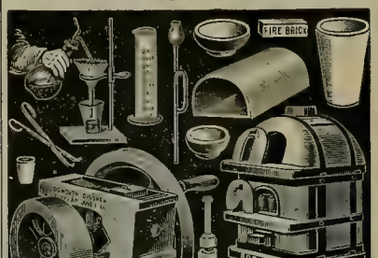

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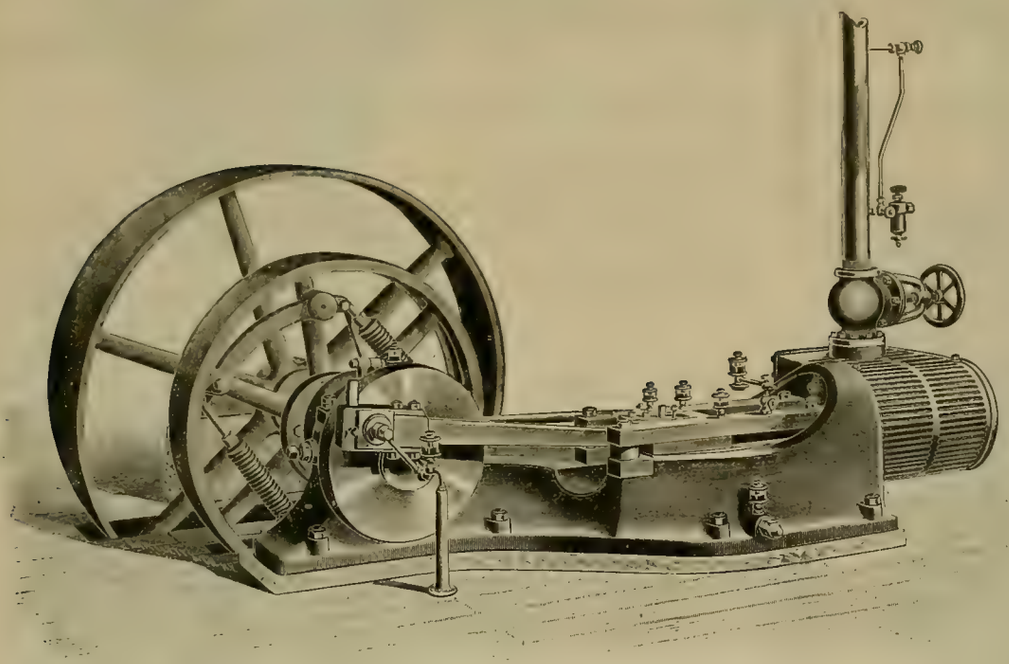

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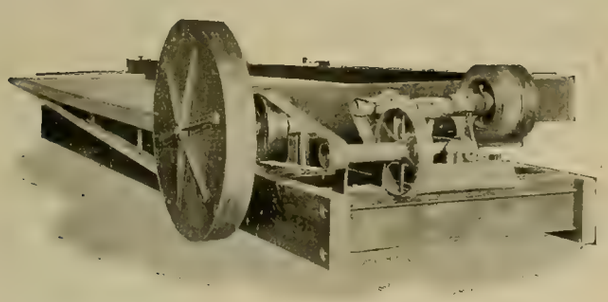

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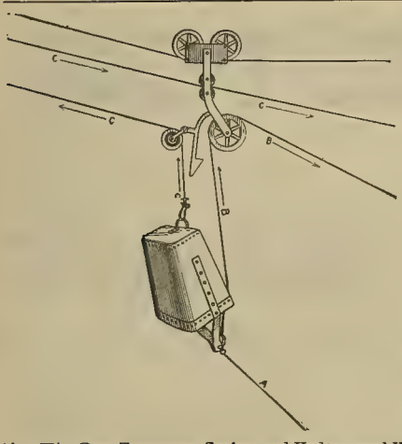

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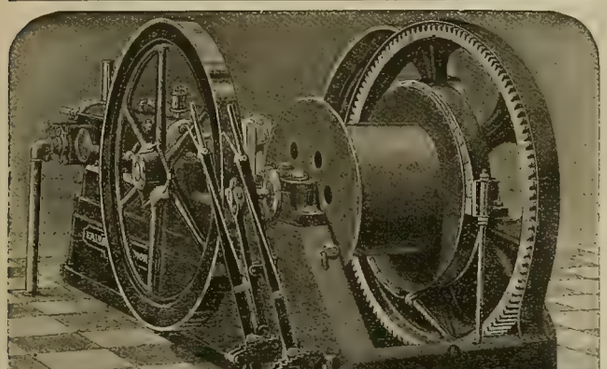

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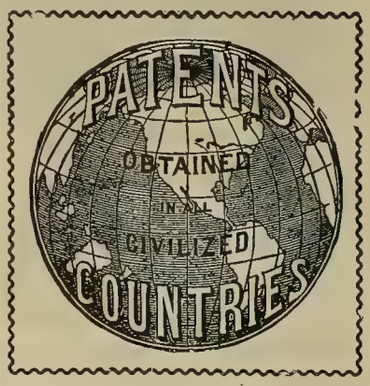

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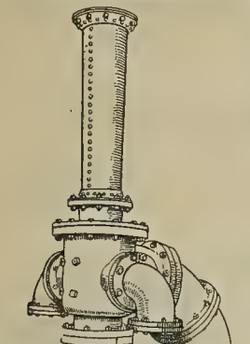

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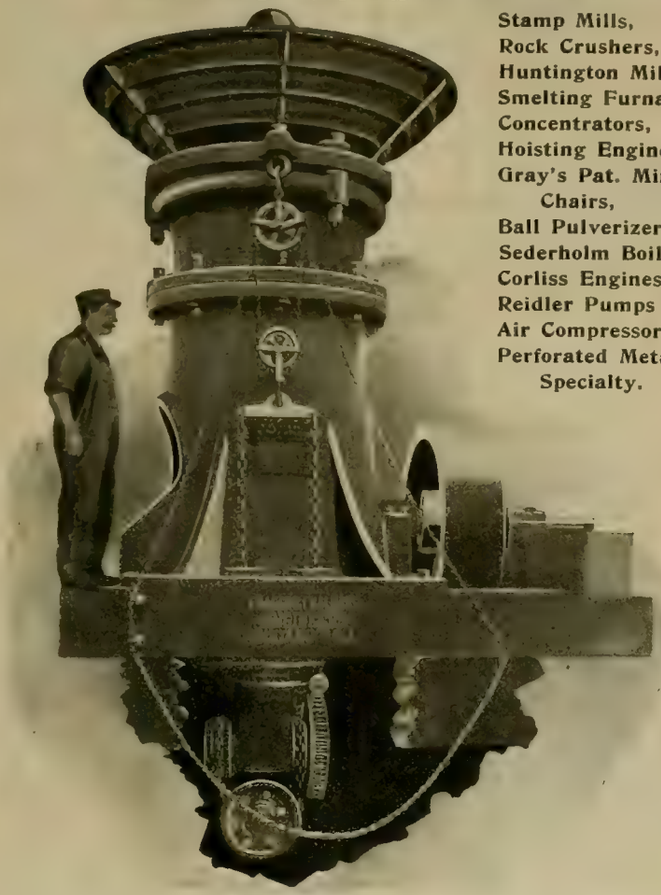

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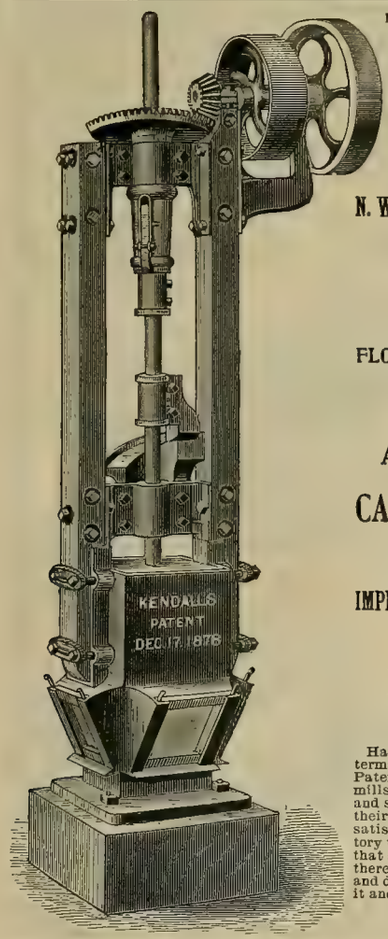

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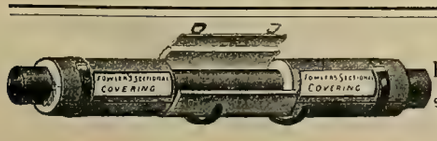

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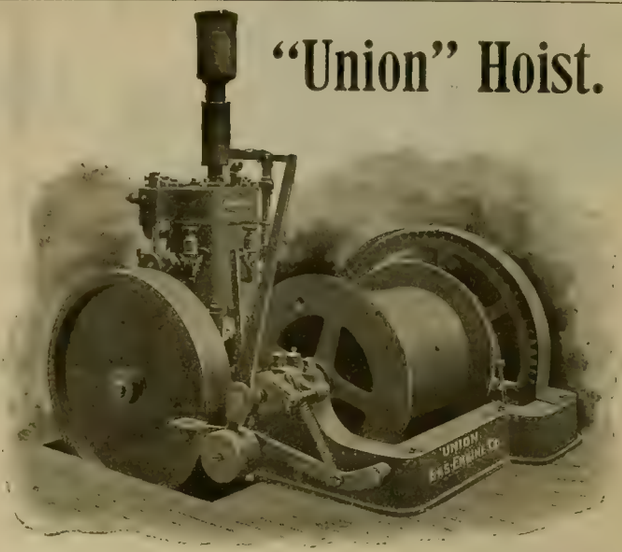

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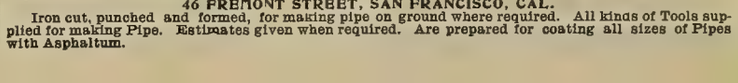

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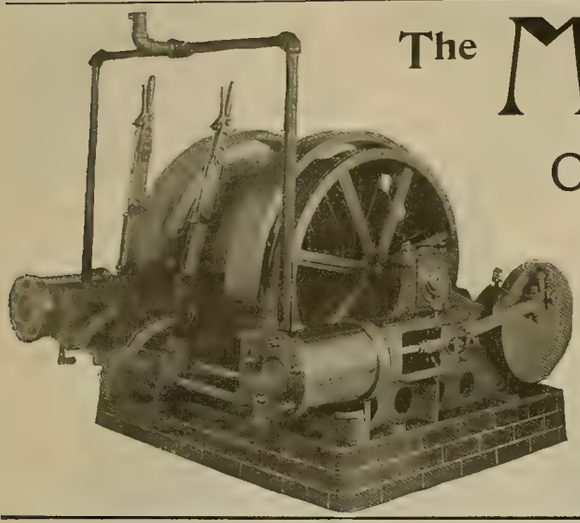

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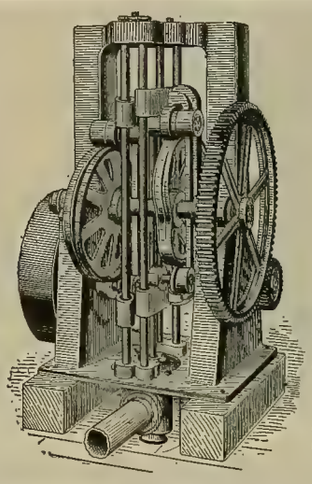

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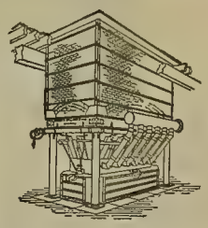

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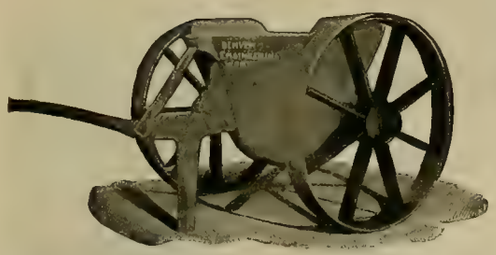

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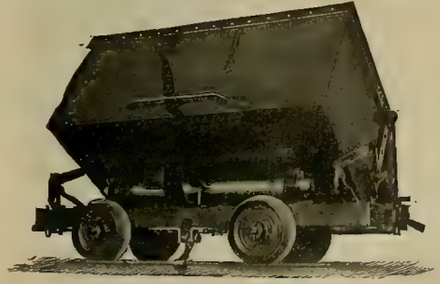

CANNOT TIP OVER WHEN DUMPING.
BUILT ANY SIZE TO SUIT.
EQUIPPED WITH DRAWBARS AND TRACK GRIP.
A CHILD CAN DUMP A BIG LOAD.

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HAVE YOU A LONG TUNNEL?

IF SO, WHY NOT USE OUR NEW

Improved Automatic Side-Dumping Tunnel Car,

AND ONE OF OUR LATEST

ELECTRIC TRAM LOCOMOTIVES.

Reduces Tramming Expense. Facilitates the Handling of Large Outputs.

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MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with State Law.

FOR the convenience of our readers in the mining counties we print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**

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Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

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Gates Rock Breaker.
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We desire to announce that we are the sole manufacturers of the

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The phenomenal mill of the century. Now perfected under several letters patent. Great capacity and small cost.

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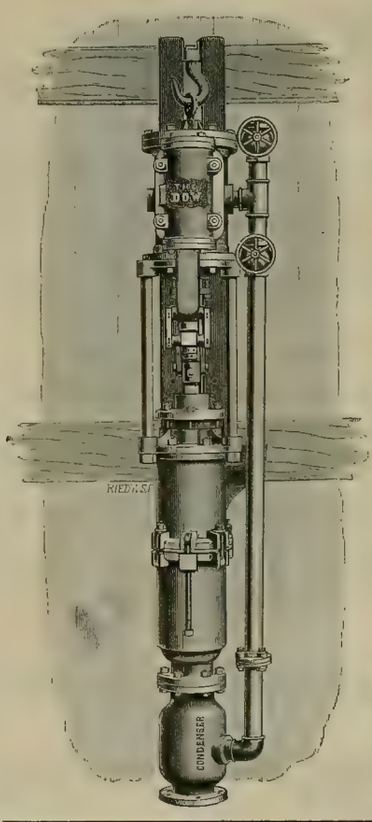

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STEEL OR IRON.—We make pipe of either, but recommend STEEL, it being superior to iron in many particulars and inferior in none.

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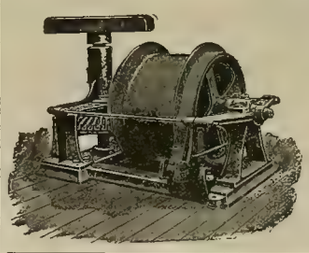

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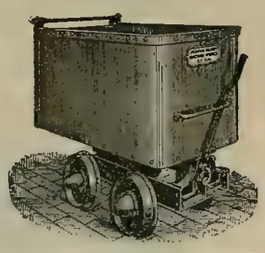

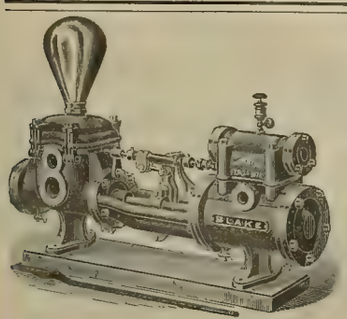

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Boiler Feed Pumps,
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Special Fire Pumps,
Independent Air Pumps and Condensers,
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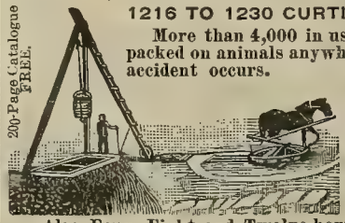

More than 4,000 in use. Made of wrought iron and steel. Can be packed on animals anywhere. The deadlock holds the load when an accident occurs.

Price of One-Horse Whim, complete, with shieves..... $90.
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Pumping Attachment with Pipe for either..... $40.
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Also Four, Eight and Twelve-horsepower Whims.

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WHICH FOR STRENGTH AND TRACTION POWER HAS NO EQUAL.

Especially Adapted for
MINING MACHINERY
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It Is Unaffected by Water, Heat or Steam.
EVERY BELT GUARANTEED.
Write for Prices. Samples Free.

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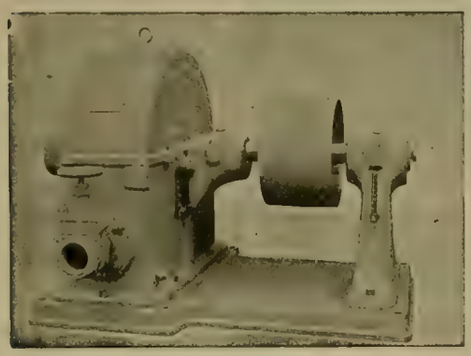

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An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Aggregating some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries.

Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

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TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

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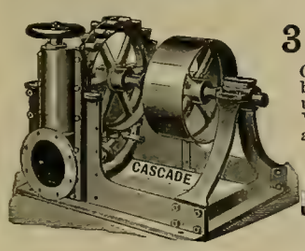

Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.

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LINK-BELT ELEVATORS —AND— CONVEYORS.

MALLEABLE IRON BUCKETS, Electric Coal Mining and Haulage Machinery, Luhrig Patent Machinery for Washing and Classifying Coal, Shafting, Pulleys, Bearing Rope Sheaves, Clutches, Etc.

Machinery designed and erected to suit existing conditions and available space.

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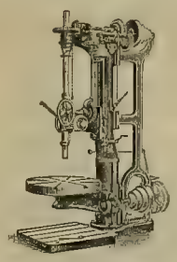

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Iron : Working : Tools.

Engine Lathes, Pulley Turning Lathes, Iron Planers, Slotters, Upright Drilling Machines, Horizontal Drilling and Boring Machines, Etc.

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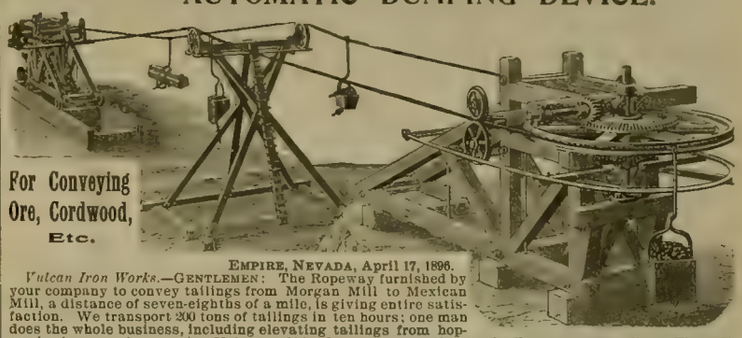
VULCAN ROPEWAY
—WITH—
AUTOMATIC ORE LOADER AND AUTOMATIC DUMPING DEVICE.



For Conveying Ore, Cordwood, Etc.

EMPIRE, NEVADA, April 17, 1896.

Vulcan Iron Works.—GENTLEMEN: The Ropeway furnished by your company to convey tailings from Morgan Mill to Mexican Mill, a distance of seven-eighths of a mile, is giving entire satisfaction. We transport 200 tons of tailings in ten hours; one man does the whole business, including elevating tailings from hopper in the ground, operating Vulcan self-loader, and attending to the Ropeway generally. The self-dumper requires no attention whatever. The Vulcan loader I consider the best feature in the whole Ropeway, making it possible for one man to load 200 tons in ten hours.

Yours very truly, J. P. WOODBURY, Supt.

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Rock Drilling, Air Compressing, Mining and Quarrying Machinery,

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—AND—
CHROME CAST STEEL
Cams, Tappets, Bosses, Roll Shells and Crusher Plates.

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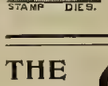
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These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

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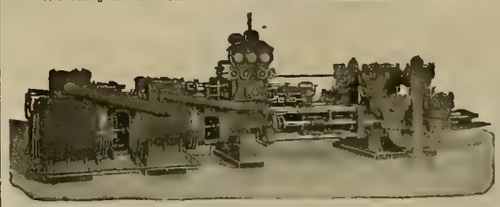
THE BEST (MINE PUMPS) IN THE WORLD.
OUR SPECIALTY.

We carry in our Denver store a stock of Cameron Pattern Sinkers and Duplex Station Pumps.

Write for Catalogue and Estimates.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Jeansville Iron Works Co.,
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Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

Every Description of Mining Plates Made.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES REPLATED. TWENTY-SIX MEDALS AWARDED. GOLD, SILVER, NICKEL, COPPER & BRASS PLATING.

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Telephone, Main 5981. Send for Circular.

Market Reports.

The Markets.

SAN FRANCISCO, Jan. 5, 1899.

SILVER.—London, 27⅛d; New York, 58⅞; San Francisco, 58⅞; Mexican Dollars, 47½@48. New York exchange, sight, 15; telegraphic, 17½ cents premium.

The Government standard of value for the Mexican dollar from January 1, 1899, has been established at .477, an increase of 4 mills over the previous rating.

Rain has caused rejoicing in California and the belief in a prosperous year, rain alone being needed. The general feeling throughout the country is that '99 will be a great year, greater even than '98. Investments are expected to be active. There is just cause for such belief.

There are more people now to invest and to operate, and more money to do it with. In 1880 we had a population of 50,000,000; in 1899 not less than 75,000,000. In the former year the amount of money in circulation was $973,382,000; it is now about $1,650,000,000. Our national debt was then $1,723,993,000, with an annual interest charge of $79,634,000, which was an average debt per capita of $38.27; in 1898 the debt had been reduced to $847,365,000, and only $13 per capita. It is impracticable to state accurately the present national wealth, but the census of 1890 showed an increase of real and personal property from $43,642,000,000 in 1880 to $65,037,091,000, and the gain since 1890 has been on a much larger ratio. Our railways have passed through the constructive and experimental stage, and their securities can now be bought upon a demonstrated value. The general tone of railway management has been improved, both in point of intelligence and integrity. Their stocks and bonds, therefore, offer greater attractions to capitalists or small investors. The marvelous mechanical and scientific inventions in twenty years have opened a new and profitable field for investment and speculation.

The concentration of control of great manufacturing lines has brought into the market attractive and profitable industrial shares. We are in close touch with foreign nations and international markets. Our people have increased in intelligence as well as in numbers and wealth. There is a greater general knowledge of the facts and influences which affect corporations and businesses. A new generation of men has come to the front since the great movement culminating in 1881. These men have had to face many trials and depressions. Until now they have had little chance to experience good times. They have been brought up in the wholesome school of adversity, and will be eager to take advantage of prosperity and to enlarge their business interests. The average business man has had all he could do for the last few years to keep himself going. This year he is accumulating a surplus and will want to make it earn something for him. The spirit of confidence is as contagious as that of depression. Leaders in the forward and upward movement will have ready and buoyant followers:

During the same time San Francisco received gold imports aggregating $30,305,487.

LEAD. — New York reports steady, $3.90 bid, $3.95 asked. The firm naming the settling price for leading miners and smelters at the West quotes Lead $3.70.

Local, pipe, 6@6½c; sheet, 6½@7c; pig, 5¾c; bar, 6c.

COPPER. — New York reports Lake "firm," $13.25 bid, $13.50 asked. Local, bar 20c per lb.

IRON.—American, soft, $21.75 and $23.75 per ton; Scotch, $24.25. Local bar, 2¼c per lb.

SPELTER.—8½@9.

TIN.—Pig, 22c per lb.; Bar, 25c.

ANTIMONY.—14.

BABBITT METAL.—No. 3, 7c.

QUICKSILVER. — Steady. Local, $41.00; export, $37.50 @ 38.00; carload lots, special rates.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13¼c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¼c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 30 @ 31c per lb.; carloads, 29c; in 10-lb. tins 37c; sulphuric acid, 2½c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9½@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ℔ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 7¼c; 6s, 14 oz., 6¾c; 6s, 12 oz., 5½c; 6s, 10 oz., 4½c; Granite (Mining) Candles—6s, 16 oz., 8¾c, 6s, 14 oz., 7¾c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $2.40; cut, $2.25; 10 to 20d, wire, $2.45; cut, $2.30; 8d, wire, $2.50; cut, $2.35; 6 and 7d, wire, $2 60; cut, $2.45; 4 and 5d, wire, $2.70; cut, $2.55; 3d, wire, $2.85; cut, $2.70; 2d, wire, $3.10; cut, $2.95. In carload lots, 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 5, 1899.

9:30 A. M. SESSION.

250 Belcher	19c	300 Mexican	32c
600 Best & Belcher	41c	300 Ophir	56c
200 Challenge	17c	900 Potosi	13c
800 Chollar	16c	500 Savage	11c
400 C. Cal. & Va.	$1 30	100 Sierra Nevada	90c
300 Gould & Curry	27c	500 Union Con	33c
500 Hale & Norc's	10c	1100 Yellow Jacket	24c
200 Justice	15c		

2:30 P. M. SESSION.

1300 Ophir	51c	600 H. & N.	09c
300 Gould & Curry	26c	300 Sierra Nevada	83c
300 Best & Belcher	36c	750 Utah	09c
800 Con. Cal. & Va.	$1 25	400 Overman	08c
700 Savage	10c	100 Union Con	32c
300 Potosi	15c	200 Yellow Jacket	18c

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.
Cable address Edbee Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

WANTED,
To Exchange Valuable Alaska Placer for California Property.
Address J. B., Mining and Scientific Press Office.

FOR SALE.
4 Woodbury Concentrators with new belts. Machines in good condition. For price and particulars, apply to EDWARD GOODWIN, Supt. Montauk Con. G. M. Co., Newcastle, Cal.

FOR SALE CHEAP.
2 Edison Bi-Polar Dynamos, 540 Lamps, with Switchboard and Apparatus Complete;
1 50-H. P. McIntosh & Seymour Engine;
2 60-H. P. Babcock and Wilson Boilers;
All in first-class condition. Address
PACIFIC TELEPHONE & TELEGRAPH CO., 216 Bush Street. San Francisco, Cal.

J. D. BETHUNE,
(Late Associate Justice Supreme Court.)
Attorney at Law, Mining Law,
PRESCOTT,.....ARIZONA.
A Valuable Gold Property for Sale.

UTAH
Mines—Dividend Paying and Investment Stock.
W. E. HUBBARD & CO., 15 W. 2d So. Street, SALT LAKE CITY.

ANTIMONY.
We buy Antimony Ore in any quantity and pay prompt CASH for same. Write us and let us know what you have.
Chapman Smelting Works Co.,
(INCORPORATED.)
422 Battery Street.....San Francisco, Cal.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork All communications *strictly confidential.*

Quicksilver
FOR SALE IN LOTS TO SUIT.
Agents for Redington Quicksilver Mine.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from Rocco Molinari, in the Humbug Gulch Mine, near Volcano; Amador Co., to deposit tailings in Humbug Gulch; from J. B. Meek, in the Grizzly Hill Mine, near Volcano, Amador Co., to deposit tailings in Misery Creek; from Lewis Emery, Jr., in the Emery Placer Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in Murray Creek; and from Archie Newell, in the Newell Claim, near Oleta, Amador Co., to deposit tailings in Deadman Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 9, 1899, at 1:30 P. M.

Silver City Reduction Co.,
SILVER CITY, GRANT COUNTY, NEW MEXICO.
Purchasers and Smelters of Gold, Silver and Copper Ores.
This Plant is Owned and Operated by the Estate of the Late Senator George Hearst of California.

MICHIGAN COLLEGE OF MINES.
Supported by the State of Michigan. Practical work. Elective system. Special advantages for men of age and experience. For catalogues address
DR. M. E. WADSWORTH, President, Houghton, Michigan.

Placer Miners' Attention
Is called to the fact that we are purchasers of
OSM-IRIDIUM
In lots of one ounce and upwards.
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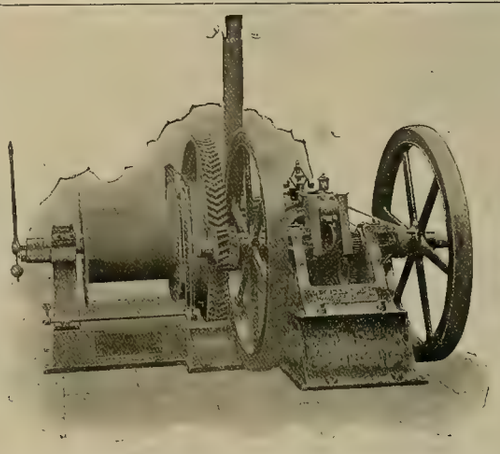

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Assessment Notices.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of December, 1898, an assessment (No. 32) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, 10th floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of January, 1899, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on THURSDAY, the 23d day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Mills building, room 31, 10th floor, San Francisco, California.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3rd day of December, 1898, an assessment (No. 22) of three (3c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of January, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 30th day of January, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of December, 1898, an assessment (No. 5) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 20th day of January, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of February, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of January, 1899, an assessment (No. 12) of Ten Cents (10c.) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 6th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, secretary.

Office—237 12th street, San Francisco, California. The Secretary will also receive payments from 12 to 5 P. M. at his business office, 220 Sansome street.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the HORSESHOE BAR CONSOLIDATED MINING COMPANY will be held at the office of the company, Room 36, No. 330 Pine Street, San Francisco, California, on MONDAY, the 16th day of January, 1899, at the hour of 1 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. Transfer books will close on Thursday, January 12th, 1899, at 3 o'clock P. M.

D. M. KENT, Secretary.

Office—Room 36, No. 330 Pine Street, San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the CONSOLIDATED ST. GOTHARD GOLD MINING COMPANY will be held at the office of the company, 113 Crocker building, San Francisco, California, on THURSDAY, the 12th day of January, 1899, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. Transfer books will close on Monday, January 9th, at 4 o'clock P. M. J. F. HOLLING, Secretary.

Office — 113 Crocker building, San Francisco, California.

ANNUAL MEETING.

Dutch Mining and Milling Company.

The Regular Annual Meeting of the Stockholders of the Dutch Mining and Milling Company will be held at the office of the company, No. 319 California St., City and County of San Francisco, State of California, on MONDAY, the 16th day of January, 1899, at the hour of 2 o'clock P. M. on said day, for the purpose of electing a Board of Directors for the ensuing year, and also for the transaction of such other business as may be brought before the meeting. Transfer books close Thursday, January 5th, 1899, at 3 o'clock P. M. GEO. W. GERHARD, Secretary.

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DELINQUENT SALE NOTICE.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 2) levied on the 15th day of November, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
William Day	622	100	$10 00
George Straut	623	1,000	100 00
George Straut	646	500	50 00
E. P. Hill	637	150	15 00

And in accordance with law, and an order from the Board of Directors, made on the 15th day of November, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 213 Jackson street, San Francisco, California, on TUESDAY, the 17th day of January, 1899, at the hour of 3 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale. J. MIDDLETON, Secretary.

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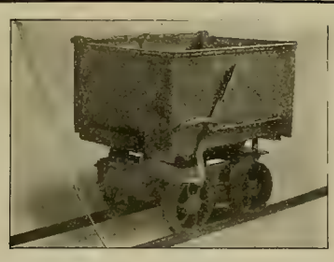

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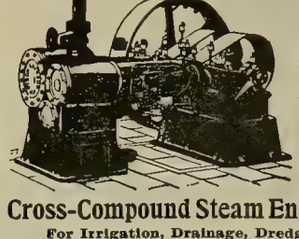

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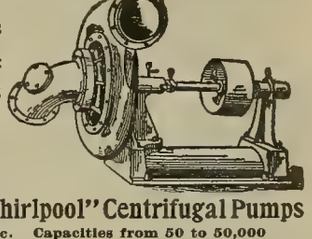

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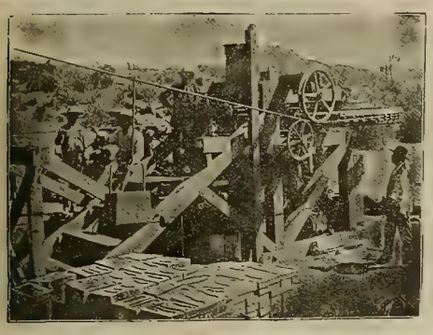

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"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.
"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

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Catalogue on Application.

CALIFORNIA STATE LIBRARY.

This Paper not to be taken from the Library.

MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

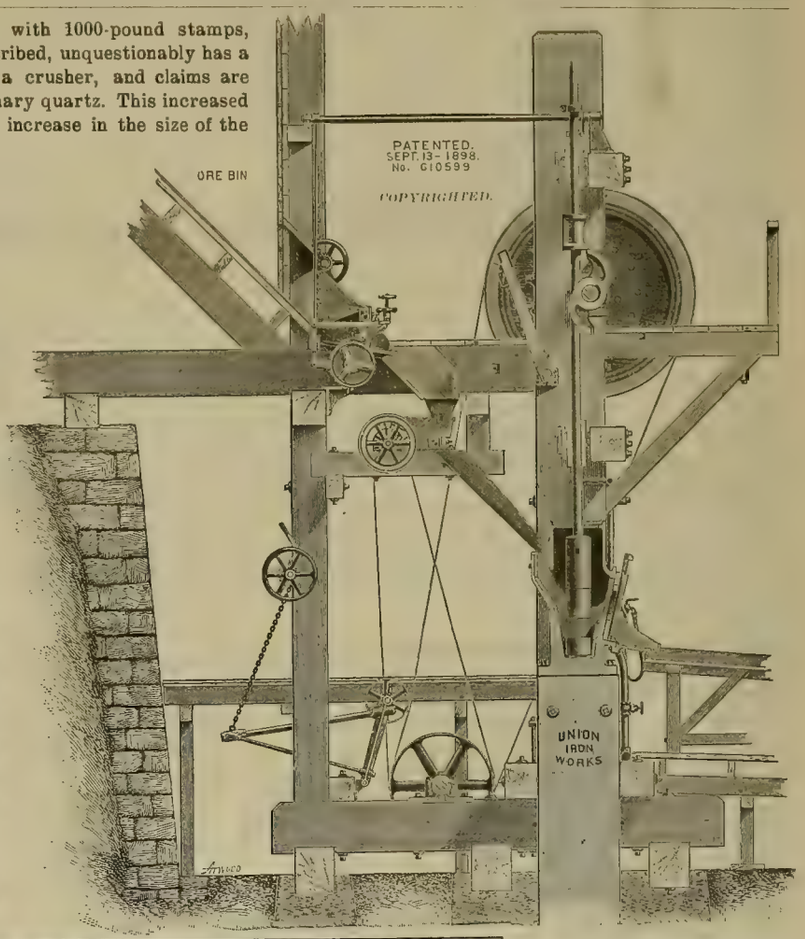
No. 2010.— VOLUME LXXVIII. Number 2. SAN FRANCISCO, SATURDAY, JANUARY 14, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

New Feature in Stamp Milling.

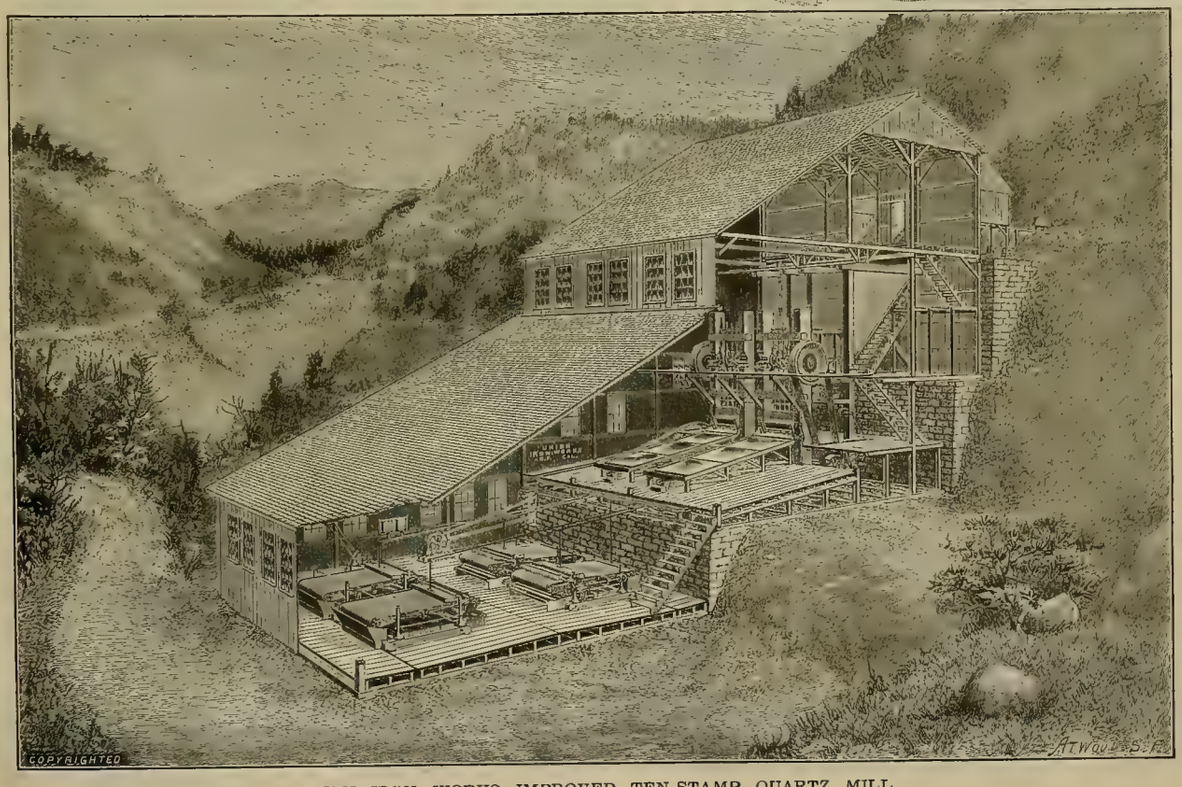
The Union Iron Works of San Francisco have recently introduced a new feature in stamp mill practice, illustrations of which are herewith produced. Instead of feeding the ore automatically into the mortar of a stamp battery in pieces ranging from two to two and one-half inches in size, requiring the stamps to perform a great deal of work that could be done by a breaker, thus reducing their capacity, the attempt has hitherto been made to crush the ore fine with a series of breakers before being put into the battery bins, but this method had to be abandoned, as it was found practically impossible to automatically feed the ore out of the bins, due to "bridging." This difficulty is intended to be overcome in the method here shown.

The ore is crushed to the usual size—from two to two and one-half inches—in the ordinary way, and dumped into the battery bins. From these it is automatically fed to the mortar by means of a combined ore bin gate and feeder, located above the feed floor of the battery, and operated by the central stamp as usual. The ore, on its way from the feeder to the mortar, passes through a small Dodge crusher, size 4″x6″, which crushes it to about one-quarter inch size before reaching the stamps. A five-stamp battery, with 1000-pound stamps, equipped with a fine crusher as described, unquestionably has a greater capacity than one without a crusher, and claims are made for five tons per stamp on ordinary quartz. This increased capacity of the battery calls for an increase in the size of the copper plates used, not in length but in width, as it is necessary to maintain a depth of pulp on the plates that will always insure fine gold coming in contact with the silvered surface. The plates used with these batteries are usually six feet in width by fifteen feet long, sometimes exceeding this in width, depending upon the character of the ore to be worked. In order to dress plates of this width, it has been found necessary to build these mills in units of five stamps, as shown in the illustration of a complete mill which is so minute as to detail that little description is necessary for our readers.

Reference to the sectional view indicates clearly the nature of the claim on which patent has been issued. In the ore stamp battery is a combination of primary crusher, a bin into which the ore falls therefrom, a secondary crusher, a feeder to deliver the ore thence to the stamp, drive mechanism for the crushers and stamp, and connected mechanism between stamp and feeder automatically regulating feed of ore from bin to secondary crusher. In the upper illustration will also be noted this secondary crusher between the ore feed and the battery mortar, the chute for conveyance to the latter, the bottom rotating table, the shaft-mounted pinion with eccentric-connected arm, the rod forming connection with an arm projecting from the rock-shaft, the stamp operated by the arm and the collar mounted thereon engaging with the arm with means for returning the shaft rocker to its initial position. No royalty or extra charge is imposed by the manufacturers of this new stamp mill.



SECTIONAL VIEW BATTERY WITH SECONDARY CRUSHER.



UNION IRON WORKS IMPROVED TEN-STAMP QUARTZ MILL.

While the duty of a stamp is affected largely by the dissimilarity of ores, varying in actual practice from one to three tons every twenty-four hours, yet any advance in increased crushing capacity is a direct gain in economics.

A ten-stamp battery, having a capacity of fifty tons per day, certainly works an advance in milling that will attract attention.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Oldest Mining Journal on the American Continent

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J. F. HALLORAN.....Publisher

San Francisco, January 14, 1899.

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Riparian Rights.

Under the title of Merced G. M. Co. vs. Dorward et al., a suit is now pending in the U. S. Circuit Court at San Francisco, which, by reason of the principle involved, is of more than passing interest to every water user in California.

The facts are briefly as follows: Plaintiff company bought in '94 the rights of the Golden Rock Ditch Co. The ditch, built about '60, carried 4000 inches of water from the South Tuolumne river to the mines at Big Oak Flat. Later it was extended to Horse Shoe Bend on the Merced river in Mariposa county. No use has been made of the water for twenty years, though the diverting dam, which washed out in '90 was rebuilt in '92, and in '94 present owners employed two men some months cutting trees and brush. Meantime flumes had rotted down and trees had grown in the canal bed. Recently defendants made a water location a mile farther up the stream and began construction of a ditch to carry water to the vicinity of their mining properties near Jacksonville, Tuolumne Co. Plaintiff sues to quiet title and a temporary injunction restrains defendants from continuing work.

The important point in the case is that while plaintiffs virtually admit such continued non-use of water as to amount to statutory abandonment and to work a forfeiture under the terms of the California water law, they set up that under the terms of the mining act of Congress of '66, (the ditch being then in use), they acquired a title prior to and independent of the terms of the State laws and free from the obligations to make continuous use of the water, which the latter statute imposes. The text of the law under which this title is claimed (Sec. 9, Act of July 26th, '66, repeated in Section 2339, U. S. Revised Statutes), is as follows:

SEC. 9. That whenever by priority of possession, rights to the use of water for mining, agricultural, manufacturing or other purposes, have vested or accrued, and the same are recognized and acknowledged by the local customs, laws, and the decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same; and the right of way for the construction of ditches and canals for the purposes aforesaid is hereby acknowledged and confirmed.

The doctrine that Congress in '66 made, of the waters of every ditch then in use, a grant which was unconditional and could not in any way be forfeited or abandoned is a novel one. Equally unexpected is the ruling of the court that a subsequent locator may be enjoined, even temporarily, from the construction of another ditch from another point on the same stream at a time when plaintiff was making and could make no use of the water.

Should the court finally adopt plaintiff's theory, that the title to every ditch in use on July 26th, '66, is still paramount, it will cause great disturbance to all water users and may upset the entire structure of water law which our courts have built up upon the principle of continuous use of water for a beneficial purpose as a basis of right of use. There are hundreds of these old ditches throughout the State antedating '66 and long since abandoned, and below them have sprung up innumerable irrigation, water power and electrical enterprises, all of which would be at the mercy of anyone who could show color of title in one of those old canals, in case the court should decree plaintiff's theory to be the law.

The case under consideration is somewhat in point, as the plaintiffs assert the right to again discharge the Tuolumne waters into the Merced as was done in '66, notwithstanding that since they ceased to use the water the Modesto and Turlock irrigation districts have expended millions of dollars on their canal systems and the great La Grange dam, lower down on the Tuolumne, and they will lose the use of whatever water is carried to the Merced. It is stated that steps are being taken by the irrigation district authorities to be allowed to intervene in the suit in order to protect their own interests.

Not Alone "Copper" Mining.

Following is an excerpt from an excellent article on copper mining in the Boston *Financial News* of the 3rd inst.:

Copper, indeed, can scarcely be considered, as the copper industry is now conducted, a mining venture in the ordinary sense of the word. Copper mines are worked on the same scale and with the same attention to the conditions of the market as any other manufacturing industry, and they should be judged by investors on much the same basis. Where there is a large supply of ore, even of a low grade, with considerable assets in the shape of furnaces or other appliances of recent date, it is scarcely possible that, with good management, other than good results should accrue. There are new copper companies coming, and with the present plethora of money there is no doubt that any good, sound enterprise introduced under good auspices will meet with a favorable reception from investors, who are tired of leaving their deposits uselessly in the banks.

The argument that copper should be removed from the domain of "ventures" applies just as well to the mining of gold. Indeed, to substitute in the above the word "gold" for the word "copper" would not destroy its force or truth; rather could it be thus enhanced, for it could be further said of gold what is denied even to copper mining that in the case of gold production is removed every vestige of chance of competition, or "cornering," or need of seeking combines or customers.

REGARDING the Tropenas steel process referred to and illustrated in the issue of Dec. 31st, '98, in answer to inquiries it may be said that the converter is a form of vessel in which there are two sets of tuyeres. The lower series drives the blast just over the surface of the metal; the upper set of smaller size is supplied with air by a separate blast box, which, during the progress of the boil, admits air merely for the purpose of burning the carbon monoxide inside the vessel. This increases the temperature and the fluidity of the metal. There is also an outlet provided near the upper part of the vessel for hot gases to pass through a hollow trunion into a regenerator, which heats the air coming from the blowing engines to the tuyeres. Oxidation takes place at the surface of the metal only, and it is claimed that there is no stirring movement and mixture of slag with metal during the blow so that the impurities in the slag do not get back into the metal. The temperature of the steel being very high, admits of its being removed from the converter in small quantities at a time for casting purposes. It is stated that the reaction is transmitted from molecule to molecule from the surface throughout the bath to the bottom, but unless there is movement of the metal this can take place only by diffusion of oxidized products dissolved in the bath, or by rapid diffusion of oxidizable impurities bringing them to the surface. The former action would operate much more quickly than the latter, and oxidations taking place beneath the surface would no doubt give rise to ebullition and thorough mixing of the metal, but not of metal with the slag. This method of blowing obviates the inconvenience and loss occasioned by the projection of metal and slag from the mouth of the vessel which is a feature of the ordinary process. It is claimed also that, owing to the bath being comparatively quiet, there is less waste from oxidation. However this may be, it is a fact that a slag very rich in iron is produced at one period of the blow. The process may be acid or basic and ferro-silicon or ferro-manganese finally added.

A "Division of Mines."

The movement favoring the creation of a department of mines and mining, a Cabinet position, which began some time ago, is not rapidly gaining the favor it should. The arguments adduced herein in support of the proposition are so far unanswered, because unanswerable, but inaction and inertia make the matter a hard one to push, there being further hindrance by premature announcements here and there of the hopes or claims of sundry individuals to attain the projected position. That should be the last thing to be considered.

Director Wolcott of the U. S. Geological Survey, has secured the introduction at this short session of Congress of a joint resolution providing for a division of mines in connection with his department. The resolution is worded as follows:

Joint resolution to provide for a division of mines and mining in the United States Geological Survey.

WHEREAS, The mining interests of the United States, which yielded during the calendar year eighteen hundred and ninety-seven an increase to the nation's wealth of five hundred ninety-four million nine hundred and ninety-one thousand dollars, have not clearly defined representation in the organization of the government; and

Whereas, It is desirable that there should be such a representation for the purpose of gathering and publishing statistics relating to mines and mining, including the statistics of gold and silver as mineral products from each State and district, in addition to the statistics now gathered by the director of the mint, and statistics in relation to labor employed and wages earned in mines and mining, and for the purpose of compiling and publishing the laws relating to prospecting, prospectors, and mining generally, and recommending revisions of the same; and

Whereas, Mining and mineral statistics of all kinds should be simplified and prompt publication made of them; therefore

Resolved, By the Senate and House of Representatives of the United States of America in Congress assembled, that a division of mines and mining be, and is hereby established in the United States Geological Survey, to be organized by the director of said survey, for the purpose of gathering and publishing statistics of the mineral resources of the United States, including the products of gold and silver, based upon the actual mined product of each State, and statistics of labor employed and wages earned in mining operations, and making investigations in relation to mines and mining generally, and publishing the results thereof, and for the purpose of compiling and publishing the laws relating to prospecting, prospectors and mining, and recommending revisions of the same; and that there be appropriated for the purpose of this division one hundred and fifty thousand dollars: Provided, That the statistics and information gathered by the division of mines and mining and by the division of geology of the Geological Survey may be published as a part of or a special appendix to the annual report of the director of the survey, or as special papers where early publication is desired, the size of the edition of each such special paper to be controlled by its economic importance and to be determined by the director of the Geological Survey and approved by the Secretary of the Interior; Provided further, That the entire cost of composition, paper, printing, illustrations, and binding of such special papers shall not exceed ten thousand dollars, the cost of which shall be charged against the appropriation for the division of mines and mining. Provided further, That all statistics for each calendar year shall be published and delivered to Congress by the first day of December of the succeeding calendar year; Provided further, That the separate chapters on any given mineral product, such as gold, silver, iron, coal, building stone, and so forth, shall be printed as transmitted for publication; that a pamphlet edition of any chapter shall be printed for distribution on request of the director of the survey, approved by the Secretary of the Interior, the size of the edition to be controlled by the economic importance of the mineral treated and to be determined by the director of the survey and approved by the Secretary of the Interior; Provided further, That the entire cost of paper, printing, and binding of all such separate chapters shall not exceed five thousand dollars, and that this cost shall be charged against the appropriation which bears the cost of the printing and engraving for the annual report of the director of the survey.

Concentrates.

THE California quicksilver industry gives employment to about 4000 men.

WATER is fifty cents per barrel in the new mining camp of Republic, Wash.

THE Hastings mineral district of Ontario, Canada, has established a public assay office.

AN "aluminum deposit" 4 feet thick, and, as usual, "inexhaustible," has been found on Orcas island, Puget sound.

THE determination of the specific gravity of any solid or liquid must be made at a temperature of 60° F., or 15.5° C.

A BAROMETRIC reading of 22.5 inches indicates an altitude of 7980 feet, and an atmospheric pressure of 11.04 pounds per square inch.

THE specimen of "white metal" from Prescott, Arizona, is chalcocite, or copper glance, containing about 60% copper, 5% iron and 18% sulphur.

DRY WASHERS in absolutely dry ground work all right on a small scale, but to attempt such work on a big plan is not successful so far as known.

THE longest telephone line in the world is now in operation between Livingston, Montana, and San Diego, Cal.—2161 miles; five minutes, $18.

WITH a boiler 30 feet long, 36 inches diameter, holes punched, joints single-riveted, working at 80-lb. pressure, the sheets should be .2618 inch thick.

IN a chimney 80 feet high, of the area stated, the draught-power is equal to .585 inch of water, about the same as a wind with a velocity of 42 feet per second.

WHAT is practically pure sulphur is manufactured by the Western Chemial Works, Denver, Colo., at $22 per ton, from ore from the Vulcan mine, Gunnison Co.

A CHARGE of abandonment will not be entertained against any one while serving in the United States army and who is thus debarred from prosecuting his case.

THE American Mining Co. (J. B. Haggin's company), at El Oro, Mexico, has a new 100-stamp mill, the most extensive plant in the Republic, daily handling 200 tons of ore.

OFFICIAL tables of "Fifty Years of California Rainfall" have been compiled by this paper, printed in convenient form, and will be sent postpaid upon request to any address.

THE Independence mine, Cripple Creek, Colorado, began producing in '93. To Nov. 30th, '98, it had yielded $4,000,000, of which $2,300,000 is the profit of its owner, W. S. Stratton.

WHERE a written contract for the sale of machinery specifically describes the kind, the size and the amount, with express warranties as to capacity, no other warranties will be implied.

CONGRESSMAN SHAFFROTH of Colorado has introduced a bill to amend the war revenue law so that when power of attorney to sell mining stock is endorsed on the back no stamp will be required.

THE plenteous rains throughout California will enable a resumption of many mine dividends, which were seriously menaced by the long continued drought that is now, happily, a thing of the past.

PORT ORFORD BEACH sand miners say copper and cloth is best for practical work and beats any other device. An illustrated detailed description of the Banta machine was published in the issue of April 18th, '96.

THE average amount of moisture in good dynamite is figured at one-half of 1 per cent. If on entering a dynamite supply store a strong odor of nitric acid is noticed, the explosive should be destroyed without delay.

ZINC is advancing in price. In '97 the miners in the southeastern Kansas and Joplin, Mo., districts got an average rate of $20 per ton. In '98 the average exceeded $30 per ton. The '98 zinc output of the latter district was 441,156,945 pounds.

"VELNA" is a newly invented fuel, made so far exclusively in Nice, from petroleum residue, refuse from animal grease, and soda lye; it is possible the vast heaps of coal waste and "culm" in various parts of this country may thus be utilized.

A CUBIC FOOT of lead ore weighs 674 pounds. Thus a vein of galena 1 foot wide, 6 feet high and 6 feet long will produce 16,582 pounds; or a vein 1½ inches wide will net one ton to the fathom, 3 inches wide two tons, 6 inches wide four tons, etc.

DURING '98 at the Denver, Colo., branch mint was received in gold $20,345,995.64. During that year Colorado gold to the value of $11,869.23 was deposited in the New York assay office, $146.75 in the San Francisco mint, and $5274.80 in the Philadelphia mint.

SUPT. SHARON says on account of unavoidable delays the Comstock Pumping Association has extended the time to Feb. 1st, '99, for the Risdon Iron Works Co. to complete the installation of the pumping plant, and expects that it will be in operation by that date.

PLACER mining in Montana bids fair in '99 to assume its old time proportions. In Madison county especially, in Alder gulch and Ruby valley, placer projects are in embryo involving the expenditure of several hundred thousand dollars, with promise of satisfactory returns.

A DAWSON CITY, Klondike, letter says the miners distrust the banks there and will ship their gold to San Francisco. Local brokers are paying $15 an ounce for gold dust, which is better than the miners can do at the banks. Considerable gold is being taken out this winter.

THE schooner Pearl of the Alaska Commercial Co., at San Francisco with $47,000 in bullion and seventy-six tons of concentrates from Unalaska and Unga, is the last vessel of the season to leave that part of Alaska, and there will be no more news from that quarter for some months.

UNDER certain conditions steamboating on the upper Yukon is a pretty good gold mine of itself. During the four months ending Oct. 26th, '98, the Willie Irving, a little sternwheeler, made ten trips between the upper lakes and Dawson, the receipts being $127,668, one trip realing $23,300.

IF an inventor forgets or abandons his invention after a reduction to practice in private, and before a public use, his competitor may claim the patent. If he forgets or abandons it after a public use his competitor can take no patent, but the forfeiture will inure to the benefit of the public.

COPPER has made Butte, Montana, the greatest mining camp on the continent. In '98 its mines yielded 300,000,000 pounds copper and paid about $10,000,000 in dividends. A local publication figures that there are on the payrolls of the Butte mines 6548 men, who annually draw in wages $8,250,480. This is exclusive of about 2000 men employed in the concentrators, smelters, etc., who in the aggregate are paid annually $1,512,000 more. The amount thus paid out for wages in '98 about equaled the amount of dividends declared.

IN recent tests of leather belting, single belts of an average thickness of .20 of an inch and double belts of an average thickness of .35 of an inch were used. The average ultimate strength per inch of width for single belts, as shown by these tests, is 918 pounds; for double belts the ratio is 10 to 7.

THERE is no definite nor regular percentage in amalgam from a hydraulic sluice or anywhere else. Ordinarily it may run about 35% gold and 65% quicksilver. Were 150 pounds of such amalgam retorted, it would probably yield in redistillation 88 pounds of quicksilver, indicating a loss of about 10%.

ORE containing nickel, cobalt and copper, giving from an assay of five grammes, 2.467 gms., arsenides from fusion, 1.246 gms., arsenide of cobalt, nickel and copper, .542 gram, arsenide nickel and copper and a button of copper and gold .421 gram, with .15 gram gold added, contains 5.42% copper, 2.04% nickel, and 8.6% cobalt.

AN Eastern estimate places the aggregate U. S. mineral production of '98 at $752,927,047. In this gold is credited with a total yield for that year of $64,200,000; silver, 64,060,000 ounces; copper, 546,367,793 pounds; pig iron, 11,712,000 tons; lead, 217,067 tons. The estimate figures the world's gold production of '98 at $286,218,954.

IN assaying for bismuth the sample may be native bismuth, bismuth residue or combination, or an alloy. If the first, the assay should be as that for sulphide of antimony; if the second, cyanide of potassium, carbonate of soda, potash and salt are required, the result of the fusion to be tested for other metals; if the third, by wet assay or analysis.

SENATOR PETTIGREW of South Dakota has a proposed amendment to the sundry civil appropriation bill, providing that the fees of United States deputy surveyors for surveying, platting and certifying to a mining claim where the claimant wishes to obtain patent, shall not exceed $30 for any one claim, or $7 per day for each day actually and necessarily employed in such work.

MR. TURNER, Canadian ex-premier, speaking on the proposed British Columbia legislation against aliens in the matter of taking up placer mining claims, says at Vancouver: "I am in favor of British subjects getting the cream of the gold districts of Canada. I hardly think the Americans will bring on any very strong retaliatory measure should the bill become a law."

IN '98 Denver, Colo., imported from British Columbia and Mexico 18,865,125 pounds silver-lead ore, worth $214,502. During '97 Denver's similar importations were 20,000,000 pounds, valued at $300,000. During the last half of '98 such importations there fell off because of the great increase of silver-lead ores received by the Denver smelters from Colorado, Idaho and Utah.

"THE latent heat of vaporization," is the amount of heat that becomes latent when a liquid changes its form to gas or vapor. It is, for instance, the number of units of heat absorbed by one pound of a liquid in the act of passing to the gaseous state. Thus a pound of water at 212° F., absorbs as much heat as would have raised the temperature of the water 966° had it not become latent.

"FORFEITURE" of rights to an unpatented mining claim rests solely upon the compliance or non-compliance with the State and Federal statutes. A "forfeiture" is not an abandonment, the latter being a voluntary act, while the forfeiture may be beyond one's control. Anyone anywhere in the United States may enter upon and locate public mineral land which has become forfeited or abandoned.

AIR, having weight, must, necessarily, have inertia. It requires force to put it in motion, and, when in motion, it must meet with some resistance to bring it back to rest. Its inertia is exactly proportionate to its weight, which, in proportion to its volume, is so small that a very small force is sufficient to put a very large volume of air in motion. As regards ventilation, air is like a rope—easier pulled than pushed.

A BOULDER COUNTY, Colo., miner has compiled a table showing the price at which mining supplies sold there in '70 and in '98. In '70 giant powder sold at $1 per pound, and now it is 13 cents. Steel in those days cost 40 cents, now it sells at 8 cents up there. Candles that now retail at $4 a box then cost $20. Smelting charges were $60 per ton, and he now gets it done for $7, and so on through a list of some fifteen or twenty articles.

ON a pipe line in a slope being 144 square inches in area, 2000 feet long, the slope dipping 1 foot in 10, there is a pressure at the bottom end of the pipe of 1175.272 pounds. With a tensile strength of 16,000 pounds per square inch, the theoretical resistance of the pipe would require a thickness of one-twenty-eighth of an inch. Practically, it should be several times that to resist handling, wear, corrosion and extra strain.

THERE is nothing in the mining law regarding the legality or illegality of location work on any day of the week. A minor can take and hold a claim. There is nothing in the Federal mining law which prevents any one locator from appropriating as many locations on the same lode as he may be able to find independent discoveries upon which to base them, but no location can legally exceed the statutory limit as to length and width, namely: 1500x600 feet.

FOUR men were recently killed at the Jumper mine, Stent, Tuolumne Co., Cal., being plunged in a skip to the bottom of a 775-foot shaft. The accident was caused by the carelessness and neglect of the engineer in charge of the hoist. The incident gives additional point to the argument that engineers so employed should be licensed. Some go still further and maintain that California should have a State mining inspector, with jurisdiction over mines, hoisting works and machinery.

AUSTRALIA is suffering from as bad a drought as that from which California has just emerged. The *Mining Standard* of Dec. 15 says: "That the drought is more severe than most of those which have recently visited Australia is evident from its effects. The lignum is reported to be dying out of the dry beds of the rivers. Fences and gates in many places have been buried in drifting sand, carried by dust storms. Stock are perishing. Old residents declare that nothing like it has been known for thirty years."

A SUIT involving an interesting question is at issue in Salt Lake City, Utah, between W. A. Clark of Butte, Montana, and A. G. Campbell of the former place, involving $19,000. It is stated that on Oct. 1st, '98, L. C. Trent of Salt Lake agreed to buy for W. A. Clark 95,112 shares stock of Ophir Hill M. & C. Co. for $75,000, the stock to be deposited in escrow and payment to be made Nov. 24th. On Nov. 22d, '98, the company paid a $19,000 dividend, which, it is asserted, was taken possession of by Mr. Campbell, the seller of the stock, and suit is brought to recover that amount.

THE Director of the U. S. mint estimates the supply of money in the world on Jan. 1st, '99, as follows:

Gold	$4,504,900,000
Silver	3,977,500,000
Uncovered paper	2,322,800,000
Total	$10,895,200,000
On Jan. 1st, '94, he estimated it to be:	
Gold	$3,419,500,000
Silver	4,442,700,000
Uncovered paper	2,700,000,000
Total	$10,562,200,000

THE stated difficulty in starting the gas engine may be because of a dirty slide valve. In some gas engines the lubricating oil is led from a general lubricating apparatus to the slide valve and piston. On stopping the pipes are filled with a considerable quantity of oil, which generally leaks out, and the channels and grooves of the igniting apparatus in the slide valve are filled. If after standing some time it is attempted to start up the engine, many futile turns may have to be given in order that the oil may be blown out from the main channels and grooves of the slide valve. This may be remedied if, on stopping, a small piece of wood, which will absorb the escaping oil, be placed under the mouth of the tube feeding the slide valve.

DR. JOHN HALDANE, probably the best living authority on gases in mines, recommends the use of mice as a test for carbonic oxide as being the best and practically the only method for testing underground. A mouse is overcome in about a twentieth part of the time that a man would be. So that if a mouse is confined in a wire cage and taken into the workings, and is overcome in one minute, the men may take it as a warning not to stop in those workings for more than ten minutes. Chemists, of course, can detect this gas easily in their laboratories, but it is manifestly impossible to take a lot of appliances into a mine, to say nothing of the time that is required to make the tests. The reason that the mouse is overcome sooner than a man is that the circuit of its blood from the lungs to the heart, and thence through the body is so very much shorter than that of the larger mammal.

THE Empire mine, Grass Valley, Cal., is a good example of the permanence of gold mining in one spot. It has been worked continuously since 1850, and has yielded over $6,000,000. Just now additional appliances—practically a new plant—are being put in, and indications are that it will continue to be a leading gold producer for fifty years more. It is such "going mines" as the Empire that controvert the mistaken notion that gold mining is transitory and ephemeral. How many business enterprises in California or anywhere else have been in existence fifty years, or, if so existing, have gone on making money for their proprietors continuously? The only mistake California makes is not advertising the existence of such profitable mines. Being in California, it is taken as a matter of course. Were it elsewhere, the fact would be heralded and made a matter of world-wide notoriety.

THE advance in price of copper shares during the past few years has been remarkable. Calumet & Hecla stock, which sold at $650 per share a few weeks ago, touched $247 in September, 1893. Tamarack, which sold at $180 during December, 1898, sold at $64 in September, 1896. Quincy sold at $80 in 1893, since which time the capital stock has been doubled, the new stock costing old shareholders but $25 per share, a total of $105 for two shares, now worth $282. Osceola sold at $20 per share in September, 1893, and touched $80 recently. Atlantic, now selling at $31.50, was sold at $7 five years ago. In 1893 Wolverine sold at 75 cents per share and is now earning 10 per cent per annum on $33. Allouez sold at 50 cents per share in 1897 and 10 cents per share in 1896, but is now worth $6.50. Centennial sold at $2.50 last year and when the company was reorganized, two years ago, many shareholders refused to pay in the $2 per share required to wipe out the indebtedness and save their holdings, yet the price on Dec. 24th, '98, was $30.25.

IN the House of Representatives at Washington a California Congressman objected this week to the appropriation for the U. S. assay office at Seattle, Wash., claiming that it was established there for the benefit of a corporation with headquarters in Chicago. The appropriation asked for will, however, be made. California's two Senators called upon the U. S. Treasurer concerning reported discrimination against the San Francisco mint and in favor of the Philadelphia mint regarding shipment of bullion for coinage. They asked that gold be shipped from Seattle to San Francisco for coinage at the mint there, instead of to the Philadelphia mint, where most of it now goes. U. S. Treasurer Roberts said that that bullion would be shipped to San Francisco but for the fact that the express company charges $2 25 for transporting $1000 from Seattle to San Francisco and only $1.75 for transporting $1000 from Seattle to Philadelphia. He promised Senators Perkins and White that he would "take the matter up with the express company and try to get lower rates to San Francisco."

"YOUR paper is invaluable to me," writes a Rossland, B. C., mine superintendent. "There are more and better original articles in your paper than in any other mining journal," says a Jerome, Arizona, miner. "The MINING AND SCIENTIFIC PRESS is fought for upon its arrival; seldom is the wrapper of any other disturbed," is a Ward, Colorado, verdict. "The MINING AND SCIENTIFIC PRESS is looked upon as authority on all mining matters in this section," writes a Randsburg, Cal., mining man. "One page of 'Concentrates' is worth the price of a whole year's subscription," says a Butte, Montana, miner. "What I like most about your paper," says a Denver, Colo., smelter man, "is its spirit, kindly, progressive, independent and accurate." "Make it three copies for '99," writes a Baker City, Or., subscriber, "then maybe I can keep a file." "We tried the —— for '98," writes a Clancy, Montana, superintendent, "but must go back to the MINING AND SCIENTIFIC PRESS for the rest of the century anyhow." These are a few of many such received this week. They are indicative of what is said by so many: the judgment, verdict, criticism and candid opinion of critical readers every week in the year. Every year the circle widens; '98 was most notable for the great additions to the list of subscribers outside of California, though never before in its history had it so many readers inside that State's borders as now.

How to Build and Operate an Arrastra.

Written for the MINING AND SCIENTIFIC PRESS by E. L. BALLOU.

In selecting the site for a water power arrastra it is presumed that foresight will be used in having it easy to get ore to, and also to get in heavy rocks for drags and bed. This site is commonly on a flat above high water on the bank of the stream from which water is taken for power. So many ways of applying this water are in use that but one—in common use in this section—will be described. From 20 to 150 feet fall can be used; 60 to 75 is found to be a good working pressure, easily controlled and not liable to knock buckets from the wheel. About 35 inches of water at this pressure will give power enough. Of course, less fall will need more, and more fall will use less water. Unless a convenient tree is used for one upright, two mudsills, two uprights and one cap piece, with the necessary braces, will be needed, of suitable lengths and sizes to meet each case.

After grading off where needed, the center post, of heart cedar or oak, is put in, and deep enough to make sure of it remaining solid. The top of the post must be not less than 2 inches higher than the top of the staves surrounding the bed. The upper end should be hewed down until it is at least 1 inch smaller than the wheel shaft. An iron band is sometimes shrunk on. The bearing plate to support the wheel is now put in. This furnishes the starting point for measuring the balance of the construction of the arrastra. The frame can now be put up and braced. The upper bearing is bolted in place directly over the post bearing—use a plumb line to make sure, moving the frame, if necessary, to get the upper directly over the lower bearing. After mortising for the wheel and sweeps, driving the journals to place in each end, and shrinking on the bands, the shaft is raised to place and a sweep is put in and keyed up level.

A narrow circular trench is now dug for the staves. These may be of any convenient width and about 4 inches thick, of cedar, pine, fir or oak. Sawed stuff is not necessary, if reasonable care is used to have the edges trimmed fairly true; 3 ft. 4 in. is a good length for the staves. Provide a wide stave, or piece of plank, for the discharge opening. This opening should be 4 in. wide and extend down to 6 in. of the bottom of the stave. (See Fig. 5, *a* and *b*.) Proceed now to place the staves, using a vertical strip nailed on the sweep as a guide. See that the staves are kept upright in both directions, and that the tops are of uniform height. Secure as fast as in proper place with some loose dirt. Don't slight the proper placing of the staves, or it will be regretted when too late to remedy.

When the staves are in place and well tamped outside, the enclosed dirt is dug out to within 6 in. of the bottom of the staves and the laying of the bed proceeded with. To plank up under the bed is quite unnecessary.

In selecting the large bed rock, reject all under 16 in. thick. Creek boulders, with at least one reasonably flat surface, are preferred, as the comparatively smooth sides are easy to clear of amalgam. Begin at the discharge opening and see that a large stone is so placed that a crevice will remain from the gate to the post until the bed is worn out. It is better not to place any large rocks against the posts or staves, leaving about 6 in. next to each to be filled with smaller rock. (Fig. 2, *a*.) For filling between the larger rock, use convenient-sized rock and mill or arrastra tailings, if they can be got; otherwise use a not too sticky clay, in either case tamping in snugly with a stick or drill. Keep the bed level in both directions, and use rocks of uniform hardness. To keep the larger rocks from shifting, a small rock or two is dropped in between before tamping. (Fig. 2, *a*.) Good-sized crevices, with removable wedge rocks, are best for catching amalgam and can be cleaned up better. The discharge gate is arranged as indicated (Fig. 5, *a* and *b*). The small sections are removed as the bed wears down, the settled charge being run off directly from the bottom.

The wheel shaft should be not less than 18 in. in diameter for a 32-ft. wheel and 11-ft. bed. It may taper to 12 in. at the upper end. It is best made of red fir, with the sap removed. An iron band is shrunk on each end. For the lower journal a piece of 2-in. round iron or 18 in. of a wagon axle is used, with about 2 in. of good steel welded on to the lower end; the upper end square, to rest against the lower side of a sweep. The steel may be pointed or left square. With the square-ended journal a 3x3x$\frac{1}{4}$ in. steel plate and soft collar, with lugs, are used. With the pointed or rounded journal a 3x3x1 in. steel plate, with a suitable depression, is used, the collar being omitted. The plate and journal are tempered hard in either case.

For the upper journal a piece of wagon axle, with the cast iron boxing let into a piece of timber, the latter bolted to the cap timber, does very well, or a handy blacksmith can make suitable irons. Both journals should project 6 in. from the shaft. Don't make a somewhat common mistake by letting the cast iron boxing into the cap timber.

For sweeps 4x8 in. of split red fir, or tough oak, is used, one the length of the diameter of the bed, the other 2 ft. less. The lower side of the sweep mortices are 12 in. from the end of the shaft, and are both cut entirely through the shaft. One is 4x9 in., the other 4x12 in., at right angles to the first. Both are tightly keyed to place with hardwood keys, and the outer ends bolted or braced to the wheel arms when necessary; 4x4 in. is cut out of each sweep at the center, to allow them to be wedged down to a common level.

The arms—twelve in number for the largest wheel, eight for the smaller—may be of 2x4 in., 2x6 in., or 2x6 in. at the shaft end, 2x4 in. on the outer end, with 1x6 in. braces nailed to arm and shaft. The mortises are 6 ft. from the lower end of the shaft and are 2 in., with every third one 4 to 6 in. deep. Let the outer end of the arms be 3 in. higher than at the shaft, thus giving the wheel a little "dish."

For the inside of the rim of the wheel use two thicknesses of $\frac{1}{2}$x6 in. breaking points, and $\frac{3}{4}$x6 in. for the outside. Use clear stuff and use either green lumber or water-soak before use. Nail securely; also use a small carriage bolt occasionally, if necessary.

The buckets should be 6 in. long and wide or deep enough to reach the lower side of the rim. Keep the tops flush with the top of the rim and 12 in. apart. The buckets may be of wood and curved, as shown, (Fig. 3), or they may be of sheet iron of proper stiffness, shaped over a block of wood and fastened to wood backing. With proper care in making the rim and placing the buckets and nozzle, nearly as high efficiency can be secured from the water with this wheel as when using the more perfect wheels on the market. To regulate the speed, the nozzle may be secured to the pipe by a piece of rubber hose, or canvas wrapped with rope, thus allowing the nozzle to be moved on and off the wheel. Or the nozzle may be secured permanently to the pipe, using a short, movable piece of pipe to cut off the stream as desired. Round-nozzle tips, from 1 to 2 in., will be needed to suit the variations in weight of drags and supply of water. Square wood or metal nozzles, with a movable tongue to regulate the size of stream, may be used; but, if economy of water is any object, a round metal nozzle and proper-sized tip had best be used. A short covering will be needed over the rim of the wheel where the water strikes the buckets to keep the water from flying about too much.

To keep rain out of the bed, small braces are nailed from shaft to arms, extending a little beyond the

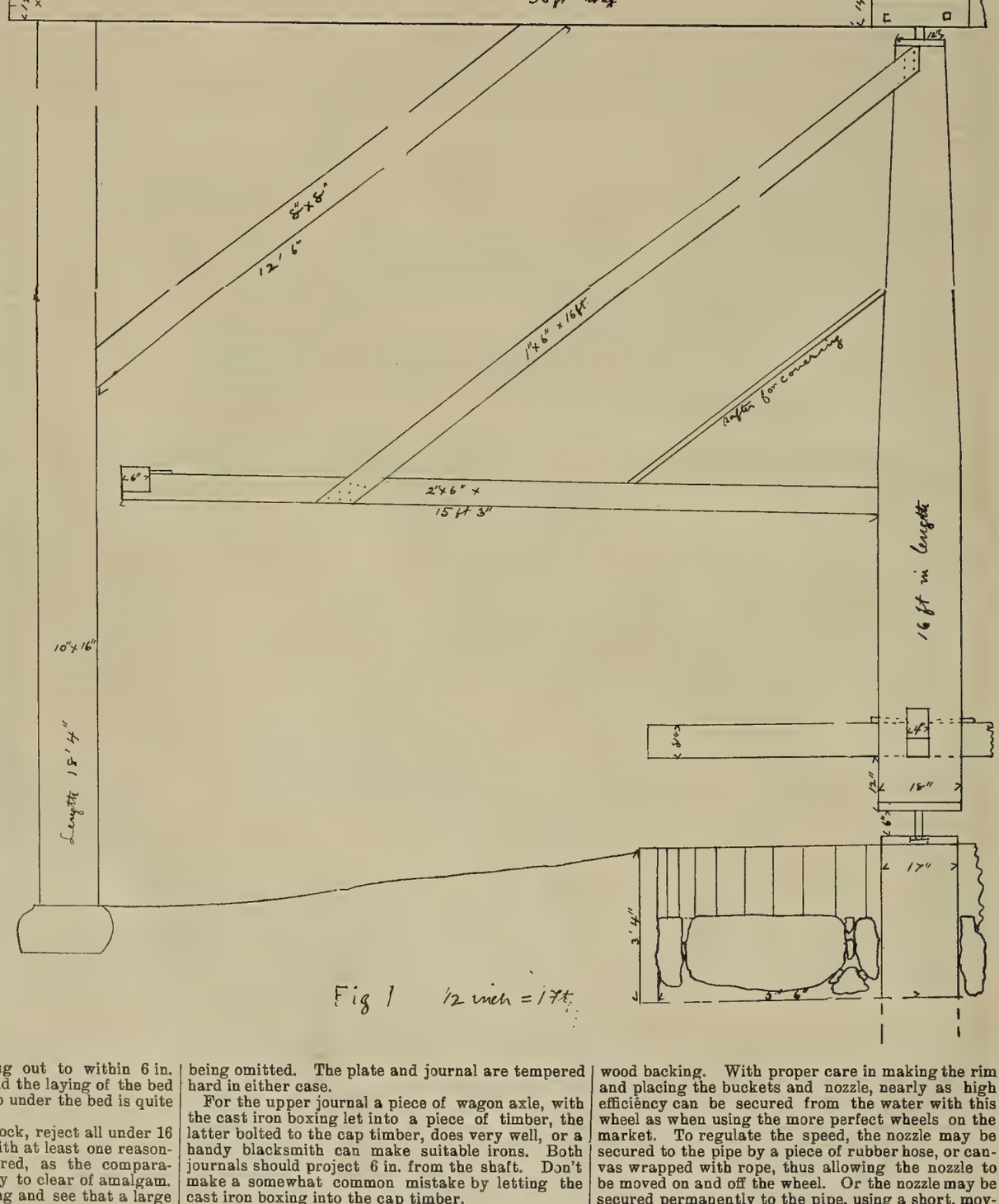


Fig 1 1/2 inch = 1ft

bed, and covered with sheeting or stakes, as fancy dictates. (See Fig. 1.)

The ideal drag is about 10 in. thick, 2 to 2½ ft. wide and long enough to just miss the sweep when entering nearly upright. (Fig. 4, *a* and *b*.) This will crush fast, spread the pulp well, and be efficient until worn almost entirely out. When a drag gets a large grinding surface it should be turned over, or a new one put in. The drags also need to be kept well up to the sweeps. To secure pins in the drags, drill 1¼ or 1½ in. holes about 5 in. deep. For pins use part of an oak sapling with a projecting limb, the green pin, with bark removed, to be somewhat larger than

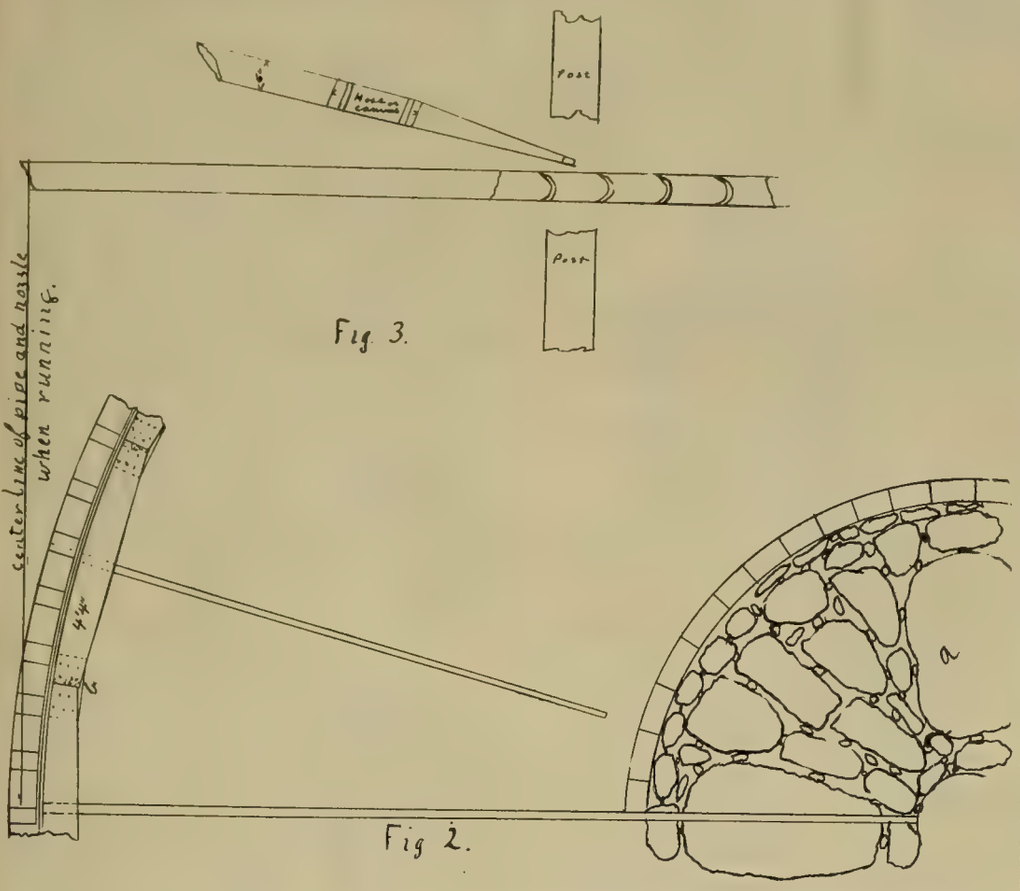


Fig. 3.

Fig. 2.

the hole it is to fill. When all is ready, place the small ends in a hot fire, turning often, so that the pins are quickly dried, but not burned. When cold, whittle until they will just drive with light blows of a sledge, being careful that the hook or former limb points down.

For fastening the drags to the sweeps, 1½ in. diameter best manila rope is usually more reliable and convenient than chains. Fasten to the pins with slipknot, take up all slack possible, so that there will be no moving of rope on the pin. Secure the loose end by wrapping stout string around it and the main rope. Fasten to the sweeps by wrapping at least twice around the sweeps and tucking the end through in front between the rope and sweep. The slack rope, being on the shaft end of the sweep, and the rope extending from the pin to the top and back side of the sweep, prevents chafing of the ropes. To take up the slack easily, move the wheel backwards a few feet by hand and block it; then place a small rock under the raised front edge of the drag, loose the wheel and secure the slack thus made available.

The drags are best arranged, to keep the wheel balanced: two smaller drags outside on the long sweep, the heaviest next the post, and one not quite so heavy farther out on the short sweep, works nicely in every way. Care should be used to keep the bed as near level as possible, for this allows of larger charges, crushes faster, saves the amalgam better, and adds to the life of the bed. By having small rocks next the staves and posts, these can be removed easily to help keep the bed in its original shape. The drags must cover the bed at each revolution of the wheel, and are moved in or out, turned over or replaced, as occasion demands. A movable trough is provided to carry water from the wheel to the bed, to allow of rapid filling when settling, and thinning the pulp when crushing.

When starting up with new bed and drags it will be necessary to run quite slow for a few days, and small drags had best be used. But, the crevices once well filled, surfaces worn on the drags and the bed worn smooth, about fifteen revolutions of the wheel can be given. Faster than this throws out too much pulp.

In running the arrastra, custom varies. If the water season is short, smaller charges and more of them are used to get ore through fast. It is then usual to run at least two charges per twenty-four hours. In any case only enough should be put in for a charge to insure its being ground properly at the desired time of drawing off. This will vary from 500 to 1500 lbs. per charge, and is put in as fast as the drags will spread it out. With heavy drags and hard ore the charge should have no piece of ore larger than walnuts. With softer ore and lighter drags lumps the size of a sledge do no harm.

A little practice will show how much water is needed to run until the "head amalgamator" comes around again—about noon, when the charge is put in just after breakfast. The necessary quicksilver can then be added, and, if two charges per twenty-four hours are run, it is ready to settle at supper time. A common practice is to run twenty-four hours on a charge, especially on ore carrying good value in very fine gold. The quicksilver is then added in the evening. In any case the pulp should be properly ground and gold amalgamated before settling and running off for a new charge.

For the quicksilver, a bottle with a piece of stout

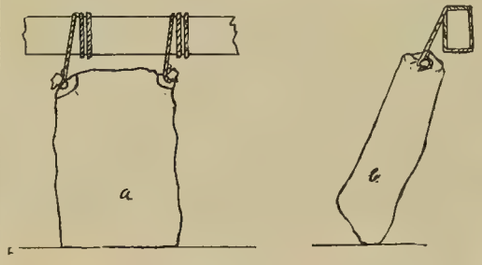


Fig 4

cloth tied tightly over the top is handy. By weighing full once and marking with a file at ½, 1 lb., etc., the exact amount used can be closely governed, and, after some practice and knowledge of the gold in the particular ore being worked, a very close estimate of the amount of gold in the arrastra can be had at any time.

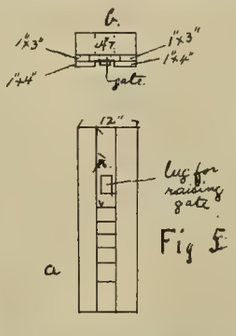


Fig 5

The amalgam should be kept quite thick, so that in the sample of pulp taken before settling it will just gather up into a ball, and, by pressing flat, will show no free quicksilver. To keep the amalgam thick too thin pulp will have to be avoided, and no quicksilver put in until the ore is fairly ground and the pulp thick enough to keep the quicksilver up. With pulp 4 in. deep and twelve revolutions of the wheel per minute, the bed can be seen for about 2 feet behind each drag when the pulp is the right consistency.

The coarser grinding digs up some of the amalgam and most of the extra quicksilver, and, unless the gold is very rusty or the ore extra rich, there will be little or no gold visible in the test taken in the afternoon, the amount of quicksilver called for being judged by the quantity of lead chip or snowflake-shaped amalgam.

If ore carrying much iron oxide is being worked, a charge can be thickened once, if desired, by adding a teaspoonful of salt. The result obtained by putting in so small an amount of salt will be astonishing the first time it is tried. The exact amount of quicksilver to be used must be learned by experience, the usual fault is to use too much.

The ore should be crushed until all will pass through a 60-mesh sieve. When properly ground and the gold amalgamated settling begins, by slowing down to five or six revolutions and water run rapidly in until about 12 in. deep; the wheel kept at this speed one and one-half to two hours. The discharge gate is then raised 6 or 8 in. and the wheel kept going until the bed is empty. The gate is then closed, a shovelful of tailings tamped in, when the arrastra is ready for the next charge. If everything is worked right no sand will be left in the bed after all the water is run out.

With clean quartz twice the bulk of water to bulk of pulp may be too much and with oxide of iron ore it may be too little. Where there is much difference in the grade of ore it is better to run the poorest ore first.

When ready to clean up let the wheel run after settling until all the water possible is run off. The balance is taken up with a sponge.

For special clean-up tools various devices are used. One is a steel tool about 12 in. long with pick point on one end and chisel point on the other, the points turned at right angles to the handle, sharpened and tempered. A small steel shovel 3 in. wide and 4 in. long is handy also. These are sometimes combined in one tool. A whisk broom is also needed. A water-tight box 4 ft. long, 1 ft. high, 2 ft. wide on the bottom and 2 ft. 6 in. on top, with a partition in the center, is provided near the bed.

A home-made trommel or screening device is also needed, unless the old-style rocker is used in cleaning up. This screen is made by nailing 1 in. square strips ⅜ in. apart around two circular ends fastened 20 in. apart on an iron or wooden shaft with a crank at the outer end. A section of the strips is fastened to independent segments working inside the ends proper, hinged on one side and hooked on the other. This makes a lid. This screen is placed in one compartment of the box, about half filled with clean-up stuff, closed, a small stream of clear water turned on and then revolved until the coarse sand and rocks are clean.

The coarse stuff is emptied where the lumps of amalgam can be picked out. The fine stuff is panned in the other compartment; or where a silvered plate is available, it is run over the plate back into the bed. Of course, after the bed is cleaned up, wedge rocks are put in place and any necessary tamping done. The coarse stuff is also put in, a little water added and the arrastra allowed to run a short time before putting in a charge of ore.

In cleaning up it is not often that the stuff next the post or the staves will pay to disturb. The stuff in the crevices is loosened with a pick, the material in the smaller crevices being worked towards the larger ones, the rocks scraped where amalgam shows and swept if a thorough job is to be made. Two inches is usually deep enough to go in cleaning out the crevices.

The cleaning and retorting of the amalgam is done in the same way as for gold amalgam secured by any other method.

The loss of quicksilver will vary from nearly all put in to three or four pounds per 100 tons of ore crushed, owing largely to the skill of the man in charge and richness of the ore.

The loss of gold is mostly in the sulphurets; the free gold being saved as close, or closer, than by any other amalgamating device.

But few chemicals are needed, a little concentrated lye occasionally being about all that is advisable. A little sodium amalgam in the quicksilver is sometimes good. Surface ore being often all that is suitable for an arrastra, it is safe as a general rule, to discard all chemicals, care being exercised to keep grease out of the pulp. Where the amalgam is squeezed use canvas in place of buckskin.

The expenses necessary in building an arrastra may vary from $75 to $1000 according to circumstances governing each case.

Ores carrying a heavy percentage of sulphurets are not suited to arrastra work, and the arrastra is the poorest device known to crush these kinds of ores for concentrating.

The running expenses vary. A set of ropes will

last from six to twelve months. The bed is good for twelve to twenty-four months. The wood work should last eight or ten years if well put together and of sound material.

The cost of attendance is from next to nothing to $200 per month. Under favorable circumstances ore going $2 a ton is worked—usually while opening up for better ore, or to keep the arrastra going while other work is on hand.

Some Experiences of a Working Miner.

NUMBER I.

Written for the MINING AND SCIENTIFIC PRESS.

I have recently returned from an extended tour among California mines. One has always interesting and often amusing experiences traveling. I had heard of H—— and concluded to go there. I found it wide-awake. Everything was crude, method appeared nowhere, while makeshift was very much in evidence. Now there are good mines at H—— and things are running smoothly, but then it was different. I went to work in the Q—— mine, one of the largest and best in camp, but I didn't fancy it much—seemed too risky. Fancy a stope 60 feet wide, 100 feet long and 12 to 20 feet high, supported on single posts 10 to 12 inches in diameter, and many of these props bending and splitting under the weight of the overhanging mass of rock, and the stope increasing in size from day to day. I had not been there a week when I hinted to the mining boss that a more secure method of timbering and subsequent filling might be of advantage to all concerned. He admitted there was "room for improvement," but said the manager insisted on him furnishing 100 tons of ore to the mill daily and he had no time to devise or put in any better system of timbering. The trouble all lay in the fact that development was not carried on sufficiently in advance of the daily requirements of the mill to permit the work to be properly done, though this big stope could have been secured had the management not been so short-sighted in its policy of economy. To me it seemed suicidal to work in that stope, so I quit, rolled my blankets and tramped over to where Billy B—— was running a tunnel to cut the vein on the P—— mine. Billy knew how to run a tunnel all right, but did not appear to be at all particular as to the direction in which it was run. I went to work in this tunnel, which was in about 400 feet. After a few days I began to wonder how far it was expected the tunnel should be run before encountering the vein, so I inquired of Billy the object of running this tunnel. His reply was rather more forcible than polite. "To cut the vein, of course. What in h—— do you suppose it is for?" My reply was that I had not been able to discover unless it were to determine the horizontal distance through the mountain to the canyon on the other side. I then took Billy into my confidence and informed him that, in my opinion, his tunnel was running parallel with the vein and he would never reach it driving in that direction unless the vein made a turn. For this I got "my time" and the benefit of a few gratuitous and rather uncomplimentary remarks. I then "hoofed it" back to the railroad and struck out for a camp where a fellow's well-meant advice would be more highly appreciated. A few days later I read in the paper that the big stope of the Q—— mine had caved and, for a wonder, no one was hurt. Lucky, wasn't it? Since leaving Billy and his tunnel I have heard that Tom G—— succeeded Billy as boss at the tunnel which was then in 500 feet. Tom run a crosscut from the face 50 feet to the left and found the vein running nearly parallel with the tunnel. Billy had been deceived by the croppings near the top of the hill, not being able to distinguish between the true strike of the vein as determined on a level and the apparent strike as it appeared on the sloping hillside. This is a frequent source of error among miners. It was a long tramp from Billy's tunnel to the next camp, but it looked like a "ground hog case," so I struck out and in time reached I——. In this vicinity a number of small mines were at work. I found in this camp one of those remarkable feats of engineering that one sees from time to time when tramping around. There was a vein on the K. S. mine which dipped steeply into the mountain.

An inclined shaft had been sunk on this vein over 100 feet in depth. Upon the advent of a new manager a few months prior to my arrival this old and sensible shaft was abandoned and a new three-compartment vertical shaft commenced up on the hillside, the collar of this new shaft being 125 feet higher than the collar of the old one. The new shaft was sunk 100 feet at a cost of $10,000, and at that point lacked 25 feet of being as low as the collar of the old shaft. The work was stopped at that point and the mine abandoned. The money expended on the new shaft would have done a large amount of development on the vein or would have run a crosscut tunnel to the vein from the mountain side and reached the vein 500 feet below the croppings. This instance furnishes another example of how a mine should not be opened. I took a lease on part of a claim near I——, and, meeting with indifferent success "chloriding" a gold mine, I rolled my blankets and took the road again heading for A——.

There were a number of mines working at A——, the newest being the Shotgun. A crosscut tunnel was in 100 feet, which was farther than it had been estimated would be necessary to run to reach the vein cropping on the surface. This tunnel was extended 25 feet while I was at A——; but the vein not being found, the owner became uneasy and began to look for the reason. The suggestion was ventured that it might be well to do some work on the vein itself on top of the hill. This was done and a 15-foot hole proved the vein to pinch out entirely. To add to the distress of this good-faith investor, who was not a miner, it was found that the quartz did not even prospect. This property was abandoned.

Learning that some work was in progress on the P—— mine a few miles distant, I went up there and found several claims being worked in a small way. A mill was running on the P—— mine, the entire operation being under the direction of a shrewd and successful business man who had "money to burn" and the boys were helping to burn some. Here again I "put my foot in it," this time by asking foolish questions. One day during the noon hour I asked the man with "money to burn" how he was pleased with the result of his operations. He expressed himself as very well pleased indeed. His answer was so pleasant and withal gratifying that I ventured a few more questions. The gentleman volunteered the information: "I am not a mining man, you know, but I find it very simple and I will soon 'savey' the business." After this remark our conversation ran something like the following:

"How many tons of ore is the mill crushing, Mr. B——?"

"Well, really, I do not know—have no manner of weighing it, you know."

"The car holds 1600 pounds and I thought perhaps you had the trammer keep tally."

"No, I did not. In fact, I have been so busy that it has never occurred to me at all."

"I suppose, since you are satisfied, the ore is pretty good grade?"

"I can't say as to that; it is to ascertain this that we are running the mill, you understand." (This last in a patronizing tone).

"Are the sulphurets pretty good grade?"

"Well, now, really, I don't know as to that, but they are pretty fair, I guess."

"What percentage of sulphurets do you find the quartz contains?"

"I don't know, I am sure—quite a lot. How do you find that out?"

"By making as close a saving as possible; drying and weighing the concentrates. Then the relation of sulphurets to the ore from which they were obtained can readily be determined."

"Have you made tests on your tailings at regular intervals?" I inquired.

"No, but we are saving very close—*very* close."

"How do you know that?"

"The mill man told me so."

"Oh, then he has taken samples?"

"Not as I know of, but I guess he understands his business."

I noticed that he was becoming a little impatient, but ventured another remark. "I judge from what you have said yourself that you know but little more of this property than you did when you took hold of it. What do you expect to ascertain by this manner of working? You do not know the value of your ore as it comes from the mine; you do not know the capacity of your mill; do not know the percentage of sulphurets saved nor their value, and have no knowledge of the saving of free gold further than the statement of your mill man that it is very close. I fail to see where you are getting the much desired information."

The gentleman abruptly left me sitting on a log and wondering what he would do next. The following day I was enlightened. He shut the mine down and I with the balance packed my blankets once more.

MINER.

Largest Piece of Silver Ore.

TO THE EDITOR:—I wish to dispute the claim of the Smuggler mine at Aspen, Colorado, as having taken out the largest piece of silver ore ever mined.

In the year 1882 the Sierra Granda mine of New Mexico took out one chunk weighing over 10,000 pounds and the estimated value was about $80,000. A few days prior to taking out the big chunk I shipped one from the same mine to the Denver Exposition weighing 640 pounds, and when melted up it yielded a little over $10,000. I also shipped another chunk to Philadelphia weighing over 1200 pounds from the same property.

The largest chunk of silver ever mined, so far as we have any record, prior to the Sierra Granda chunk (called Jackson's Baby), was mined in Zacatecas, Mexico, many years ago, and contained a little over $51,000 in silver.

D. H. JACKSON.

P. S.—I was the manager of the Sierra Granda mine when these pieces were taken out. D. H. J.

Placerville, Cal., Jan. 9th, '98.

Storage Battery Development.

Of all branches of the electrical industry of this country, none has shown such a rapid growth during the last three years as storage battery work. Its enormous increase is shown by the following figures, representing the actual weight of storage battery installed, not reckoning containing cells, acid, etc., since 1894: In 1894 the plates used weighed 349,000 pounds; in 1895, 1,112.800; in 1896, 2,315,300; in 1897, 3,607,300; in 1898, 3,927,480, or nearly twelve times the weight of 1894. Only a very few years ago it was as much as an electrical engineer's reputation was worth to seriously recommend the use of the storage battery, and those who were associated with its exploitation received at the hands of the profession more pity than respect. Now the tables are entirely changed, and it is an exception to find an engineer who will not consider the use of a storage battery as an auxiliary in all cases of generation and transmission of electrical energy. It has many things in its favor. It renders a smaller generating plant necessary; it will do many classes of work alone, instead of requiring another electrical plant, as was formerly thought inevitable; it is economical, as its load is constant instead of varying, and its full efficiency is secured; it also saves money by reducing the depreciation on plants through avoiding the sudden throwing of heavy loads on them. The storage battery has had a remarkable influence on many other branches of electrical work. The electrical elevator was for a long time greatly retarded by the fact that it was considered necessary to operate it from a dynamo separate from that supplying the lights, or to sacrifice the steadiness of the lamps if they were both run from the same dynamo. The storage battery entirely overcomes this trouble, and there is now no need to complicate the electric plant in any building by adding hydraulic machinery. For years it has been the custom to refer to Europe for the most advanced illustrations on storage battery work, but this is no longer the case. The recent important installation in Chicago is 50 per cent larger than any battery in the world.

Not Subject to Relocation.

TO THE EDITOR:—There is a mine here supposed to be patented, but through mistakes made in survey is not. It was resurveyed Oct. 8th, '98, no assessment work being done for two years, with the exception of having a man around for a week or ten days about New Years. On Dec. 27th, '98, the company sent two men to the mine to work long enough to work out $100 as assessment work for last year. Was the ground open for relocation on Jan. 1st, '99? Can I hold same, having located and monumented it, peaceably and according to law?

The original owners having resumed work on the 27th of December, and according to the above statement from that time on continued to work the property until after the 1st of January, '99, the ground was not subject to relocation on January 1st. The resumption of work by the original owners prevents forfeiture.

U. S. Geological Survey Maps For Sale.

TO THE EDITOR:—It might be of interest to the general public to know that the topographic maps of the Geological Survey can be obtained of Dillon & Co., 310 California street, San Francisco, and I should be obliged to you if you would make this announcement through your columns.

H. W. TURNER.

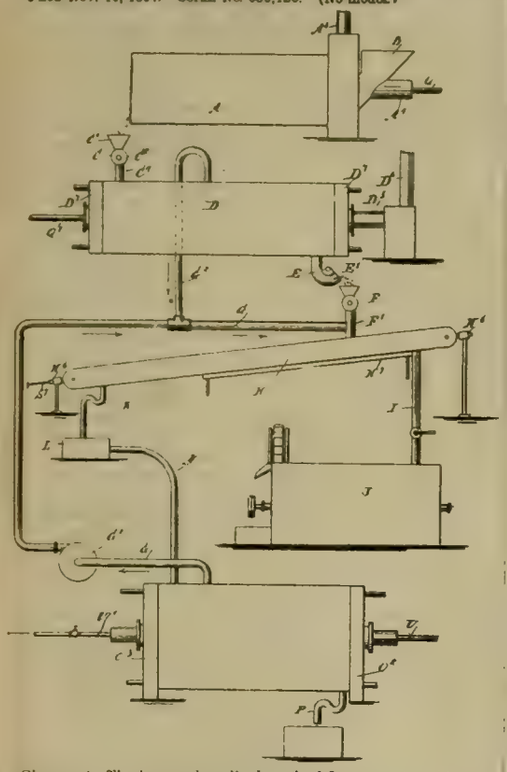
Dept. of the Interior, U. S. Geological Survey, Washington, D. C., Jan. 4th, '99.

AS A SUBSTITUTE for guttapercha as an electric insulator, German electricians report some degree of success by using a compound of ozokerite, amber and asphalt, heated in a retort, at a temperature of 400°, which liberates the volatile gases, the residue being employed in the manufacture of the insulator. This residue is of a blackish color, with the consistency of wax or dry rosin. It is claimed that it can be used in covering cables, being employed either alone or mixed with guttapercha, mineral powders or sulphur, and is said to have sufficient plasticity not to crack or break when the cable is bent or twisted. The best proportion to be observed in the manufacture of the article is fifty parts of ozokerite, forty-five of yellow amber and five of asphalt.

ACCORDING to *Electricity*, a bridge of 900 feet span at Budapest is being erected entirely by means of electrical machinery. The iron girders used as piles to keep the water back from the excavations for the shore pillars were driven in by an electric ram. The ram was a hammer rising 34 feet, with a velocity of 12 feet per second. The soil out of the holes was raised by an electric windlass. The water was removed by seven centrifugal pumps, working day and night. The 5-inch diameter pumps were driven by 10 H. P. motors, the 8-inch by 16 H. P., and 1-inch by a 20 H. P. motor.

Recent Mining and Metallurgical Patents.

617,226. METHOD OF AND APPARATUS FOR EXTRACTING BITUMEN FROM SAND. AUGUSTUS S. COOPER, San Francisco, Cal. Filed Nov. 19, 1897. Serial No. 659,120. (No model.)

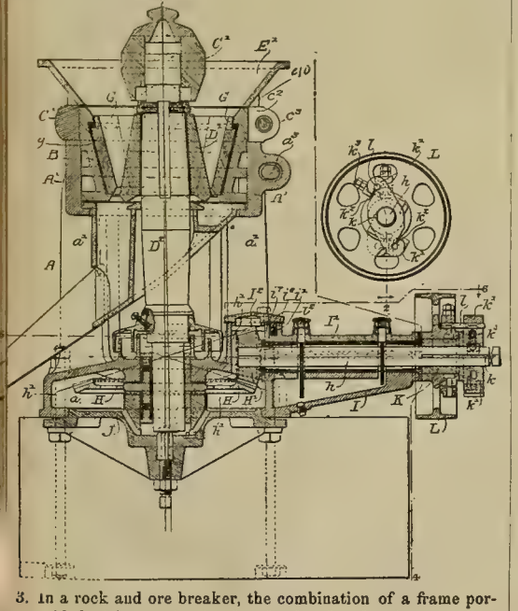


Claim.—1 The herein-described method for separating bitumen om sand, consisting in subjecting the material to the action of crude etroleum-oil to soften and dissolve the bitumen contained in the nd, and then subjecting the mass to the action of a benzin solvent r the bitumen, mechanically agitating the mass, separating the solu- on from the sand, evaporating the solvent from the asphalt, and turning the solvent in vaporized form to fresh portions of the oiled nds, as set forth.

16,659. ROCK OR ORE BREAKER. PHILETUS W. GATES and THOMAS W. CAPEN, Chicago, Ill., assignors to the Gates Iron Works, same place. Filed Apr. 30, 1897. Renewed Oct. 27, 1898. Serial No. 694,742. (No model.)

Claim.—1. In a rock and ore breaker, the combination of a frame base portion provided with an upper encircling portion, an annu- -shell portion provided with crushing-concaves inserted within the per encircling portion and having its upper portion projecting above same, means for securing the upper encircling portion and the nular shell together, a spider portion encircling the upper portion the annular shell, and means for securing it to the annular shell, stantially as described.

2. In a rock and ore breaker, the combination of a lower frame base portion provided with an upper circular portion split longi- inally, an annular-shell portion provided with crushing-concaves erted within the circular portion and having its upper portion jecting above the same, bolt mechanism for clamping the upper cular portion and annular shell together, a spider portion split lon- udinally encircling the upper part of the annular shell, and bolt chanism for clamping the spider portion to the annular shell, sub- ntially as described.

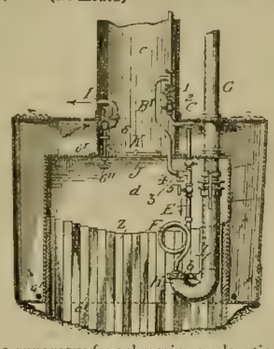


3. In a rock and ore breaker, the combination of a frame por- provided with a projecting bearing-bracket forming a part of closure of the oil-chamber in which the driving-gear mechanism rates, an upper removable box portion provided with a recess groove or channel arranged to hold a filling or packing material, and a cap portion arranged to be secured thereto and compress the packing so as to form a hermetical joint, substantially as described.

4. In a rock and ore breaker, the combination of a gyrating shaft, a horizontal driving-shaft gear, mechanism intermediate of such shafts to transmit power and motion from one to the other, a driving-pulley, lugs secured to the driving-shaft so as to rotate therewith and slitted longitudinally to form clamps, break-pins inserted in the clamp portions and in the driving-pulley, and clamping-bolts for closing the clamps to grasp the pins, substantially as described

5. In a rock and ore breaker, the combination of a gyrating shaft, gear mechanism for operating the same, a horizontal driving-shaft, a sleeve portion secured thereto, a driving-pulley mounted upon the sleeve, projections on such driving-sleeve slitted longitudinally to form clamps, break-pins inserted in such clamp portions and in the driving-pulley, and clamping-bolts for closing the clamps to grasp the pins, substantially as described.

616,567. APPARATUS FOR SUBMARINE MINING AND EXPLORATION. CALVIN BROWN, San Francisco, Cal. Filed Oct. 22, 1897. Serial No. 656,038. (No model.)



Claim.—1. In apparatus for submarine exploration, &c., the combination of a supporting structure, a pneumatic caisson, a discharge-pipe extending from the interior of the caisson upwardly, and having an open mouth within the caisson, a cover for closing said mouth, an air-supply, and a pipe connecting said air-supply with the discharge-pipe.

2 In apparatus for submarine exploration, &c., the combination of a float, a vertically-movable caisson carried thereby, a longitudinally-adjustable discharge-pipe extending from the interior of the caisson to the deck of the float, an air-supply, and an extensible connection from said air-supply to said discharge-pipe, substantially as and for the purposes set forth.

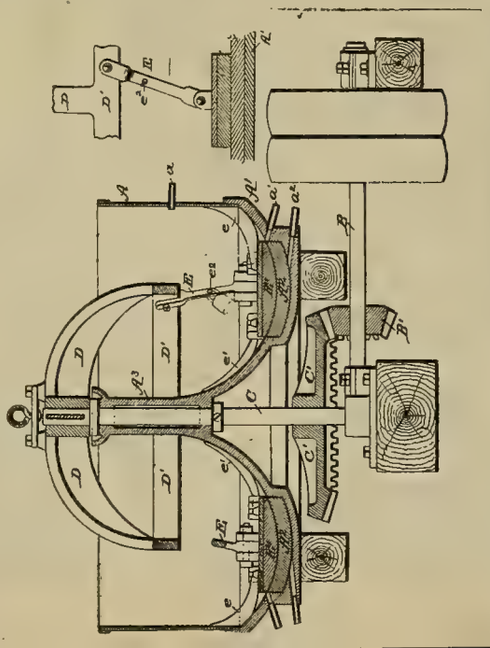
3. In apparatus for submarine exploration, &c., the combination of a float or scow, a caisson and air-lock carried thereby, sinking and raising compartments on the caisson, an air-supply, water inlets and exits to and from said compartments, and valves on the caisson and in the air-lock for regulating the supply of air and water to said compartments, substantially as set forth.

4. The combination with the float and its vertically-movable caisson, of a discharge-pipe extending from the interior of the caisson to the deck of the float and having an adjustable slip-joint, and an air-supply pipe having a flexible connection with said discharge-pipe, substantially as and for the purposes set forth.

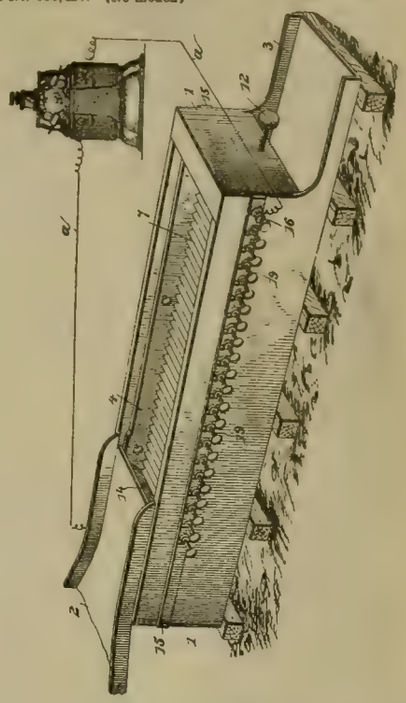
5. In combination with a pneumatic caisson, sinking and raising chambers connected thereto of pointed or wedge shape substantially as and for the purposes set forth.

616,915. ORE GRINDER AND AMALGAMATOR. JACOB GERSTLE, Portland, Oreg. Filed Oct. 26, 1897. Serial No 656,430. (No model.)

Claim.—An ore grinder and amalgamator consisting of a pan having a concave bottom A′ rising in the center in the form of a conical hub, and having an annular recess at its lowest point containing detachable flush-laid dies A^2, a superposed rotating frame D D′, inclined and pivoted trailing arms E having shoes E′ at their lower ends, said shoes being provided each with an outer scraper *e* and an inner scraper *e′*, and outlets *a a′* a^2 for the water and material substantially as shown and described.



617,024. ELECTROLYTIC REDUCING AND AMALGAMATING SLUICE. JOSEPH H. JORY, San Francisco, Cal. Filed May 27, 1897. Serial No. 638,427. (No model.)



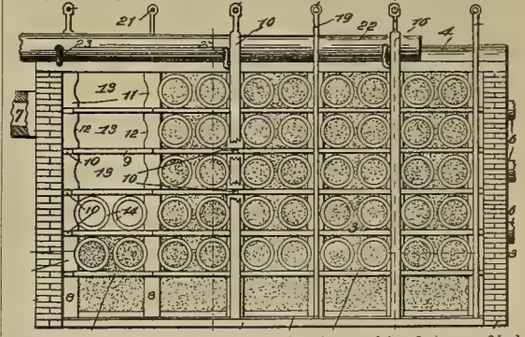
Claim.—1. In a reducing and amalgamating sluice, the sluice-box, a series of plates having at their opposite side edges pivot-studs, metallic contact-strips fitted to the outer sides of the box, and having electrical connections therewith, and a series of conducting-screws mounted in each of said strips, the series of screws at each side of the box having their inner ends engaged with the pivot-studs of every alternate plate, substantially as described.

2. A reducing and amalgamating sluice having a series of closely-arranged metallic plates with passages therebetween, suitable electrical connections for alternately charging the plates positively and negatively, and a readily-fusible metallic covering or coating surrounding the permanent negatively-charged plates, substantially as described.

3. A reducing and amalgamating sluice having a series of closely-adjacent plates with contracted passages therebetween, electrical connections for alternately charging the plates positively and negatively respectively, and a fibrous or similar protective covering incasing the alternate positive plates, to prevent direct metallic contact of the adjacent plates, substantially as described.

4. In a reducing and amalgamating sluice, the sluice-box, a series of closely-arranged plates having opposite pivot-studs loosely hung at opposite inner sides of the box, metallic conducting-strips fitted to opposite exterior sides of the sluice-box in the same horizontal plane as the pivot-studs, each of said strips having an electrical connection with one pole of a source of electrical energy such as a dynamo, and a series of conducting-screws adjustably mounted in each conducting-strip and working through openings in the adjacent side of the sluice-box, the series of conducting-screws at each side of the sluice-box being adapted to have their inner ends contact with the pivot-studs of every alternate plate, substantially as set forth.

616,475. ZINC-SMELTING FURNACE. ROBERT H. LANYON and WILLIAM LANYON, Iola, Kans. Filed Apr. 5, 1898. Serial No. 676,559. (No model.)



Claim.—1. The combination with a zinc-smelting furnace, of hollow buckstays forming a part of the side walls of the furnace, a series of solid buckstays arranged alternately with said hollow buckstays, air-inlet pipes discharging into the chambers within said hollow buckstays, there being openings formed through the inner walls of said hollow buckstays as required to distribute air and discharge it into the furnace, and retorts in said furnace with their outer ends adjacent said buckstays, substantially as specified.

2. A zinc-smelting furnace having side walls constructed of vertically-arranged pillars, plates having their ends resting on said pillars, which plates form a rest for the outer ends of the retorts within the furnace, there being air-inlet ports left between the ends of certain of said plates, the space around the outer ends of the retorts between the pillars and plates being filled with fire-clay, and means of conveying and discharging air through the ports to the interior of the furnace, substantially as specified.

Mill Practice of the Utica Mills, Calaveras County, Cal.*

NUMBER II.

By W. J. LORING, Angels Camp, Cal.

We keep a duplicate cam shaft, with cams and pulleys ready to take the place of a broken shaft, which we can thus replace in three hours, instead of at least forty-eight hours, the period otherwise required to strip the broken shaft, turn a new one to fit the cams, and get the ten stamps started again. If a cam shaft breaks we take it out, cams and all, and roll in the new one, with cams already fitted on it. After the two batteries have started again we can, at our leisure, strip the cams and pulley from the broken shaft and fit them to a new one, to be ready in case of another breakdown. I need hardly say that this arrangement saves much valuable time, as we are using sixteen cam shafts, each operating two 5-stamp batteries, and liable at any moment to break, thereby subtracting 10 stamps from the capacity of the mill until it can be replaced. The discharge is 10 inches high, three chuck blocks are used, and as the dies wear the chuck block is changed, keeping the discharge as nearly uniform as possible. Manganese steel shoes are used with very satisfactory results. They are 10 inches long, 8½ inches in diameter of face, and weigh when new 177 pounds, and after full use about 28 pounds each. Their life in service averages 296 actual days' work. These shoes are cast with hollow necks, that is a 2½-inch hole, 3½ inches deep, is cast in the neck, leaving ½ inch of metal around it. This hollow neck reduces the weight about 3 pounds, causing a saving of at least 25 cents per shoe in first cost, to say nothing of freight. We have used the manganese steel for both shoes and crusher plates since November, 1895, and have found it far superior to anything else.

The dies are made of hard iron and last 120 days. They are 5 inches high over all, 8¾ inches diameter of face, and 9⅛ x 9½ inches in base area. They weigh, when new, 84 pounds, and after using 41 pounds each. They cost 4½ cents per pound as delivered to us, and the old iron is sold to the foundry for 1½ cents per pound.

Round-punched "tin" screens are used; they are made in sheets of 10 x 14 inches. We use No. 1 (equivalent to 30-mesh), which lasts from 15 to 20 days. On clean ore—that is, ore free from chips—a screen will last 30 days. These sheets are burned over a mild charcoal fire before using; just enough heat to burn the tin is all that is required.* The superficial area of the discharge is 336 square inches. A splashboard made of ½ x 12-inch clear pine, having the full width of the screen, is suspended to the screen frame by two eyestraps, riveted to each end of the board, and two hooks, screwed to the screen frame. A strip of canvas or cloth 6 inches wide is tacked to the lower edge of the board, to confine the splash to the apron.

To the mortar below the screen is bolted an iron apron, the bottom of which falls 1 inch below the lip of the mortar, permitting the insertion of a 1 x 12-inch rough board flush with the upper edge of the lip of the mortar. On this the pulp falls from the screen. I have found this board to be a good amalgamator. After a rough board has been used for a month it amalgamates as quickly as a plate, but will not stand the jar like a copper plate. A splashboard used for this purpose can be cleaned in one-eighth the time required to clean a copper plate. This board is protected by a 2 x 6-inch board extending across the apron, and having a ⅝-inch hole bored in each end to receive two hooks fastened to the battery posts.

Four inches below the board, on the apron, runs a trough in which are two apertures 3 inches square, delivering the pulp on a copper plate 5 inches wide, with a pitch toward the mortar, whence it passes to the sluice plates, 2 feet wide, and furnished with 22 feet of $\frac{1}{16}$-inch copper plates set to a grade of 2 inches to the foot.

Of these sluices, each battery has two separate runs, set on independent sets of legs, with wedges to level each sluice independent of the other. Before putting on the plates the tables are dressed down in the center $\frac{1}{16}$ inch for the full length, causing the pulp to run in angular waves across the plate. If the tables are not dressed as described, but are left flat, the pulp will not run so evenly, but will tend to one side or the other. It is a hard matter, at best, to keep the tables perfectly level; and when they have been dressed down in the center, as described, it is much easier to control the flow of pulp.

The headplates—that is, the first 8 feet at the upper end of each sluice, are raw copper; the remaining 14 feet are plated with 2½ ounces of silver to the square foot. We do all our own silver plating at the electro-plating works owned and operated by the Utica Mining Co.

The plates are cleaned every morning, two men usually working together and each taking a plate on adjoining batteries. A plug of soft wood is driven into one of the 3-inch holes in the cast iron apron (described above), causing the pulp to run through the trough and out through the other 3-inch hole on the other plate. The plate they cut off is first washed with clean water, to remove all sand, then sprinkled with quicksilver, and then rubbed with a whisk broom, to loosen as much amalgam as possible. Every five or six days a weak solution of cyanide of potassium is used in dressing the plates. Great care must be exercised in applying cyanide to amalgamated plates. If too much is used they will become hard and glassy.

After the plates have been thoroughly treated with the whisk broom they are rubbed downward with a piece of 75 per cent pure india rubber gum, ½ inch thick and 4 x 7 inches in size. The amalgam is then taken up, together with all the sulphurets that may have adhered to the plates during the run of twenty-four hours. The plate is then lightly sprinkled with quicksilver at the head, as the case may require, and lightly brushed with the whisk broom for the full length. The last plate is always brushed upward from the extreme end, so that, in case any amalgam should be hanging to the edge of plate, it will be brushed up to where it can be readily seen and picked up.

By the methods described two men can dress twenty-four sluices, 22 feet long and 2 feet wide, in from one and one-half to two hours.

In order to save the sulphurets which are mentioned as having adhered to the plates, and which are very rich (sometimes yielding $10 per pound), the amalgam collected every morning is cleaned in a tank used for this purpose only. At the end of each month this tank is cleaned out and the sulphurets are charged, with 25 pounds of quicksilver, into an amalgamating barrel 40 inches in diameter and 48 inches long, which is run at about fourteen revolutions per minute, in which they are treated for eight hours. The charge is taken out through the head (not through the discharging plug, as ordinarily), with a dipper, and is panned and settled.

The amalgam is cleaned in the usual way, and the sulphurets are sent to the chlorination works in wooden buckets.

At the lower end of the sluices is a tail box, having the full width of two sluices, with a drop of 3½ to 4 inches, and a bottom 5 inches wide. This box has a wing, the full length of the box, with a pitch of about 45° towards the sluice, and extending to within ½ inch of the bottom of the box. The outlet is 1 inch above the bottom of the box. This wing causes the pulp to pass under it and keep the box clear at the bottom, catching the "drip quicksilver" which is certain to occur in a gold mill.

From this opening extends a sluice 12 inches wide and 8 feet long, the upper end of which carries ½ x ½-inch riffles, 2 inches apart, while below the riffles are 6 feet of silver-plated copper plates. This box has a grade of ⅞ inch to the foot, and from it the tailings pass to the concentrators, in which the sulphurets are saved.

Three concentrators are employed to each battery of 5 stamps. The Frue vanner, the Union concentrator, and the Tulloch, are all used, and all do fair work.† On each concentrator there is a sulphuret discharge, which deposits the sulphurets in a box directly under the head roller of the machine, and from this box the concentrated sulphurets are taken out every day. The use of this roller does away with the labor of hoeing out the sulphurets. All that is required is to settle the sulphurets and dip out the water, and they are ready to be shoveled out. A car holding 900 pounds of sulphurets is used to convey them to the dump house. Two samples are taken from each car with a 15-inch sampling iron, and after all the concentrates for the day have been taken out and sampled the aggregate sample is sent to the assay office, together with the aggregate of the samples of the final tailings, taken every three hours. These aggregate samples are assayed every day and a record of the result is kept. The tailings from the concentrator run through a flume three-fourths of a mile long and are worked over a canvas plant for the fine sulphurets lost in the concentrators. From the dump house the concentrates are conveyed one-fourth of a mile to the chlorination works, owned and operated by the Utica Mining Co. These works contain seven roasting furnaces and a cyanide plant, the latter being used only on the slimes recovered from the mill tailings after they have been passed over the Gates canvas plant above mentioned.

At the end of a run of from 15 to 30 days, as the grade of the ore may demand, a cleanup of the mill is made in the following manner: The feed is shut off from three batteries (15 stamps) until they have been "pounded out;" then the stamps are hung up, the battery water is shut off, and two rectangular pans, 15 x 14 inches in area, 3 inches deep on the high side and 2 inches on the low side, are placed in front of each battery, the low side of each being slipped under one of the holes in the apron. These pans are made of the form described in order to keep the top as nearly level as possible, so that the wash water will flow all around the top, and not tend to one place, as it would do if the pans were made of uniform height. The amalgam adhering to the screen frame is taken off with a scraper, made for the purpose, and deposited in a gold pan; the screen frame is then removed and thoroughly washed, after which the chuck block is taken out and placed in the cleanup room to be cleaned; the wooden apron is then scraped and the amalgam put in a bucket; then the coarse sand in the battery is shoveled out into a box made for the purpose; and then the pan with the cleanings from the screen frame is put under each stamp, which is thoroughly cleaned of any amalgam that may be found in keyways or between the bosshead and shoe. After each stamp has been thoroughly cleaned in this way the amalgam is taken to the cleanup room and ground with the chuck block amalgam from the same battery, the weight being kept for each battery separately. The dies are then removed and washed on the apron, and the battery is cleaned out, all the hard sand that has accumulated around the dies being put in the amalgamating barrel. After the battery has been thoroughly cleaned in this way about half an inch of sand is put in the bottom of the mortar, the dies are returned to their respective places, the coarse sand is put in, the chuck block (which by this time has been cleaned) is put in place, the screen is replaced and keyed, and the apron is thoroughly washed (as little water being used as possible), everything being cleaned down into the rectangular pans mentioned above. These pans, and the buckets used around the battery, are washed into the amalgamating barrel.

By the time the cleanup man has finished the washing of buckets and pans the man who is looking after the self-feeders has started the cleaned-up battery, and has its neighbor ready to be opened. Three men on the batteries and three men at the cleanup room can clean up twelve batteries in three hours.

(*To be Continued.*)

*Trans. Am. Inst. Min. Engs., Buffalo meeting, October, 1898.

†One reason for preferring perforated tin to Russia sheet iron for screens is the cost. Although the tinplate is in fact sheet iron tinned, it is cheaper than the Russia sheet iron. Tin sheets, 10 x 14 inches in size, cost about $1.35 per dozen, and 3½ to 4 sheets are required for a 5-stamp battery. Russia sheet iron screens cost from 40 to 75 cents per square foot, which makes them much dearer. Before using the sheets we burn (that is, oxidize) the tin surface to prevent amalgamation. It is well known that tin will amalgamate as readily as copper or even silver. If a tin screen were used without first burning off the tin, the formation of tin amalgam upon it would soon clog the discharge through it. Apart from the question of cost, however, and for reasons which I will not here undertake to explain, the tin screens are to be recommended. I have tried Russia sheet iron, both slotted and punched, and also wire cloth, and have obtained better results from the tin than from any other screen material. I think any millman who will make a trial of it will come to the same conclusion, unless he is dealing with conditions different from those which I have encountered, or can at this time conceive as essentially affecting this part of the mill process.

†We are using fifty-four 4-foot Frue, six 4-foot Union and sixteen 3-foot 10-inch Tulloch concentrators. From comparative tests of these machines I can find but little difference in the tailings. A special experiment made with the Frue vanner may be of interest to those engaged in milling. The machine has a shaking frame, 12 feet long and 4 feet wide. (Some are 6 feet wide, but we use the 4-foot size.) I dropped the back roller 3 inches by putting a block of wood between the side rail and the bearing that supports the roller. Then I took out enough of the small rollers that carry the belt to reduce the total length of the concentrator to 8 feet from center of head roller to center of small roller. From this small roller to the back roller I did not use any rollers in making my test. The belt from the small roller to the back roller had so much grade that nothing was saved on it, so that by this arrangement of the concentrators the effect was just the same as if 4 feet had been cut off from the back end. I had three vanners altered in this way, and made my test by assaying the tailings of these three against that of the 12-foot machines. This experiment continued for thirty-six days. The tailings assayed as follows:

	Per ton.
From the altered machine (4 x 8 feet)	$0.33
From the unaltered machine (4 x 12 feet)	0.41

or a saving of 8 cents per ton in favor of the sheet concentrator. If an 8-foot vanner will do as good work as one 12 feet long, there can be a saving in first cost, and in the cost of excavation and foundation, which in some localities is a large item.

Source of Placer Gold in Alaska.

Written for the MINING AND SCIENTIFIC PRESS by W. J. REYNOLDS.

On the islands and coast of Alaska the formation is granite with a slate contact. Wherever quartz ledges are found after crossing the coast range, lime, porphyry and slate predominate. Where lime abounds there seems to be no mineral: the country rock has all been thrown up with a second eruption. It is mixed together, bunches of barren quartz mixed in, all lying flat, no first formation on edge, and not a quartz ledge from the lakes down the river as far as this place, over 700 miles. Some of the cliffs here show slate, quartz and porphyry soldered together from the eruptions; the quartz is of such a fine rose character as would make a prospector look for gold in it. It is barren. The convulsion that came after the first formation mixed the ledges up with the country rock and the heat run the gold out of the quartz. Time and water worked it into channels and pay deposits. Some have been claiming that glacial action wore the gold out of the rock; if it did there would still be gold left in quartz rock not worn and ground fine. It is not a first formation placer like some of California, notably on Feather river, where the bedrock is on edge and quartz seams and stringers between. There the gold was made: instead of adhering to the quartz it formed in coarse particles in the clay seams between the rock. As the surface wore away the gold settled back to bedrock, and on the mountains around are quartz ledges. Here it is different: the ledges that have been are all scattered on the surface or soldered in bunches through the country rock. If any ledges are found here it will be in a different formation, one that has not been so disturbed. I have not prospected around Circle City yet; I understand from an old Californian it is of the same character. The Klondike has a good placer formation—slate, mica schist and quartz all mixed. When one hears of "mother lodes" being struck it is in the minds of inexperienced tenderfeet or schemers. This country is a good place for hardy, experienced miners, but others had better stay away.

70-Mile, Yukon River, Alaska.

Mining Summary.

Precious Metal Product for 1898.

Following is Wells-Fargo's annual report of the yield of gold, silver, copper and lead in the region where the MINING AND SCIENTIFIC PRESS has its largest circulation. The figures are furnished through the courtesy of Mr. Jno. J. Valentine:

The report of precious metals produced in the States and Territories west of the Missouri river (including British Columbia and Northwest Territory), during 1898, shows in the aggregate: Gold, $78,461,202; silver, $33,016,565; copper, $46,200,648; lead, $13,344,251; total gross result, $177,022,666. The "commercial" value at which the several metals named therein have been estimated is: Silver, 58 cents per ounce; copper, 12 cents per pound; lead, $3.05 per cwt. Due allowance must always be made for probable variations from reported figures, by reason of the manifest difficulty of getting entirely reliable data from private sources. Estimates are sometimes liable to be exaggerated and are, to a considerable degree, guesswork; but, with some modifications on this account, the general results reached, while only approximately correct, may be accepted as the closest approximation possible under the circumstances:

STATES AND TERRITORIES.	Gold Dust and Bullion.	Silver Bullion by Express.	Ores and Base Bullion by Freight.	Total.
California	$15,402,653	$61,143	$2,639,255	$18,106,351
Nevada	2,709,785	695,580	100 168	3,505,542
Oregon	2,172,300	38,735	4,015	2,215,119
Washington	320,504	52,002	85,000	457,506
Alaska	3,253,991		67,500	3,321,491
Idaho	2,187,000	3,723,665	5 437,000	11,648,265
Montana	4,939,080	9,425,000	29,843,000	43,808,080
Utah	2,168,282	101,323	8,212 283	10,481,888
Colorado	23,177,202	14,456,559	3 682,823	41,316,644
New Mexico	304,866	73,295	1,324,765	1,704,866
Arizona	3,187,625	686,757	11,721,447	15,575,829
Dakota	6,575,220	95,000	34,300	6,704,420
Texas	5,250	275 850		281,100
Wyoming	21,225	26,750	4,300	52,275
Br. Columbia and Northwest Ter'y	11,975,000	3,035,200	1,753,000	17,663,200
Total	$78,461,020	$33,562,108	$64,999,356	$177,022,666

The gross yield for 1898, shown above, segregated, is approximately as follows:

Gold, 44 32-100	$78,461,202
Silver, 22 4-100	33,016,565
Copper, 26 10-100	46,200,648
Lead, 7 54-100	13,344,251
Total	$177,022,666

The year's combined product of the metals herein treated of is the greatest in the history of those countries—United States of America and British Columbia and Northwest Territory—that of gold, $78,461,202, being above any previous record officially reported; and the world's output of gold for 1898, being approximately $280,000,000. The most notable increases have been in South Africa $25,000,000, the British possessions of the Northwest $6,000,000, Australasia $6,000,000, and the United States $3,000,000.

ANNUAL PRODUCTS OF LEAD, COPPER, SILVER AND GOLD IN THE STATES AND TERRITORIES WEST OF THE MISSOURI RIVER, INCLUDING BRITISH COLUMBIA AND NORTHWEST TERRITORY, 1870-1898.

YEAR.	Product as per W. F. & Co. statements, including amounts from British Columbia and west coast of Mexico.	Product after deducting amounts from British Columbia and west coast of Mexico.	The Net Products of the States and Territories West of the Missouri River, Exclusive of British Columbia and West Coast of Mexico, Divided, are as follows: LEAD.	COPPER.	SILVER.	GOLD.
1870	$ 54,000,000	$ 52,150,000	$ 1,080,000	.....	$17,320,000	$33,750,000
1871	58,284,000	55,784 000	2,100,000	.....	19,286,000	34,398,000
1872	62,236,950	60,351,824	2,250,000	.....	19,924,420	38,177,305
1873	72,259,693	70,139,860	3,450 000	.....	27,483 302	39,206,558
1874	74,401,045	71,965,610	3,800,000	.....	29,699,122	38,466,488
1875	80,889,057	76,703,433	5,100,000	.....	31,635,239	39,968,194
1876	90 875,173	87,219,859	5,040,000	.....	39,292,924	42,886,935
1877	98,421,754	95,811,582	5,085 250	.....	45,846,109	44,880,223
1878	81,154,622	78,276,167	3,452,000	.....	37,248,137	37,576,030
1879	75,349,501	72,688,888	4,185.769	.....	37,032,857	31,470,262
1880	80,167,936	77,232,512	5,742,390	$ 808,000	38,033,055	32,550,067
1881	84,504,417	81,198,474	6,361,302	1,105,000	42,987,613	30,633,950
1882	92,411,835	89,207,519	8,008,155	4,055,037	48,133,030	29,011,318
1883	90,313,612	84,639,212	8,193,559	5,683,021	43,975,101	27,816,491
1884	84,975,954	81,633,835	6,834,601	6,086,252	43,529,925	25,183,567
1885	90,181,260	87,311,382	8,562,991	7,838,036	44,516,599	26,393,756
1886	103,011,761	100,169 222	9,185,192	9,276,755	52,136,851	29,561,424
1887	104,645,950	103,327,770	9,631,073	10,362,716	50,833,884	32,500,067
1888	114,341,592	112,665 569	11,263,630	18,281,490	53,152,747	29,987,702
1889	127,677,836	126,723,384	14,503,323	14,793,763	64,808,637	32,527,661
1890	127,166,410	126 804,855	11,509,571	20,569,092	62,930 831	31,795,361
1891	118,237,441	117,946,565	12,365,780	13,261,663	60,614,004	31,685,118
1892	111,531,700	111,259,508	11,433,947	19,370,516	50,607,601	29,847,444
1893	104,081,591	103,827,623	7,756,040	23,631,330	38,491,521	33,948,723
1894	105,113,489	104,844,112	8,223,513	22,276,294	38,721,014	35,623,291
1895	118,164,642	117,896,988	7,170,367	27,052,115	35,274,777	48,399,729
1896	126,280,536	121,949,536	6,536,026	28,713,305	33,684,983	53,015,242
1897	153,435,460	142,853,460	8,775,144	38,388,604	34,034,034	63,655,597
1898	177,022,666	159,350,466	11,804,251	45,807,648	35,081,365	66,486,202

The exports of silver during the past year to Japan, China, the Straits, etc., have been as follows: From London, $27,404,623; from San Francisco, $5,217,409. Total, $32,622,032, as against $48,412,009 last year. Pounds sterling estimated at $4 8665.

MEXICO.

STATEMENT OF THE PRODUCT OF GOLD AND SILVER IN THE REPUBLIC OF MEXICO REVISED AND CORRECTED FROM 1877 TO 1898.—VALUES UPON MINTAGE BASIS.

Years.	Gold.	Silver.	Total.
1877-1878	$ 747,000	$24,837,000	$25,584,000
1878-1879	881,000	25,125,000	26,006,000
1879-1880	942,000	26,869,000	27 742,000
1880-1881	1,013,000	29,234,000	30,247,000
1881-1882	937,000	29,329,000	30,266,000
1882-1883	956,000	29,569,000	30,525,000
1883-1884	1,055,000	31,695,000	32,750,000
1884-1885	914,000	33,226,000	34,140,000
1885-1886	1,026,000	34,112,000	35,138,000
1886-1887	1,047,000	34,600,000	35,647,000
1887-1888	1,031,000	34,912,000	35,943,000
1888-1889	1,040,000	40,706,000	41,746,000
1889-1890	1,100,000	41,500,000	42,600,000
1890-1891	1,150,000	43,000,000	44,150,000
1891-1892	1,275,000	45,750,000	47,025,000
1892-1893	1,400,000	48,500,000	49,900,000
1893-1894	1,425,000	47,350,000	48,675,000
1894-1895	4,750,000	54,225,000	58,975,000
1895-1896	5,475,000	54,450,000	59,925,000
1896-1897	8,500,000	60,683,000	69,183,000
1897-1898	9,925,000	67,525,000	77,450,000
Total	$16,589,000	$837,028,000	$883,617,000

EXHIBIT OF THE COINAGE OF MEXICO FROM THE ESTABLISHMENT OF THE MINTS IN 1537 TO THE END OF THE FISCAL YEAR OF 1898.

COLONIAL EPOCH.	GOLD.	SILVER.	COPPER.	TOTAL.
Unmilled coin from 1537 to 1731	$ 8,497,950	$752,067,456	$200,000	$760,765,406
Pillar coin, 1732 to 1771	19,889,014	441,629,211	.....	461,518,225
Bust coin, 1772 to 1821	40,391,447	888,583,989	342,893	929,298,328
INDEPENDENCE.	$68,778,411	$2,082,280,656	$542,893	$2,151,581,960
Iturbide's imperial bust, from 1822 to 1823	$ 557,392	$ 18,575,569	.....	$ 19,132,961
Republic eagle, 1824 to June 30, 1873	45,040,628	740,246,985	$5,235,177	790,522,290
REPUBLIC.	$45,598,020	$758,822,054	$5,235,177	$809,655,251
Eagle coin, from July 1, 1873, to June 30, 1898	$12,473,773	$598,304,756	$203,296	$610,981,825

SUMMARY.—Colonial Epoch, from 1537 to 1821, $2,151,581,960; Independence, from 1822 to 1873, $809,655,251; Republic, from 1873 to 1898, $610,981,825; total, $3,572,219,036.

EXHIBIT OF COINAGE OF GOLD, SILVER AND COPPER IN THE REPUBLIC OF MEXICO, FROM THE 1ST OF JULY, 1873 TO THE 30TH OF JUNE 1898.

YEARS.	GOLD DOLLARS.	SILVER DOLLARS.	COPPER DOLLARS.
1873-1874	$886,744	$18 816 067	$15,966
1874-1875	862 619	19,380,558	21 712
1875-1876	869,401	19,741,664	30,651
1876-1877	666 559	21,415,128	3 035
1877-1878	694,698	22,081,203	41 304
1878-1879	658 306	22,162,987	16 300
1879-1880	5 1,826	21,018 528	14,035
1880-1881	492,098	21,617,305	32,258
1881-1882	452,500	25 146,260	11,072
1882-1883	107 600	24,084,321	..
1883-1884	328,618	25,377,370	..
1884-1885	423,250	25,810,728	..
1885-1886	425,000	25 850,000	..
1886-1887	410,000	25,600,000	..
1887-1888	340 330	26,711,000	..
1888-1889	305,100	25 274,570	..
1889-1890	240 208	24 428,326	..
1890-1891	308,000	24,256,000	..
1891-1892	291,040	25 527,000	..
1892-1893	391,672	27,160,876	..
1893-1894	553,978	30,185,611	..
1894-1895	545,237	27,628,981	..
1895-1896	565,786	22,631,788	..
1896-1897	453,474	19 296,000	..
1897-1898	459,210	21,427,057	..
Total	$12,473,773	$598 304 756	$203 296

SUMMARY.—Totals: Gold, $12,473,773; silver, $598,304,756; copper, $203,296; grand total, $610,981,825.

ARIZONA.

The Black Warrior Copper Co. near Globe has begun work on the Diamond H. shaft, and also to block out ore in the Montgomery mine, of the Black Warrior group. The Diamond shaft is down 135 feet and the last 50 feet is in sulphide ore. On the Montgomery there is a 100-foot shaft, a 350-foot tunnel and a surface cut showing good ore in all the openings.

Walter E. and F. M. Mendenhall are engaged in developing the Evergreen mining claims near Big Bug and are taking out good ore.——W. Miller and others have purchased S. Chadwick's mine and let a contract to drive a tunnel 250 feet on the ledge. This mine has produced ore by the carload that averaged fifty ounces silver, 50 per cent lead and some gold per ton.——M. J. Neary shipped to Kingman two carloads of ore from the Fourth of March and Samoan mines on Sherum Peak. The ore is high grade gold and silver.——Near Prescott the Senator mill has completed a run of forty-one tons of ore from the Senator mine, which yielded $30,000 in gold. The ore was from the 700-foot level.

The Mescal mill is being worked by J. B. Tomlinson, who is also sinking a shaft on the Sterling mine.——Dillon & White, in their Dexter group of mines near Prescott, will at once begin development.——The Midnight Test mine, on Groom creek, is yielding good ore. This is one of the oldest mines in Yavapai county.——The Champion mine, on Lynx creek, recently sold to M. Costello, has been patented, and it is the intention of the owner to thoroughly develop it.

Kingman *Miner*: The San Francisco mine near Kingman shipped a carload of eight-ounce gold ore.——On the Ben Butler mine a 3-foot ledge of $40 ore was found.——Watson & Co., working the Lady Bug mine at Mineral Park, have 130 feet of stoping ground opened up. The ore streak is a good width and shows ruby and native silver.——R. Gray on the Blue Belle mining claim opened a body of silver-gold ore of good grade.——In the Oro Blanco district the Ragnaroo M. & M. Co. are taking out valuable ore. The company are pushing a tunnel that will strike three veins at a depth of 500 feet. They have leased the Yellow Jacket's 20-stamp mill and will be crushing ore this month.——A number of promising claims are being developed in Mesquite district near Yuma. The Bay Horse Co., it is said, will soon run a pipe line to the Colorado river, eighteen miles and erect a stamp mill.

Yuma *Sun*: Ore running $300 per ton is being shipped from the Lucky Boy mine near Chloride.——The White Hills M. Co. in Mohave county increased its force of sixty men on the 1st.——The winzes and lower levels of the American Flag mine in Wallapai mountain, owned by D. W. Rosner of Denver, will be cleaned out and sinking resumed on the ore body.——Clack & Poland, leasers, take $1,000 a month out of the Oro Plata mine, owned by J. W. Gerritt. Fourteen men do the work.——About $25,000 was realized from a run of forty tons of ore from the new strike in the Senator mine in Yavapai county. The discovery is thought to be extensive.——Weaver district's Mother Lode group of mines has been sold to ex Gov. McIntyre of Colorado, who proposes to erect a 100-stamp mill and develop and operate the mines on an extensive scale. The price paid was about $100,000.

Bisbee *Orb*: The Copper Queen Co. at Bisbee have adopted a new departure for the handling of the slag from the furnace. A track will be laid from the furnaces to the track upon which the Little Queen is operated. On this track a small motor engine with cars attached will be placed, which will convey the slag from the furnaces to the Little Queen, where it will be transferred from the motor train to the big slag pots and taken to the slag dump and emptied. This will do away with the many hand carts so long in use at the smelter, and prevent the many minor accidents which happen in the handling of the slag.

Phœnix *Republican*: At the Ray mine a diamond drill has been placed and twenty-men are employed. Their principal work now is prospecting for a large body of ore so as to justify an outlay for extensive machinery. There is a blow-out of copper on the surface, which is of high-grade sulphuret ore, but they will go deep for the main ledge.

CALIFORNIA.

Butte.

The third dredger near Oroville, known as the Goodwin dredger, made a trial run last week and worked in a satifactory manner.——The cold weather caused the shutting down of the Gold Bank mine at Forbestown.

J. E. Poingdestre has organized a company and will open the Miller & Johnson quartz claim near Forbestown. Work will begin in the spring.

Calaveras.

(Special Correspondence).—The Spanish Bar M. Co., a San Francisco corporation, have begun work on their hydraulic property near Mokelumne Hill. They have six men at work.

The Smuggler Hydraulic Co. are ready for operations awaiting water which is promised them by March 1st from the Amador Ditch Co., who are repairing their property anticipating their ability to furnish abundant water supply the entire year.

The North Star Drift M. Co., since the recent storms have begun work on a large scale. They put sixty men to work. This property is controlled by a Chicago company. They have two and one-half miles of channel and will push operations all the season.

Mokelumne Hill, Jan. 7th, '99.

Heinsdorff & Schworer's mill is running on quartz from the Heinsdorff property near Murphy's, where F. W. McNear was recently operating, but quit work when connection was nearly made with the shaft from which this quartz is being milled.

Work on the Demarest mine near San Andreas is being pushed. A sump is being sunk at the 400-foot level and stoping has begun from the 300 and 400-foot levels.

Mokelumne Hill *Chronicle*: Davison & Fitzsimmons of San Francisco are operating the Favorite mine, in Esperanza district, under bond from Zumwalt & Co. A mill is contemplated.——B. O'Neill has a force at work on the old Prussian Hill mine.——Largomasino & Cavanna are sinking the shaft on the Bluebell mine. A vein 18 inches wide of $100 rock has been uncovered.——It is locally reported that the Hazel Dell mine will resume operations, and that the Fox mine near Angels will be reopened.

El Dorado.

(Special Correspondence).—The new mill on the Griffith Con. mine has been started and works successfully. Motive power is electric. The first cleanup at the end of the month will be big, as the ore is high grade. This is another of the mother lode properties abandoned many years ago at water level. A Scotch company began work on this about eighteen months ago and their development of the old property has been extensive and thorough. The same company operates the Jumper and other properties at Stent, Cal.

Adjoining the Griffith is the Larkin property, upon which development has been done about two years. The company is composed mostly of San Francisco merchants, and in a modest way they have assessed themselves every month to keep work moving until they have now a productive property. They have a 10-stamp mill in operation. The depth reached in the mine is nearly 500 feet.

The old Springfield mine, which was abandoned at a depth of 1700 feet some years ago, received attention about eighteen months ago from A. Harpending and Judge Williams. Work was started some distance from the old shaft, and the product has been surprisingly rich. Fifteen stamps are in operation during the day only and the daily cleanup is $1000. The company is about to sink a shaft in the footwall to a vertical depth of 500 feet.

In the Crown Point mine a large body of fair grade ore was struck last week. This property is being developed under lease by a Scotch corporation.

All the properties I speak of in this letter are on the mother lode between Nashville and Placerville.

In the Marguerite mine, upon which extensive work is being done by an Indianapolis company, work is progressing. A fair sized vein of high-grade ore was struck last week.

On the Ribbon Rock mine, also under development by Eastern people, encouraging results are met.

The Gold Bug Co. contemplates putting in pumping machinery.

McPhearson & Co., who began work recently near Placerville, have reached 100 feet depth and are in a large body of $6 ore.

Green Bros. are meeting with encouragement in the property they are developing. They are having their work done by contract.

The development of quartz properties in this county has assumed large proportions when the fact is borne in mind that only two years ago a very few properties were in oper-

ation and less received any attention to speak of.

In the eastern portion of the county, Senator Chapman is developing the Gold Note and Philadelphia properties extensively, employing nearly 100 men.

In the western part of the county a San Francisco company is expending much money in opening the old Unity mine, and the Boulder Co. is completing improvements upon its extensive property.

In the Kelsey and Georgetown districts work continues on the "going properties" and new ones are being opened.

All in all the county seems at last, after long waiting, to have received the attention of capital, and the owners of prospects or claims have also realized that it is of advantage to make concessions instead of holding undeveloped properties at unreasonable figures.

Placerville, Jan. 3rd, '99.

Placerville *Democrat*: The Montezuma mine, near Nashville, has been bonded to San Francisco people. Operations will begin soon. ——The Lone Star mine has been bonded to San Francisco capitalists, who will begin work this month.——It is locally reported that the Inez Central M. Co. will soon resume work.——The Last Chance mine is operated by C. A. Robert. Considerable development work has been done. He has a large ledge of ore averaging $6 a ton.——Purcell & Claresse are operating the old Marguerita mine.—— Near Placerville, in the Atlantic mine a strike of good ore was made last week.

Inyo.

At Wilson's canyon in the Argus mining district a 5-stamp mill is in operation day and night. Some ore is shipped which bears a 100-mile wagon haul and smelter charges.—— At Mountain Springs canyon the Inyo M. & M. are running a 3-stamp mill on good ore.

Kern.

Review: The output of the Johannesburg Reduction Works for '98 was $200,000. The dry-washing product was $100,000. These two make the Rand gold product for the year $1,-125,000.——The dry concentrator at the Hard Cash mine is handling twenty-four tons of rock per day, reducing twenty-five into one. The company treat the concentrates with settlers and amalgamating pans.——J. Woodrough put a small force at work on his Monitor claim.——The Wedge G. M. Co.'s report for '98 shows that about $35,000 was milled; all debts were paid; machinery amounting to $3000 was purchased; a new shaft put down and other improvements made. The December output was 121 tons. The first milling, for that month, of seventy tons gave $2200. Last week fifty tons went to the mill, which will probably average $40 per ton.——Fletcher & Balch, who are sinking on the Little Nugget near Garlock, ran fifteen sacks of ore last week at the Eureka mill, which netted $60 a ton.——In the St. George mine at Vanderbilt, A. G. Campbell has developed a 10-foot vein of base ore, running from $20 to $40 a ton, at a depth of 175 feet.

Madera.

Near Raymond hoisting works are being erected on the mining property undergoing development by S. Hopkins, Supt. Gold Hill mine at Grass Valley, Cal.

Nevada.

A. Scott & Co. have struck a ledge of good ore in a mine leased by them near Nevada City.

Grass Valley *Telegraph*: There was a cave at the Manzanita hydraulic mine near Nevada City last Monday night in which many acres of land slid accompanied by a roar that could be heard for miles. The cave carried with it huge trees and rocks and the bank which fell was 500 feet high. The earth had been loosened by the recent heavy storm.

Placer.

When the Pioneer G. M. Co., near Damascus, three years ago bought the property work had reached only to the 500-foot level. Since that time the company has put in No. 4 tunnel on the 1000-foot level. For the past year and a half pay ore has been taken from between the 1000-foot level and the 500-foot level. The company will run No. 5 tunnel at the 1500-foot level. During the summer a dam 100 feet in length, 30 feet wide at the base, 6 feet wide at the top and 23 feet in height was constructed across the American river, which will guarantee sufficient water to meet all the requirements of the property. There has also been installed an electrical plant which furnishes 300 H. P. During the past year the ore averaged from $9 to $17 per ton.

The Eureka Con. D. M. Co., near Forest Hill, for three years has been running tunnels, upraises and drifts, searching for the channel. Last November a year ago the east vein of the channel was located, but all efforts to find the west vein or opposite side were fruitless until last Saturday. This development has been anticipated by Mr. Chappellet. It is possible that the channel just found is not the main one. Experts have expressed the opinion that there were at least two channels in the Eureka ground.

Plumas.

J. Ghidotti is working, under a lease, the Star of Hope quartz mine, near Crescent Mills. The ledge is about 7 feet wide. Two hundred tons of ore milled paid between $4.50 and $5.

Hall & McGrath are opening up the Emerald quartz mine. The tunnel is in 200 feet and has cut across ledge matter 25 feet wide; twenty-one tons of ore milled $9 per ton.

L. Requa of Oakland is running a tunnel to tap an ancient river bed near LaPorte. The tunnel is in 6000 feet.

Quincy *Independent*: Operations have been resumed on the Green Mountain mine at Crescent Mill.

Riverside.

The coal mines at Elsinore are turning out several carloads of coal a day.——In the Virginia Dale district there is much activity in the development of properties. —— E. E. Fancher, in the Coriscaiana mine in the Pinacate district, has made a discovery of good ore.

San Diego.

In Pichaco district S. W. Dorsey is doing the assessment work on his group of claims. ——The Tarantula group is being developed with encouraging results.——Placer mining is being extensively prosecuted and much gold of this character is secured.

The Escondido gold mine, which was recently sold to Denver capitalists for $50,000, is to be developed by the new owners without delay. The mill has been started up and a 5-stamp mill has been ordered. The drifts and levels are being reopened and a new pump is being put in.——In the Uncle Sam mine a large arrastra is being put in.

Shasta.

(Special Correspondence.)—Both gold and copper properties in Shasta county are being sought by capitalists, and there is more of an active business interest in mining development among the old inhabitants who, Micawber-like, have patiently awaited present opportunities, than has been the case in twenty years.

The ores, that in portions of the county were either not understood or would not bear shipping, find a market in the local smelter, and this one feature has done much to bring Shasta county into notice for its mining possibilities.

There are at present experts in the county from Europe examining copper properties that have been brought to the attention of German capital. There are likewise New York and New Jersey companies represented in the examination of copper properties.

In the Old Diggings district, the National Consolidated mine has been enabled to start its mill since the rain set in.

The Lyons property in the same district, long since abandoned, is pending negotiations to be reopened.

The Sam Houston mine, on which a San Francisco company recently began work, has at 90 feet depth found a 3-foot ledge of $20 ore, which they are shipping to the smelter. I am told that they will build a tramway to the railroad at Hart station.

The Phœnix property near Shasta, on which work was abandoned years ago because of its low grade, is again being worked. The ledge is large, over 60 feet, and the ore years ago is said to have yielded from $2.25 to $4 a ton. A San Francisco capitalist is carrying on the work, and I am informed that if the ore will average $3.50 a ton he will continue operations and erect a milling plant commensurate with the property.

From the Black Spider mine at Keswick, on which work was resumed recently, a high grade vein has been opened, which was widened into a 2-foot ore body, maintaining its value throughout, running high in gold, with some silver and copper.

In the Muletown district, the Black Bear mine, which some years ago was a shipper to Selby's, but upon which the pay shoot was lost, has begun the search for the old chute. The 300-foot tunnel is being continued, and sinking the shaft from 150 feet depth will be renewed.

The recent snows and rain storms have given life and energy to mining and business generally. There will be an abundance of water, and there will be comparatively more work done on quartz and gravel properties in this county than it has experienced in many years.

The Uncle Sam mine, at Kennet, is reported sold to a company represented by F. H. Deakin of San Francisco.

Redding, Jan. 10th, '99.

Hurst & Morrisey are developing a property at Harrison Gulch. The shaft shows good ore. The tunnel is in 200 feet. The ledge is not large, but the ore is high grade.

The Redding *Democrat* is informed that the Golinsky copper property near Kennet has been sold to Lewisohn Bros. of New Jersey for $150,000.

Shasta *Courier*: The developments in the district of which the Mt. Shasta mine is nearly central will result in the erection of at least two mills for reduction of both free gold quartz and rebellious ores.

Sierra.

(Special Correspondence).—The Gold Bluff M. Co., who have resumed work on this old-time property near Downieville, are driving their operations on an extensive scale. There are four tunnels in the mine, the lowest of which is 2200 feet long and taps the shaft at 900 feet depth, and 375 feet below the Yuba river. I am credibly informed that they have a large ledge and that the ore is fair grade. Sinking is continued. The twenty stamps are dropping almost continuously. The same company is also operating another property near Downieville. The 5-stamp mill at present is idle, but will be started up before long. The people operating these two properties are also successfully operating extensively in Tuolumne county. They are a San Francisco company.

York & Sons are meeting with success in their Slug Gulch mine. They recently took out over $1700 in a few days. They do not make public the amount they take out, and my present information was gained incidentally.

The recent storms are making glad the many miners, who are now able to wash the winter's storage of gravel.

Downieville, Jan. 8th, '99.

F. R. Soward has sold the Phœnix quartz mine at Sierra City to N. S. Keith of San Francisco. The purchaser will let a contract to sink the shaft before starting the mill.

Siskiyou.

The Fernandez placer mine on Cherry creek is prepared for operations as soon as water is afforded. This mine yields $17,000 a year.—— The Little Wonder quartz mine on Cherry creek, is turning out well. The quartz body is large.——The Hunter mine on Cherry creek has 500 tons of ore on the dump.

The river miners on the Klamath have not been able to work much lately owing to cold weather and storms.

The Gum Boot quartz mine of Scott river has been taken by D. H. Moffat of Denver, Colo., who is making arrangements to work it on an extensive scale. He has let a contract for sinking a shaft 100 feet to test the ledge. ——Ironsides & Wadsworth in the Cherry mining district will make the first run in the new mill of ten tons as a test.

Trinity.

Redding *Searchlight*: From the present outlook the gold output of Trinity will be more than double that of last year. Hydraulic properties are preparing to operate on an extensive scale; smaller placer properties expect to do two years work in one. The larger quartz properties such as the Brown Bear, Chloride Bailey and Strode mines are looking forward to a good year.——T. O'Keefe has developed a good property on Buckeye creek above Lewiston and has about 100 tons of ore on the dump ready for the arrastra. A shaft sunk on the ledge 80 feet shows a good quality of ore.——M. Ryan and associates of Mendocino county have struck it rich at their quartz claim near Lewiston. They have sunk a shaft about 60 feet and taken out eighty tons of rock which is supposed to go $80 per ton. They will work much of the rock this winter through an arrastra.

Tuolumne.

The Rawhide mill near Sonora will resume operations soon.

COLORADO.

During 1898 the Consolidated Kansas City Smelting & Refining Co. even exceeded its usual annual extensive business.

The product of the Arkansas Valley works at Leadville for the year amounted to:

Silver, 3,174,336 ounces at 58¼c	$1,849,051
Gold, 75,479 ounces at $20.67	1,560,151
Lead, 18,155 tons at $72.60	1,318,053
Copper, 1,037 tons at $250	259,250
Total values	$4,986,505

The derivation of the above was as follows:

	Silver, Ozs.	Gold, Ozs.	Lead, Tons.	Copper, Tons.
Colorado	2,883,935	75,453	12,437	1,037
Idaho	284,324	21	5,692	....
Utah	6,075	3	26	....
Totals	3,174,336	75,479	18,155	1,037

The product of the Argentine works (estimating December) was as follows:

Silver, 7,836,086 ounces at 58¼c	$4,559,521
Gold, 241,834 ounces at $20 67	4,998,083
Lead, 39,535 tons at $72.60	2,870,245
Blue vitriol, 4,693 tons at $75	351,975
Total value	$12,779,824

The metals at the Argentine works derived from Colorado ores amounted to:

Silver, 538 ounces at 58¼c	$ 313
Gold, 2,764 ounces at $20.67	57,132
Total values	$57,445

This company also received at their El Paso works Colorado ore, contents as follows:

Silver, 7,352 ounces at 58¼c	$ 4,182
Gold, 2,417 ounces at $20.67	49,959
Total values	$54,141

The output of the American Zinc-Lead Smelter at Canyon City for 1898 was as follows:

Silver, 101,483 ounces at 58¼c	$ 59,113
Gold, 967 ounces at $20.67	19,988
Lead, 1,701,098 lbs. at $3.63 per 100	61,746
Copper, 351,186 lbs. at 12c	77,247
Zinc, 3,900,656 lbs. at 6c	234,039
Total	$452,133

The Omaha-Grant Smelting & Refining Co., with plants in Denver, Omaha and Durango, for 1898 did the following aggregate of business:

	Ounces Gold	Ounces Silver.
Colorado	178,885 50	4,369,826
Other States and countries	125,783 80	8,905,872
Totals	304,669 30	13,275,698
	Pounds Lead.	Pounds Copper.
Colorado	23,325,301	2,177,975
Other States and countries	86,500,232	1,655,245
Totals	109,825,533	3,833,220

The market values were:

304,669 ounces of gold, at $20.67 per oz	$6,297,514 43
13,275,698 ounces silver, at 58¼c per oz	7,733,094 08
109,825,533 lbs. of lead, at $3.63 per 100	3 986,666 85
3,833,220 lbs. copper, at 12 cents per lb.	459,986 40

Following was the production of the Globe Smelting & Refining Co., Denver, for 1898, (exclusively Colorado ores):

	Gold, Ounces.	Silver, Ounces.
Colorado	187,315	7,314,032
Outside	22,865	1,512,656
Totals	210,181	8,826,688
	Lead, Pounds.	Copper, Pounds.
Colorado	22,619,408	1,108,839
Outside	15,682,875	33,371
Totals	38,302,283	1,142,210

The value of product was:

Gold, 210,181 ounces, at $20.67	$4,344,826
Silver, 8,826,688 ounces, at 58¼c	5,141,546
Lead, 38,302,283 lbs., at $3.63 per 100	1,390,372
Copper, 1,142,210 lbs., at 11c	125,643
Total value	$11,002,388

The work of the Bimetallic smelter, Leadville, for 1898, was as follows:

	Tons of Ore.	Gold Ounces.	Silver Ounces.
Lake county	79,472	16,780	2,225,399
El Paso county	505	484	299
Pitkin county	7	....	891
Park county	7	3	42
Chaffee county	26	85	51
Eagle county	122	104	3,237
Mineral county	8,699	141	475,805
Totals	88,838	17,598	2,705,725
		Lead, Pounds.	Copper, Pounds.
Lake county		2,859,926	413,111
Eagle county		5,247	181
Mineral county		13,829	164,888
Totals		2,859,001	578,180

Values in ores:

Gold, 17,598 ounces at $20.67	$ 363,700
Silver, 2,705,725 ounces at 58¼c	1,581,910
Lead, 2,859,001 pounds at $3.63 per 100	193,782
Copper, 578,180 pounds at 12c	69,381
Total value	$2,118,773

Following is a statement of the metals produced by the Philadelphia Smelting and Refining Co. at Pueblo for the year 1898, the product for the month of December being in part estimated:

Silver, 7,520,823 ounces at 58¼c	$4,380 879 40
Gold, 164,811 ounces at $20.67	3,396,308 37
Lead, 50,841,902 pounds at $3.63 per 100	1,845,561 04
Copper, 5,805,002 pounds at 11c	648,450 32
Total	$10,271,199 03

For Colorado only (included in above) the values were:

Silver, 4,934,502 ounces at 58¼c	$2,874,347 41
Gold, 134,699 ounces at $20 67	2,784,228 83
Lead, 17,281,232 pounds at $3.63 per 100	627,308 72
Copper, 4,614,352 pounds at 11c	507,567 72
Total for Colorado ores	$6,793,452 68

Following is the value of the shipments of the Boston & Colorado Smelting Co. for the year ending December 31, 1898, at the prices actually realized:

	Gold.	Silver.	Copper.
Colorado	$1,304,720	$436,735	$195,252
Other States & Ter's.	40,352	153,448	195,252
Totals	$1,345,072	$590,184	$390,504
			Totals.
Colorado, total value			$1,936,708
Total outside			389,053
Grand total			$2,325,761

The output was divided as follows:

Gold, 65,073 ounces at $20 67	$1,345,072
Silver, 1,013,191 ounces at 58¼c	590,184
Copper, 3,684,000 pounds at 10.6c	390 504
Total values	$2,325,760

The Colorado Smelting Co., with its plant at Pueblo, did the following aggregate business in '98:

	Copper, pounds.	Lead, pounds.	Silver, ounces.	Gold, ounces.
Colorado	173,664	12,788,714	1,280,921	58,800
Other States and Territories	40,986	16,746,038	750.524	1,996
Totals	214,650	29,534,752	2,031,446	60,796

The values reached were:

Gold, 60.796 ounces at $20.67	$1,256,653
Silver, 2,031,446 ounces at 58¼ cents	1,183,317
Lead, 29,534,752 pounds at $3.63 per 100	1,072,109
Copper, 214.650 pounds at 12 cents	25,758
Total	$3,537,837

The National Smelting and Refining Co., South Chicago, on bullion dore bars and ores received from smelters and mines in Colorado, for the year 1898, December estimated, report the following:

	Lead, Pounds	Silver, Ounces.	Gold, Ozs.
Bullion—			
Colorado Smelting Co	26,610,702	1,954,594	66,278
Dore Bars—			
Pueblo Smelting Co		2,858,299	39,800
Ores—			
Colorado Smelting Co		49	388
Taylor & Brunton		124	1,088

Value of material handled:

Gold, 107,534 ounces at $20.67	$2,222,728
Silver, 4,811,066 ounces at 58¼c	2,801,446
Lead, 26,610,702 pounds at $3.63 per 100	965,968
Total values	$5,990,142

DOLORES COUNTY.

A 100-ton concentrator will be built at Rico by W. E. Hawley, who has leased the Enterprise and neighboring dumps, estimated to contain 524,000 tons of gold-silver ore of an average value of $6 per ton. Of the assay value 75 per cent is silver and 25 per cent gold. The experimental tests resulted in a saving of 90 per cent. The plant will be ready for work April 1.

CLEAR CREEK COUNTY.

The following report is made by Chamberlain & Co. of ore purchases made in 1898:

Gross tons of ore	4,800
Gross value of ore	$424,363 00
No. ounces of silver	605,375
No. ounces of gold	824.58
No. pounds of lead	1 079,994
Average net value per ton	$77.60

Dewey Bros. report as follows:

Tons ore shipped	5 352
Amount paid for ore	$211,321.54
Average per ton	$40.43
Ounces gold	1,496
Ounces silver	324.634
Pounds lead	2,450 855
Pounds copper	63,077

EL PASO COUNTY.

The Portland Co. at Victor bought four claims of the Morse G. M. Co. for $225,000, of which $60,000 was paid last week.——The Vindicator will sink 225 feet, which will make the shaft 850 feet deep.——The Ingham Con. Co. at Victor have decided to adopt the leasing system, in lieu of company work, for the further development of the property.——The Finn Leasing Co., operating the Morning Glory No. 2, sent out a twenty-ton shipment, which is estimated to return from $40 to $60 a ton.——Simmons & Co. made a shipment of ore from their lease on the Zenobia of forty-eight tons, of which twenty-three tons were eight-ounce ore, and fifteen tons was two-ounce ore.——Returns on a twenty-ton shipment from the Adams sublease of the Gold Sovereign were $43.80 a ton.

It is locally reported that an ore body 300 feet in length has been opened in the 700-foot level of the Victor gold mine, and that the vein is 15 feet wide.——The Minnie Bell mine near Victor is outputting sixteen tons daily.

Two cars shipped recently yielded $67 a ton.

The total output from the Union Co.'s properties for December aggregated 800 tons, the bulk of which came from the Orpha May.——The Anchoria-Leland is producing 600 tons monthly.——The Newland lease on the Deadwood is producing a carload every other day.——Dubois & Conrad, leasing on the Wallace of the Vindicator Co., shipped three carloads last week that ran from two to eight ounces to the ton.——Returns from a shipment from the Engineers' Leasing Co. from nine tons were $35, and the remainder $25 a ton.

The Victor *Record* is informed that Boston capitalists have secured a long time lease on the Moffat-Smith tunnel, and that work on the property will begin within fifteen days. The tunnel will pierce Gold hill from Cripple Creek gulch and has already been driven nearly 3000 feet. It will develop at depth a section but little prospected and prove of value for drainage purposes. The bore already carries away an immense flow of water and is effectually draining a large acreage on Gold hill.

GILPIN COUNTY.

The shipment of smelting ore and tailings from Black Hawk for December footed up a total of 253 cars or 4554 tons.

LAKE COUNTY.

The Mab M. Co. on the Wolfton lease, Leadville district, in December produced about 4000 tons of lead sulphide which, it is estimated, nets $35,000.——The Maid of Erin silver mines lessees shipped 3700 tons of the usual variety of ore in December.

The output of the Jonny mines for December showed a good increase. Twenty-five cars a day are being shipped. The mine is to be equipped with all the latest appliances for lighting, both for underground and surface. The new dynamos will have a capacity of 1500 incandescent lights and 118 volts pressure on the line. It will also furnish power for the motors.——The Leadville Pumping Association will soon receive two new station pumps; one is 22x10x12, the other will be 22x10x18. The water is at present being lowered 4 feet a day.——The Fanny Rawlings lease and the Big Four M. Co. have 140 men on the payroll. The Big Four shipped in December 250 tons of gold-copper ore. The Rawlings tonnage was 1500 tons of oxide and sulphides.——Douglas, Newton & Co., lessees of the A. Y. and Minnie mine and mill, produced in December 1327 tons of crude lead carbonates and lead sulphide concentrates. The commercial value of the same will reach $30,000.

SAN JUAN COUNTY.

The Congress mine near Silverton is shipping a carload of pay ore a day and will continue to do so all winter.——The Tiger is shipping twenty-five to thirty tons of mineral a day. There are fifty men working on the Tiger.

SAN MIGUEL COUNTY.

The annual report of the Tomboy G. M. Co. at Telluride, shows the production of the year to have been $328,055, the yield of 24,620 tons of ore obtained at a total operating expense of $277,710. The last six months produced 21,833 tons, yielding $314,930, at a cost of $179,237, including development work and improvements aggregating $47,262.

Considerable work is going on at the Attica mine at Ophir and frequent shipments are being made. A new body of ore has been cut which gives 18 inches of high-grade mineral. The mine will be kept in production the entire winter if snow does not interfere.

SUMMIT COUNTY.

The Victoria mine at Frisco is shipping four cars of gold ore per week.

IDAHO.

J. Warton, who has had charge of the South Peacock mine in the Seven Devils for a Boston company, has bonded the Green Vale copper claim near Cuprum for $10,000.——The Checkmate mine in Boise the past two years has been productive of many shipments of high-grade ore and will make another soon. The company has been prospecting new ground and has found a vein that is over 5 feet wide. In this a streak appears that yields an average of $100 in gold per ton.

The Idaho City *World* is informed that the Big Buffalo mine on Buffalo Hump, has been sold to Butte and Spokane men; $25,000 is to be paid in thirty days, $25,000 in ninety days, $100,000 in one year, $175,000 in eighteen months and $175,000 in two years.——The Lucky Boy ores at Custer City are worked over plates and Wilfly tables, saving about 67 per cent of the values. Tailings have accumulated to the amount of about 10,000 tons, and the company will put in a cyanide plant to rework them. At DeLamar next summer there will be three plants working on tailings.

Hailey *Times*: The company that bought the Crœsus group of mines and mill recently has begun work. They are putting in an air compressor to operate power drills. The price of the property is $100,000, of which $5000 was paid last week.

MONTANA.

Kempfer & Hegener, leasing the Copper Queen lode, near Neihart, have a 10-inch body of ore, which averages 100 ounces in silver and $4 in gold. A drift of 60 feet has been run on the vein, cutting a chute of ore which assayed from 88 to 200 ounces in silver. They contemplate putting on machinery to run the shaft 200 feet.

In the Antelope mining district, near Philipsburg, a 50-ton cyanide plant will be erected on the properties of J. A. Murray and S. F. King.

The concentrator at the Snowshoe mine shut down last week because of freezing of the water supply. The company has sixty men on its pay roll. The upper tunnel is in a distance of 800 feet. The main tunnel is in 1200 feet and is being pushed ahead by two shifts. The winze from this tunnel is 80 feet deep and still sinking in first-class ore. A hoist is being placed to carry this winze to considerable depth. As soon as this plant is completed work will be resumed in the double compartment crosscut tunnel. The mine is developing ore rapidly and will soon be able to keep in operation several mills on the property. There is a considerable quantity of both first-class ore and concentrates on hand at the mine, which is being shipped to the smelter at the rate of about forty tons a week.

The Bowers coal property, near Livingston, under lease to the Thompson Investment Co., has been opened up under the management of J. J. Coleman and is again in shape for production. The undertaking of putting the mines in condition for working a force of miners has been more difficult than was anticipated, on account of water, but this impediment has been overcome.——A dredge is being put on Cataract creek, near Basin. The machine takes more after one of the large steam shovels used by railroads. The machinery will be ready for operation in the early spring.

NEVADA.

The output of gold for Osceola this season is about $15,000.

At Stateline, G. A. Rice is in 200 feet on his tunnel and has encountered a body of good ore.——Wicks & Buell in the Mono tunnel are in 100 feet. The ledge assays $5 in gold.——The Creole mine has a body of ore which assays $20 in gold.——The Gold Haven property litigation has been settled and Jewell & Co. have resumed work and have struck a body of good ore.——The Gold Crown mine at Siegel, White Pine county, shipped to Salt Lake last week a car of ore showing 99.4 ounces silver, 22.4 per cent manganese and 60 cents in gold. This is the first company organized in this section and will be known as the Boston & Nevada. The property has two veins in its group. In one of these copper predominates, the ores showing from 18 to 25 per cent of that metal per ton. The other is silver-lead, assays showing from 25 to 35 ounces silver and from 50 to 65 per cent lead.——The Occidental M. Co. at Virginia made a shipment of six tons of concentrates and sulphurets last week to Selby & Co. at Vallejo, Cal.——Forty stamps are dropping in the Dexter mill at Tuscarora.

The Virginia *Chronicle* says that the passage of an appropriation bill at the coming legislative session to supply funds for the establishment of public ore reduction works in prominent mining districts of the State, where owners of small mines could have their ore worked at a cost that would pay a small interest on the outlay for the plant, will result in placing the author of such a measure with both feet in the middle of the road leading to immortality. So far the mining legislation in this State has been confined to tinkering with the statutes relating to the location of mineral ground until every conceivable obstacle is thrown in the way of obtaining title to mining ground by making it possible to rob the poor prospector of the fruits of his labor after developing a rich body of ore through some technicality, should there be a future contest for the ownership. The establishment of public reduction works under the plan mentioned above would result in a vast increase in the bullion product and wealth of the State and the doubling of its population in the next two years.

NEW MEXICO.

J. N. Warner, from the W. B. & A. mine near Pinos Altos, made a shipment of ore that ran 37 per cent lead, $8 gold, and good value in silver per ton.——The Pinos Altos G. M. Co. are doing a great amount of development work on the Pacific lode. At the Gillett shaft drifts are being run at the four levels. The primitive system of hoisting by buckets will be superseded by cars and elevator cages.

At Andrews the cyanide mill is running night and day. Last month the mill produced $6500. The Trippe is furnishing the ore, the production of which last month was 900 tons of milling ore and six cars of refractory ore, which was shipped to the smelter. The shaft is being sunk to the depth of 1000 feet. It is now down 215.——A deep shaft will soon be started on the El Oro claim, on which the cyanide plant is situated. The development of the El Oro consists of a 200-foot shaft and 1400 feet of drifts and tunnels. After development work on the mines warrants the expense and insure sufficient ore, a smelter will be added to the two mills now in operation.

Silver City *Enterprise*: Near Silver City the reduction works have built a new stack 110 feet high, through which the fumes escape from the furnaces. Little of the value gets out of the dust chambers, and that little is precipitated before reaching the top of the stack. The works are smelting from 110 to 130 tons of ore per day besides fluxes. Last week eleven cars of ore were received from the La Descubedero mine near Chihuahua, Mexico.——W. H. Newcomb is shipping two cars of iron ore per day from Legal Tender mine.—— C. Metcalfe has struck some rich silver sulphide in the Golconda mine.

OREGON.

Last week Godfrey & Tabor brought to Baker City the cleanup from their Red Boy mine; the run was less than one month. The amount of gold was 1494 ounces, valued at $15.95 per ounce making a total of $23,829.30. The Red Boy has a 20-stamp mill. It is estimated that the mine's yield for the present year will approach $350,000.

The Golden Key M. Co., who have a group of mines bonded in the Gold Hill district, last week made the second payment on their property. The final payment will be made in July. This is the property of which Lord Sudley of England is the principal and the property is the Braden mines.

Sumpter *News*: The La Bellevue mine is working. F. Cabell is pushing development work on his Onion creek properties. I. Clopp has a force at work on the Ajax and Savage. The Magnolia mine is showing well. D. Russell has thirteen men at work on his Canary group night and day. A force is taking out a shipment of good ore from the Cougar. Miller & Co. are developing the Phil Sheridan group. In the Banzette mine near Robinsonville, under lease to Keeton, Osborn & Co., they are taking out good ore. The Don Juan and Phœnix mines are both working. The Pyx, under lease to Mounts & Co. is sending out good ore. The Morning Glory at Robinsonville has an 18-inch vein of $60 free-milling ore and two carloads on the dump ready for shipment as soon as the roads are open in the spring. Weaver & Co.'s Golden Gate, the Belcher, belonging to Larson & Co., and the Imperial owned by Kelley & Cradlebaugh, are all pushing development work. The Little Giant, under bond to W. L. Vinson, is driving a 300-foot tunnel.

UTAH.

Preparations are being made at the Silver King mine at Park City for sinking the shaft which is 1100 feet deep. The greater part of the last three years has been spent in developing the large ore bodies on the 1100-foot level. Two hundred feet in depth will be added to the shaft and stations will be cut at the 1200 and 1300.——At Mammoth, the Ajax, on the 400-foot level, last week struck a good chute that yields good values.——The Geyser-Marion at Mercur last week shipped to the sampler 800 pounds of gold dust. The management has begun with the crushers at the mill running full capacity and with 150 tons daily going through the plant.——The South Sunbeam M. Co. at Silver City decided to let contracts at once for the prospecting of the ground.

The ore streak encountered in the Highland Boy mine near Bingham at 460 feet has been followed in the tunnel, which is over 15 feet in ore.——The Star Co. is running its new cyanide mill with satisfactory results. Late developments in the Star group show improvements in the quality of ore.——The Jumbo mine at Deep Creek is producing ore which shows 100 ounces silver and $20 gold per ton.——At the Queen of Sheba crushing continues day and night.——At a depth of 120 feet in the Showell placer at Bingham the channel was broken into and the ground shows a satisfactory yield. The Showell placer is owned by the Dalton & Lark Co.

At Tintic a streak of ore has been found showing chloride of silver.——The Buckeye at Tintic has let the contract to sink the main shaft 200 feet deeper.——The Northern Light shipped a load of high-grade ore last week.

The shaft at the Alaska, near Diamond, is being put to a depth of 400 feet.

At the annual meeting of the Alice M. Co. the old directors were re-elected, with J. R. Walker president, L. H. Farnsworth secretary. This company has paid $1,075,000 in dividends to date.

The *Miner* reports shipments of Tintic's camps last week of seventy-nine cars of ore, twelve cars of concentrates and two bars of bullion.

WASHINGTON.

(Special Correspondence).—W. L. Sanders, E. B. Palmer and associates, of Seattle, are developing several groups of mining claims on the west fork of Miller river, in King county, from five to eight miles from Skykomish. Some of the characteristics of this district are of interest.

In their S. S. S. group the vein, opened from the surface, is from 1 to 4 feet wide, with a quartz gangue, carrying lead, iron sulphides, gray copper and zinc; the Sunday group shows a quartz and granite gangue, is said to be 16 feet between the walls, with a 16-inch pay streak of gold and silver ores which runs about $32 per ton; the Little Una group of nine claims, outcrops in an iron capping from 50 to 75 feet wide, interspersed with streaks of quartz, calcite, granite, hornblende and iron pyrites. The mass of iron capping carries small values in gold, silver and copper, the pay streaks assaying as high as six ounces gold; the Lynn group covers a vein, claimed to be a true fissure, from 4 to 16 feet wide, bearing lead, arsenides, gray copper and chalcopyrite in a quartz, lime and granite gangue. These ores are well adapted to concentration and assay from $4 to $12 gold and from 6 to 100 ounces silver.

The Golden Tunnel M. Co., organized by R. V. Ankeny, John Thomas, George T. Gardner and A. W. Hager, of Seattle, are giving attention to a group of claims in the Salmon district, a few miles from the Great Northern, in King county. The discovery was made in a natural cave, 50 feet deep and 75 feet wide, where a body of free milling quartz was exposed. It is asserted that an average of forty assays resulted in $16 per ton of gold. The cave is on the mountain side and the vein is said to extend to the apex of the mountain, 1000 feet, as well as downward as far as exploiting has gone. This vein is claimed to run from 23 to 80 feet in width. WASCOTT.

Seattle, Wash., Jan. 5th, '99.

At Republic the tunnel on the Gold Hur M. Co.'s property is making progress. The ore assayed from $3 98 to $5 24.——The Georgie Reed and Bull Dog group of claims is being developed. The ledge is 32 feet wide. The assays average $8 50 a ton.

Last week W. C. Butler gave a receiver's deed of all the property of the Pride of the Mountains and the Monte Cristo M. Cos. to J. B. Crooker, the representative of J. D. Rockefeller in Everett. The price of the Pride of the Mountains was $167,501.95 and the Monte Cristo M. Co. $160,569 98.——At Republic J. E. Knowlton sold four claims for $6000.——A 400-foot tunnel has been started on the Merrimac.

Near Newport, Towle & Co. made a strike of 4 feet of galena.——M. Heller in the Lone Star and Hawkeye claims is developing a ledge that shows considerable galena and a little copper.——The Conquest shipped a carload of ore last week; twelve men are at work on the mine.——Kock Bros. have resumed work on the Flower mine.

In the Mary Ann mine has been opened a silver carbonate, the first in the camp. The ledge is 5 feet in width and is a clean body of ore.—— At Springdale in the Cleveland mine the ore showing is good and about twenty men are at work. It is expected that a large amount of money will be expended by the company for improvements in the spring. The Cleveland is owned principally by J. P. Graves and other Spokane people. The Gray Eagle mine is shipping good ore. There is not a claim in this neighborhood where depth has been reached that has not proved a paying mine.

Near Chelan, development work is progressing on the Eureka group of mines. Four new ledges have been found on the Little Jim and Dolly claims; one 18 feet wide, said to be steel galena; one 21 feet wide, carrying cube iron, showing gold and copper; another, 9 feet wide, showing gold and copper; and the fourth, 6 feet wide, carries cube silver. Work has also been started on a shaft on the Crystal Cave mine.

FOREIGN.

BRITISH COLUMBIA.

The shipments of ore from the Slocan division from July 1, 1898, to January 1, 1899, were 17,857¼ tons.

The value of the ore produced by the Rossland mines during the year ended, aggregates $2,084,758.12. The shipments were 116,697 tons. For the year ending December 31, 1897, the shipments were 68,000 tons, and the value of the ore mined was $2,100,000. In a single year the shipments from the mines were almost doubled, while the value of the output increased $700,000, or 33 per cent.

R. Thompson of the Eureka Con. Co. at Rossland contemplates the erection of a compressor and hoisting plant.——The largest mining deal since the sale of the Center Star mine, was made in Rossland last week; the B. C. mine in Summit camp, Boundary, was sold for $300,000 and $50,000 paid down.——The second payment by the B. A. Co. to the minority shareholders of the Le Roi Co. has been made. It amounted to $3,12½ per share. The shipment of the old matte from the Le Roi smelter at Northport is at the rate of a carload a day, the shareholders in the Le Roi Co. will fare equally in the distribution of the proceeds from these matte shipments.——G. B. McAulay has bought the Big Copper mine in Copper Camp near Grand Forks for $50,000 in cash. The Big Copper was bonded a few years ago by Col. Weir of New York, who, after developing it to some extent, threw up the bond. Since that time the property has remained undeveloped. The ore assays 12 per cent copper, six ounces in silver and a trace of gold.

MEXICO.

C. W. Hayes has secured the Amarillas-Cajon and Yaqui mines, in the Cerro Colorado district near Santa Ana, Sonora, and has put men in each mine to push operations. There are 1000 tons of ore on the dumps and before that is reduced more than sufficient ore to keep the mills running will be coming from the mines. The two shafts, down 200 feet each, will be sunk 250 feet deeper. The ledges in both mines are about 10 feet in width, and the ores run from $8 to $171 per ton. A lot of 400 tons some time ago yielded $8000 in gold bullion, and the tailings yield about $11 per ton.

At the old Magistral copper mine near Chihuahua a 100-ton smelter is being erected. At this mine there are 50,000 tons of ore on the dump——Smith & Turnier have out between 75 and 100 tons of high-grade ore from their Progreso mines near Sabinal.——From Oaxaca it costs $43 a ton to get ore to Monterey or Aguascalientes. Some miners are shipping their ores to Liverpool, finding it more profitable. It is locally said that an English company is about to erect a smelter in Oaxaca.

Two Republics is informed that S. Camacho has entered into a contract with the Government of the State of Nuevo Leon for the establishment in that State of several new smelters and for the construction of certain lines of railroad. The principal smelter will be constructed near the city of Lerdo, and will have a capacity of 300 tons per day. The other smelters will have a minimum daily capacity of 200 tons. Monterey has already three smelters and when the ones above referred to are constructed the State of Nuevo Leon will have more establishments of the kind than all the other Mexican States combined.——The ore brought to Chihuahua one day last week for shipment represented a value of $114,000.

On the Santa Rosalia mine a stamp mill has been installed as well as an air compressor and the steam pumps and engines in the mine have been replaced by machinery operated by compressed air. Previous to the change it was impossible for the men to work in some parts of the mine on account of the heat. The mill is now in operation and new bodies of ore have been struck.

BORNEO.

A. B. Snow, an American mining engineer, is at work on a Dutch concession up the Kahayan river. He says that when he and a colleague went up the Kahayan river some months ago, they found the country quite undeveloped; they were the first engineers to undertake work in that part of Borneo. It was a difficult task to get there, involving a journey of over 200 miles up the river, and there were many difficulties to be encountered when they started work. They drove a tunnel 160 feet long on the property of the company employing them, made crosscuts and found pay ore. One of the chief difficulties to cope with is the scarcity of good labor. The Dyaks would, like the Malays, work until they had collected a small sum of money. Then they "chucked it," and there was a dearth of workmen until poverty again asserted itself. There is a great difficulty in getting mining supplies; it is next to impossible to obtain necessary materials in the towns of Borneo. Even in the Singapore it is hard to get things wanted about a mine.

Industrial Notes.

—In '98 there were 3388 men engaged in coal mining in Washington.

—Mail matter now arrives in San Francisco 97 hours and 55 minutes from New York city.

—The net earnings of the Colorado Fuel & Iron Co. for November, '98, were $115,000. The fixed charges of the company are $490,800 per annum.

—Mine Inspector Owens thinks that unless the duty on British Columbia coal is taken off, the output of Washington State during '99 will double that of '98, which was about 1,700,000 tons.

—The Portland, Or., Water Committee proposes to install and maintain an electric plant of sufficient capacity to light the city. The city now uses 703 arc lights of 2000 candle-power each and 637 incandescent lamps of 26 candle-power each.

—The Northwestern Railway Co. has begun grading for the road to the Seven Devils country. It starts from Huntington, Or., and follows the Snake river, the distance being eighty-three miles. For the first ten miles there will be some tunneling and rock work, but after that the work will be easy.

—The annual report of Supervising Inspector General Dumont to the Secretary of the Treasury for the year ended June 30, 1898, shows that there were on the Pacific coast, at the date of compilation, 657 steamers of 117,238 tons register, compared with 35 vessels of 18,242 tons when the district was established in 1857.

—It is now proposed to raise $2,000,000 for a Pacific Ocean Exposition to be held in San Francisco in 1901. The California State Legislature will be asked for an appropriation of $200,000, and Congress for one of $300,000. The scope of the exposition includes the States of the Pacific Slope, and the Central and South American, Asiatic, Siberian, Australasian and Oceanic countries bordering on the Pacific ocean, including Hawaii and the Philippines.

—The Snoqualmie Falls, Wash., Power Co. expects on the 22nd prox. to transmit electrically the water power of the Snoqualmie Falls height, 268 feet, to the industrial centers of Puget sound. The hydraulic works and the thirty-mile aluminum transmission lines have been completed, and the electric machinery from the Westinghouse Co. is now assembling. The service will be over two separate pole lines, carrying four independent 25,000-volt circuits.

—An agent of a German steamship line was in San Francisco last week studying the conditions with a view of establishing a trans-Pacific line of German steamships with which to share in the increase of American commerce with the Orient. He casually remarked that the tonnage of the ships in his line was greater than that in the navy of the United States. The tonnage of that one line was more than one quarter as large as the total tonnage under the American flag in the foreign trade.

—In '98 the San Francisco & San Joaquin Valley built sixty miles of road in California on the main line to Bakersfield and the extension of the Visalia branch. In Arizona the Gila Valley, Globe & Northern was extended from Geronimo to Globe, fifty-eight miles, and the Santa Fe, Prescott & Phœnix has built a branch a little over twenty-six miles long. In Oregon the Astoria & Columbia River completed its line to Globe, laying forty miles of track, and the Columbia Southern was extended from Wasco to Moro, eighteen miles. In '99 over 500 miles new track will be built in the section designated and the State of Washington.

—In the U. S. Senate this week a bill was introduced to provide for a submarine cable between the United States and Hawaii, the Philippines, Japan, China and Australia. By its terms the Postmaster-General is authorized to contract with the Pacific Cable Co. of New York for the payment of $125,000 a year for twenty years for transmission of official messages from San Francisco to Honolulu, the line to be laid by December 31, 1900. Before December 31, 1902, the company will construct a line from Honolulu to Manila with an additional sum of $125,000 to be paid by the Government. Within four years the company shall lay connecting lines to Japan, for which $125,000 a year for twenty years shall be paid. The rates fixed between San Francisco and Honolulu are 35 cents a word, and to the farther points $1 a word.

—The torpedo boat Rowan, built for the United States navy by Moran Bros. of Seattle, Wash., made successfully its final trial trip, on the 6th inst., on Puget sound, making a speed of 27.62 knots per hour, which is 1.62 in excess of the speed required. The Rowan is a trim little craft, 170 feet long, 17 feet wide, 11¼ feet depth, drawing 5½ feet of water. The armament consists of four rapid-fire one-pounders and three torpedo tubes. The engines run at 360 revolutions per minute, developing a H. P. of 3200. It has a twin-screw propeller, has the standard air-compressor plant prescribed by the Government Ordnance Bureau, which compresses the air to 1500 pounds per square inch. There are now three coast-built torpedo boats—one, the Davis, built in Oregon, one, the Rowan, built in Washington, and one, the Farragut, built in California.

—The great interest in Asiatic commerce which other nations as well as the United States are now feeling is illustrated in a recent subsidy agreement made by the German government, by which it proposes to pay more than a million dollars a year for a fifteen-year term for the establishment of steamship lines to ply between its ports and those of Japan, China and Australasia and certain ports of Oceanica. That the German government and those of its citizens participating in its commerce should feel a special interest in the trade of the Orient is not surprising in view of the fact that its exports to that part of the world have quadrupled during the past decade. A copy of the contract between the German government and the Lloyd steamship line for the establishment and maintenance of postal and commercial communication between Germany and eastern Asia and Australasia has reached the Treasury Bureau of Statistics. It shows that the Lloyd Co. agrees to maintain for a space of fifteen years steamship lines running from Bremerhafen or Hamburg, Germany, by way of a Belgian or Dutch port through Genoa, Naples, Port Said, Suez, Aden, Colombo, Singapore and Hongkong to Shanghai, China, and back by the same route; a second main line through the same ports to Yokohama, Japan; also a main line through the same ports to Adelaide, Melbourne and Sydney, Australia; also branch lines from Hongkong to Shanghai and from Singapore to German New Guinea, and other ports in Oceanica. Four steamers are, under this contract, to be built for the Chinese and Japanese service, to be of not less than 6000 tons and equal to those of foreign nations in every respect, their plans to be approved by the Admiralty, and to be running, respectively, by Oct. 1, 1899, Jan. 1, Sept. 1 and Nov. 1, 1900. The steamers to be constructed for the Australian line are to be not less than 5300 tons, and also equal to those of foreign nations in every respect and subject to the approval of the Admiralty. All the ships are to be built in German yards and German material is to be used as far as possible, all Admiralty requirements to be carried out in them, putting them into condition in which they can readily be utilized for war purposes when necessary. The agreement provides that in cases of mobilizing the fleet the Chancellor can purchase the vessels on full payment of their value, or can hire them. The terms of the contract also provide that only German coal is to be taken on board at German, Belgian or Dutch ports of call, except by the special assent of the Imperial Chancellor; that in cases of German and foreign goods being simultaneously offered for dispatch the German goods are, if necessary, to have the preference, and also that the Chancellor may prohibit the importation of German, Belgian or Dutch ports of such agricultural products as may compete with those of German agriculture. The agreement provides that the German government shall pay to the Lloyd Co. 5,590,000 marks per year, payable monthly. (Value of mark, 23.8 cents.) This contract extends from April, 1899, for a term of fifteen years. The regular plan of sailing on the Japanese line must begin at latest in April, 1899. It is also announced that a Bremen firm intends to establish with steamers now being built for that purpose a steamship line on the Yangtse Kiang in China, to ply between Shanghai and Hankow. By the aid of these lines, which will connect with the subsdized lines running from Hamburg to Shanghai, German dealers and German interests will be in direct communication not only with Shanghai, which has two-thirds of the import trade of China, but also with Hankow, one of the most important commercial cities of China, and having a population of about 1,000,000. It is now being connected with Peking by railroad. Hankow is probably the most important of the distributing centers of interior China, being splendidly situated in the very heart of the country, surrounded by a network of rivers and lakes and reached by the largest ocean steamers; and when to this is added the railway system now under construction its importance as a distributing point for interior China is very great. Germany's exports the Asiatic countries have increased very rapidly during the past decade. Her exports to China in 1887 amounted to 14,309,000 marks in value, and in 1896 to 45,266,000. To Japan the 1887 exports were 6,398,000 marks, and those of 1896 35,611,000. To British East India they were in 1887 7,230,000, and in 1896 49,179,000 marks. To Dutch East Indies and the Philippines they were in 1887 5,849,000 marks, and in 1896 16,943,000. To Australia they were in 1887 7,470,000, and in 1896 29,247,00 marks.

Commercial Paragraphs.

THE Abner Doble Co. will furnish the hydraulic equipment for the Driesam mine, located near Arrastraville, Tuolumne Co., Cal., consisting of five whee's, hoist, compressor, rock breaker and blower, operating under 380 feet head. The wheels are 4 feet and 6 inches in diameter.

THE Vulcan Iron Works Co. at Seattle, Wash., is entering the field for the manufacture and sale of mining machinery on a scale that is in harmony with the spirit and growth of the mining industry of the Northwest. This company, which has been in business for a number of years, is just completing a new plant, comprising a three-story building, 120x207 feet in size, which is being equipped with modern machinery and appliances for all kinds of machine and engineering work. The main machine shop is 60x107 feet and every machine therein is new. The power for all lathes, drills, etc., will be electricity, transmitted from the Snoqualmie Falls power plant. The cranes and elevators will be run by compressed air and hydraulics. The pattern room, stock rooms, moulding and blacksmithing departments are being well equipped and fitted up. Two more large blocks for exhibiting mining machinery in operation and for storage are to be built. This plant as it now stands requires a force of over 100 men. Mr. Isaac Hulme, the general manager, states that he is preparing to bring out some new types of machinery for mine and mill work.

Catalogues Received.

CATALOGUE No. 54, Fraser & Chalmers, Chicago; Sederholm boilers for high pressures and large units; described and illustrated in detail with numerous tables.

Personal.

JNO. W. MACKAY is ill at the Palace hotel, San Francisco.

THOS. MEIN of Oakland, Cal., has returned from Mexico and Phœnix, Arizona.

C. A. BROCKINGTON has been appointed Supt. Omaha mine, Grass Valley, Cal.

MR. EVERETT SWARTZ, the director of the Wilmerding school, has arrived from Waltham, Mass.

W. J. SHARWOOD has returned from conducting cyanide operations at Marysville, Montana, to Berkeley, Cal.

F. H. DOOLITTLE has returned to San Francisco after a five years sojourn in Bulawayo, capital of Matabele Land, South Africa.

F. ZEITLER, Supt. Champion M. Co., Nevada City, Cal., is in San Francisco attending the annual meeting of his company.

R. H. CAMPBELL of Shasta county, Cal., now a prominent hydraulic mine operator in the Cariboo district, B. C., is in San Francisco.

EMIL LOBE of Seattle, Wash., was recently in San Francisco, purchasing machinery to equip a property in Ketchican district, southern Alaska.

N. W. CHAPMAN is succeeded as Supt. of the Buxton, Clinton and Portland mining companies at Deadwood, S. D., by J. A. Greenough.

CAPTAIN J. J. NILER, U. S. A., will have charge at Los Angeles, Cal., of the U. S. engineer work on the San Pedro, Cal., harbor, to begin in April.

THE January number of "Cassier's Magazine" has as frontispiece a good portrait of Geo. W. Dickie of the Union Iron Works of San Francisco and a biographical sketch written by John Richards.

SUPT. R. C. CHAMBERS of the Ontario and Daly, Utah, mines, has returned from San Francisco. He says it is useless to think of resuming work at those Park City properties with silver at its present price.

H. C. HOOVER of San Francisco, who for the last two years has been in Westralia in the employ of Bewick, Moreing & Co., has gone to the province of Szuchnan, China, to assume charge of that firm's mining interests there.

W. J. CLARK of the General Electric Co. has accepted the position of Gen. Mgr. of the foreign department, with headquarters at New York. In the reorganization of the foreign department Mr. D. Mazenet, who for five years has held the general managership, and has piloted it from its small beginnings to its present position as one of the foremost departments of the company, becomes managing director of the Mexican General Electric Co., with headquarters in the City of Mexico. In view of the importance which our recent foreign acquisitions and our improved relations with foreign countries will give to our commerce, especially in the field of electrical development, the scope of the foreign department will necessarily be greatly widened, and this department, already important, will, with its broader field of action, undoubtedly become the foremost in the company. It will have charge of all commercial relations between the General Electric Co. and all countries outside the United States. Mr. Clark's wide experience in foreign commercial matters particularly fits him for his new position. He has traveled through Europe, as well as in the countries south of us, and his familiarity with foreign methods and manners will stand him in good stead. His book," "Commercial Cuba," recently published, is already generally acknowledged to be the standard authority on Cuban commercial affairs. He will be greatly missed from the railway department, in the management of which he made a unique record.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FOLDING CAMP STOVE.—W. S. Ray, San Francisco, Cal. No. 617,122. Dated Jan. 3, 1899. This invention relates to the construction of a knock-down or folding stove adapted for easy transportation and which is readily set up to form a complete stove, with means for bracing and strengthening the parts with relation to each other. It consists essentially of top and bottom sections with interlocking grooves so that they may be slipped together and form a rectangular box, sockets fixed to the sections upon opposite sides with bars fitting said sockets to lock the bars together and form legs for the support of a stove and a firebox and oven, each having outwardly projecting flanges adapted to be suspended upon the inturned interlocking meeting edges of the top and bottom sections. Suitable dampers are arranged to direct the heat around and beneath the oven, and a removable or telescopic stove pipe is fitted to the stove behind the oven.

FAUCET FILTER.—W. H. Vance, San Francisco, Cal., assignor of two-thirds to F. W. Wolfe and E. D. Wolfe of same place. No. 617,133. Dated Jan. 3, 1899. This invention is designed to provide an economical and effective reversible filter which may be attached directly to a faucet. It consists essentially of a casing, the cap of which is adapted to be secured to the faucet, a hollow stem extending through the casing having an intermediate partition with openings above and below the partition so that water received into the upper end is discharged outwardly into the casing and is returned into the tube and discharged through the lower openings. A perforated cylinder is slidably fitted to the tube and carries the filtering material. When this filter is at the bottom of the casing chamber, the water passes from the outside into the interior and thence to the discharge. When the casing is moved to the top the water passes outwardly through the filter and returns through the lower openings to the discharge. In this manner the filter can be reversed at any time and kept constantly clean.

POLE OR SHAFT COUPLING BOLT FOR VEHICLES.—E. L. Lowe, San Francisco, Cal., assignor to S. Lowe. No. 617,107. Dated Jan. 3, 1899. This invention relates to a bolt to be used in conjunction with pole or shaft couplings of vehicles. It consists essentially of a threadless bolt having a head upon one end, a longitudinal groove or channel at the outer end, a raised guard or shoulder near the outer end of the bolt, out of line with the slot or channel and a threadless nut having a guide groove corresponding with the raised guard upon the bolt to guide the nut passing over the guard, a set screw passing through the nut and adapted to engage the groove or channel so as to lock the nut against the coupling lugs after the bolt has been inserted, the parts being turned by gravitation so as to retain the guiding groove out of line with the shoulder of the bolt and prevent its slipping off even if it becomes loosened.

PICK.—F. Kortick, San Francisco, Cal. No. 617,105. Dated Jan. 3, 1899. This invention relates to a locking device for removable pick points, for safety hook and like attachments. It consists essentially of a head having a shank projecting a right angles, a tongue or yoke passing through the shank with the ends pressing upon the parts to be locked and a removable key passing through the head and pressing upon the tongue or yoke to retain it in place.

CALIPERS.—J. H. Culver, San Francisco, Cal. No. 617,082. Dated Jan. 3, 1899. The object of this invention is to provide a means for setting a pair of calipers and then allowing them to be removed, and afterwards returned accurately to the point at which they were set, this being necessary where the part to be calipered is of such a nature that the calipers must be opened in order to remove them therefrom and afterwards returned to their adjustment. It consists sentially of curved legs pivoted together at one end, the other ends being adapted to open and close about the pivot. Clamping screws engage each of the legs at approximately equal distances from the pivot point and a bar having a longitudinal slot fits one of said screws so that when it is loosened it may slide back and forward upon the screw and may be locked at any desired point by clamping the screw upon it. The opposite end of the bar has a countersunk chamber with a slot extending outwardly from it through the periphery of the bar. The other clamping screw fits this countersunk chamber when the shank of the screw has been entered into the slot and when the two screws are set the calipers will be adjusted to the part desired, then by loosening the screw which fits the countersunk opening, the legs of the calipers may be entirely separated and this end disengaged from the bar so that the calipers can be removed. They may then be returned and the parts again connected, the clamping screw secured and the space between the ends of the calipers will be exactly the same as originally adjusted.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JANUARY 3, 1899.

616,882.—MAKING EXTRACTS—J. Blair, Springdale, Wash.
617,081.—SNAP HOOK—C. A. Conger, Oakland, Cal.
617,226.—BITUMEN FROM SAND—A. S. Cooper, S. F.
617,082.—CALIPERS—J. H. Culver, S. F.
617,3.0.—CONCRETE BREAKER—Fairchild & Wilton, Los Angeles, Cal.
617,243.—FLY PAPER HOLDER—Fernald & Karten, Santa Paula, Cal.
617,305.—ELEVATOR—E. M. Fraser, S. F.
616,915.—ORE GRINDER—J. Gerstle, Portland, Or.
617,015.—NUTLOCK—T. Harding, San Jose, Cal.
617,024.—SLUICE—J. H. Jory, S. F.
617,105.—PICK—F. Kortick, S. F.
617,107.—POLE COUPLING—E. L. Lowe, S. F.
617,120.—DOOR—W. D. Plue, Rainier, Or.
617,122.—CAMP STOVE—W. S. Ray, S. F.
617,133.—FAUCET FILLER—W. H. Vance, S. F.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Recently Declared Mining Dividends.

Anchoria-Leland, Colorado, 3 cents per share, $18,000; Jan. 14.

Portland, Colorado, 2 cents per share, $60,000; payable Jan. 15.

Breece Iron M. Co., Colorado, $10; Dec. 15.

Silver King, Utah, $37,500; Jan. 9.

Swansea, Utah, 5 cents per share, $5000; Jan. 9.

Tomboy mine, Colorado, $250,000; Dec. 25.

Idaho mine, B. C., $28,000; Jan. 3.

Yellow Jacket M. Co., Nevada, stock dividend, 35 shares for each 100 shares outstanding Jan. 12.

Apollo Con. M. Co., Alaska, 50 cents per share, $100,000; Dec. 25.

Apollo Con. M. Co., Alaska, 40 cents per share; $80,000, Jan. 10.

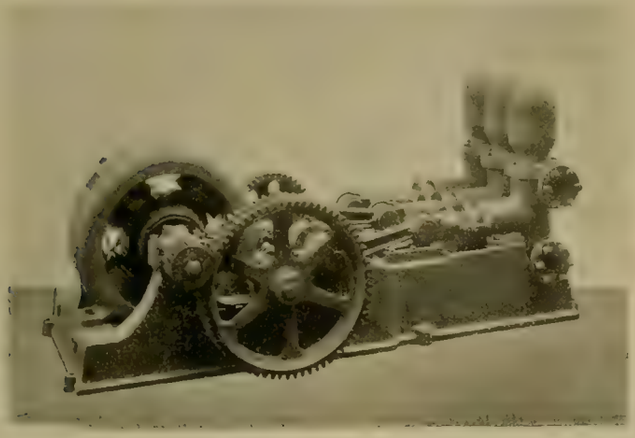
Pennsylvania, California, for December, 5 cents per share, $2750.

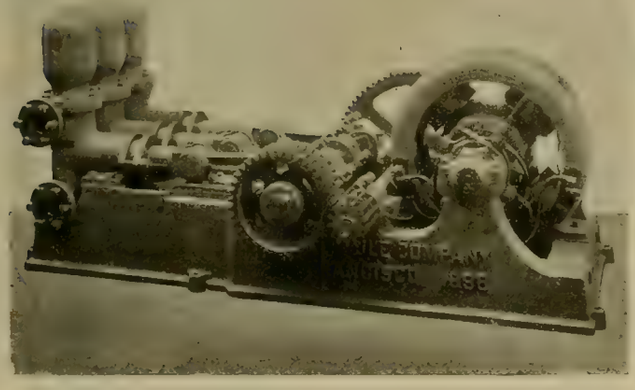
Books Received.

"*Electrolysis and Electrosynthesis of Organic Compounds.*" W. Lob. Translated by H. W. F. Lorenz; 104 pages, 12mo., $1; published by John Wiley & Sons, New York City.

Electrically Driven Mine Pumps.

Herewith are two views—engraved specially for this article—of a small triple plunger, outside packed, special high duty electrical driven mine pump, manufactured by the Abner Doble Co., 200-210 Fremont street, San Francisco. This pump has a capacity of 108,000 gallons of water per twenty-four hours under a vertical lift of 500 feet. It is of the very latest type and is considered by its manufacturers to possess points of improvement over recent practice in designing direct connected pumps for mining purposes. This pump was mounted on a sled and thus used as a sinking pump for unwatering the mine for which it was made, where its use has already lowered the water 150 feet in the shaft. The Doble people make the additional point, that when the water is lowered to the 500-foot working level the owners of the pump illustrated will then have a first class electrical driven station pump, whereas, had they used the sinking pump, they would have been compelled to install a station pump at an additional expense.





THE DOBLE TRIPLEX ELECTRIC MINE PUMP.

Temperature of Battery Water, Etc.

To the Editor:—Having noted several articles on temperature of battery water, and having received great benefit therefrom, I will contribute my mite. Those who have been writing upon the subject may have forgotten more than I will ever know. But I am now experimenting with artesian water and, in my judgment, it is too warm. As it leaves the pipe, it is 80°; in the mill, 76°. I am using a Huntington mill, and we save 80% in the bullion well in the mill; it is very hard to save on the plates, as the quicksilver will run or wear off with the sand; the mercury on the plates is not firm enough to hold the gold. If we drop a piece of dry amalgam on the plates it will roll over and be coated with quicksilver, but will not hold to the plates. I do not believe it would stay on the plates in a battery with water at 70° or 76°; the splash would wear it off. If any of your readers have tried and found why it does not, I would like to know. I contemplate building a larger mill, and am experimenting with that view. My plates have but 1¼-inch drop to the foot, and they are hard to regulate even at that.

Austin, Nev. T. J. Bell.

A Few Questions Answered.

Ordinarily a multitude of questions are weekly answered in "Concentrates" on the third page of each issue, the questions themselves being omitted to save space, the answers being, virtually, publication of the questions themselves. The following was received from an Arizona subscriber after that page in this issue had gone to press. The questions are more varied than valuable:

What is the value of wolramite and sheelite ores? What is sheelite, and does it carry gold or any other valuable minerals? For what is wolframite used? Where can I obtain samples of platinum and cinnabar ores? What is ilvaite? What is lignite? What is meant by a tonstate of two or more minerals?

Sheelite is a calcium tungstate. Wolframite is a tungstate of iron and manganese. The value of wolframite and sheelite ores is dependent on the percentage of tungstic acid. No ore of less than 50% is commercially available, and the value runs from $1.20 to $1.40 per unit, but it must be free from sulphur and phosphorus. It is used for making a dense, strong, tough steel. Sheelite is obtained in commercial quantities in Trumball, Fairfield Co., Conn. In Arizona it is found connected with gold quartz. The United States consumed in 1897 seventy tons of wolframite ore; Europe uses about 600 metric tons per annum. Lignite is a brown coal formed from strongly compressed vegetable or wood fiber, that retains more or less the form of the original wood. It is a non-coking coal, with a large amount of volatile matter. Platinum can be found and obtained in many of the California gravel claims, in the black sand in cleaning up. Cinnabar ores can be had from any mineral dealer. Ilvaite is a brittle, dark-gray mineral containing silica, iron protoxide and lime, found in Elba, Tuscany, the Tyrol, Cumberland, R. I., and Somerville, Mass. The last question we are unable to answer.

Brunton's Patent Pocket Mine Transit.

The accompanying engravings illustrate a new pocket instrument which furnishes means for performing, within the limits of accuracy imposed by its size and construction, all of the operations for which the ordinary transit is used.

Fig. 1.

The instrument has been designed especially to meet the wants of mining engineers, mine managers and superintendents; but its peculiar features render it admirably adapted to the requirements of geological field work, the taking of topography, and, in short, to any purpose for which a light pocket instrument is desirable, and where a reasonable degree of accuracy will suffice.

Fig. 1 shows the instrument folded and ready for the pocket. An aluminum case covers all the working parts, its outside dimensions being but 2¾x2¾x1 inches and total weight less than eight ounces.

Fig. 2.

Fig. 2 is a plan of the instrument as seen when used for taking courses or horizontal angles and shows the line on the mirror bisecting the opening of the reflected sight.

Our limited space prevents us from illustrating but a part of this valuable instrument, but Figs. 3 and 4 will show its commoner uses.

Fig. 3.

Fig. 3 shows the method of holding and sighting the instrument when taking courses or horizontal angles, where the point sighted is not more than 45° above nor 15° below the observer. The instrument is correctly sighted on the object when the eye looking into the mirror sees the black center line bisecting both the opening in the front sight and the object sighted at.

Fig. 4.

In taking vertical angles the instrument is held as shown in Fig. 4. The open sight is thrown out parallel with the face of the instrument, with sighting end folded at a right angle. The mirrored lid is held at approximately 45° with face of instrument, in which position the eye can see the object sighted at through the round opening in end of sight and the hole through mirror. The clinometer vernier is operated by a lever from the back of the instrument and the mirror serves to show when the bubble in the level on the vernier is on the center, thereby indicating the angle. The lid may then be opened and the angle read direct from the vernier.

Among the noteworthy points characterizing the new instrument are:

1. The construction is such as to permit the sighting of the instrument and the reading of the needle to be performed simultaneously by a single observer. This is not possible with the ordinary surveyor's compass unless a Jacob's staff is used; and while the prismatic compass admits of simultaneous sighting and reading, the use of the prism introduces many disadvantages.

2. Horizontal angles are readily taken between objects situated at almost any angle above or below the observer.

3. The combination in one instrument of means for taking both horizontal and vertical angles, and for obtaining clinometer readings.

The pocket transit was invented and patented by the well-known mine manager, D. W. Brunton of Aspen, and is manufactured and sold by Wm. Ainsworth & Sons of Denver, Colo., who issue a pamphlet giving a detailed description of the instrument and its uses, and who will be pleased to send it to any desired address.

A Negative Opinion.

To the Editor:—Some time ago you had an article under the heading "Does Gold Volatilize?" I say no. If I may, I would suggest to the party who wrote the article to screen out all organic matter from his ore after becoming wet and assay same. I think he will be surprised, and can easily see where the gold went. T. K. Code.

Steeple Rock, N. M.

Youngs' Gold Dredge.

Articles at various times published in the MINING AND SCIENTIFIC PRESS on gold dredging or subaqueous placer mining have contained discussions of the subject generally, with descriptions and illustrations of the various types of dredges in use. In some of those articles the construction and operations of the dipper and ladder, or chain bucket, types have received special attention. The purpose of this article is to give a description of the mechanism of a new dredge of the suction type, with some observations as to its adaptation to the work of placer mining where the gold-bearing material is under water in the beds of rivers and lakes.

Youngs' gold dredge, which is to be described herein, was built specially for allaround work in the rough, swift-flowing as well as smooth streams of gold-bearing countries, and is adapted to meet the varied conditions found in all such streams. It has been exposed to the severest tests in the Northwest and its operators consider the inventor's claims for it fully demonstrated by those tests.

The dredging machinery proper is placed upon a barge or boat 135 feet long, 32 feet beam, drawing 2 feet of water. The main features are a 24-inch specially designed centrifugal pump, driven by a compound condensing engine of special high-speed pattern, a triple-drum hoisting engine, a turntable and a suction pipe, terminating in a rock ejector and plow blade. The mechanism of the equipment, with reference to the accompanying cuts and drawings, is described further on in the article.

The plow blade, which is at the submerged end of the suction pipe, cuts and plows through the gravel to the jagged and serrated bedrock, loosens the material in which the free gold may be held. It rakes the bedrock, moves boulders, opens crevices, enabling the hydraulic suction to reach places where the gold particles may be lodged.

The weight of the suction pipe and fixtures upon its vertical position, together with the pull exerted toward the boat, always keeps the suction down and over the material to be raised, and the smooth, easy manner of loosening the gravel by the plow blade does not disturb or agitate the gold, only as it is passed over. This gives the gold no chance to float away before the suction reaches it. By carrying its "breast" behind it, as it does on the downstream side, and by working to a common center, all that is loosened by the pipe will be kept within reach of the mouth of the suction by the natural current of the stream and the force of the suction itself.

By means of the rock ejector at the end of the suction pipe, the latter can be quickly cleared of rocks which may become jammed into it. This automatic removal of rocks which obstruct the suction obviates the difficulty which heretofore has been the great hindrance to the success of centrifugal pumping plants.

The motion of the end of the pipe is 25 feet; the swing of the turntable is through 150 degrees, making it possible to dredge an area of about 2000 square feet without moving the boat.

The method of saving the gold, of separating it from the material pumped up, is a question of gravity applied to a system of sluices on the boat, a double line of which extends the length of the boat on either side, the material first passing through an improved rotary grizzly of special design.

This machine has been used on the Fraser river and two of them are being constructed for use next year on Forty-mile river, a tributary of the Yukon.

The inventor of this dredge and the Youngs' Gold Dredger Co. claim these points of superiority: 1. That it will penetrate the gravelly bars in the stream and reach the gold in any pocket or cavity in an uneven bedrock.

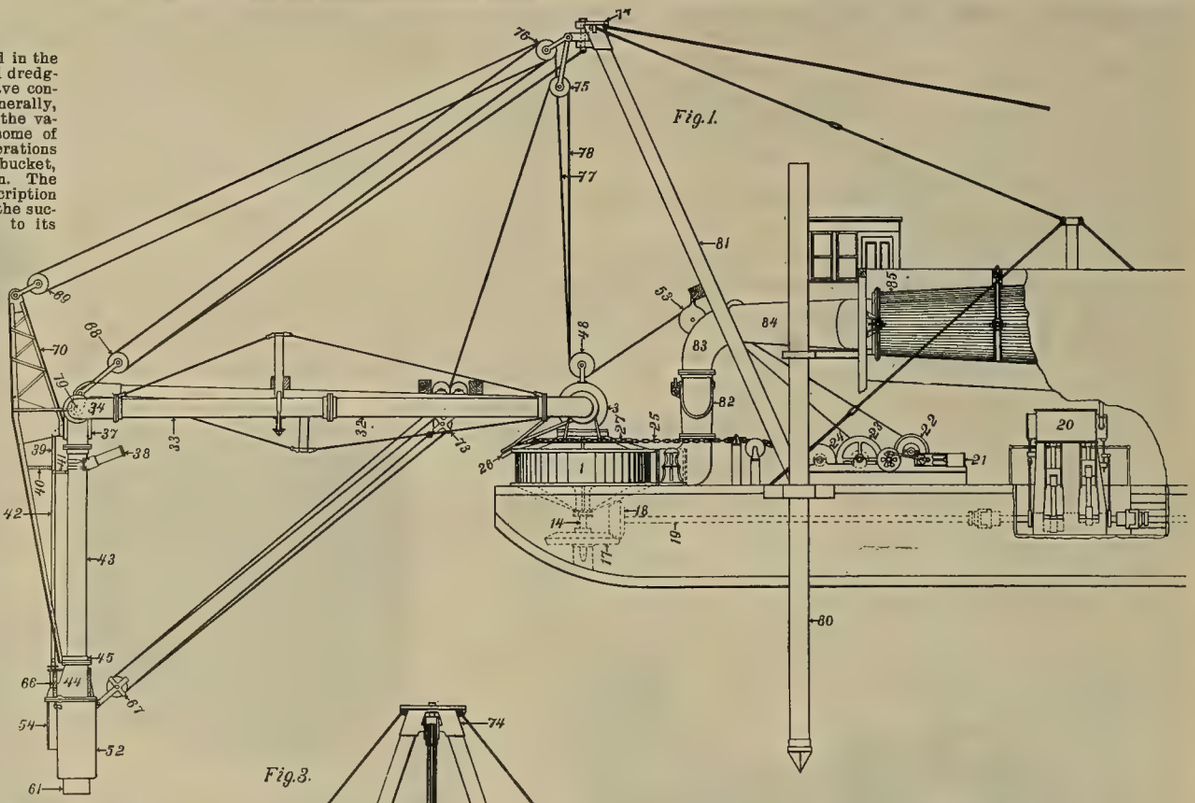


Fig. 1.

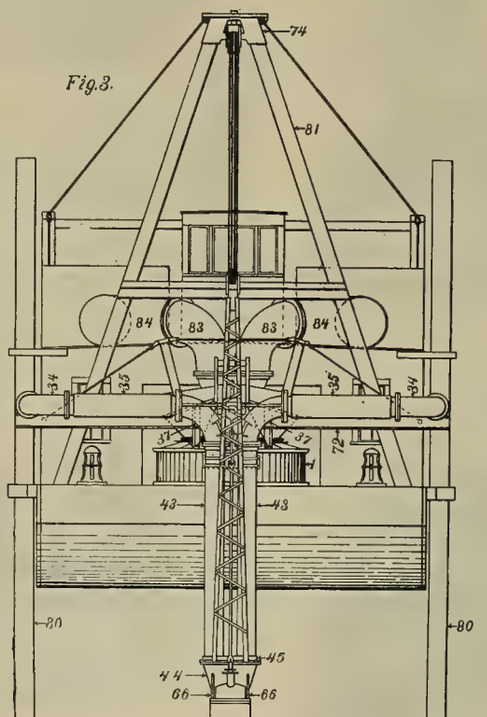
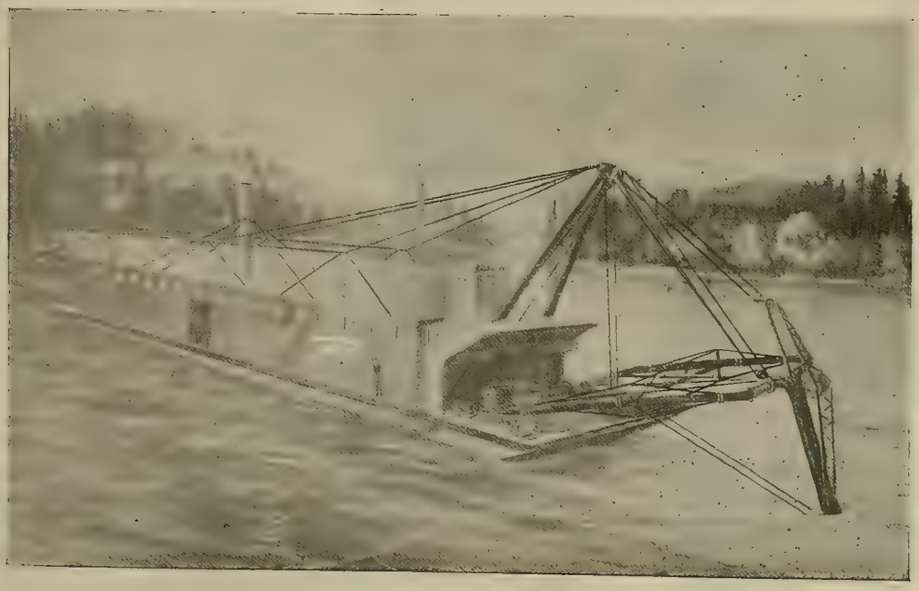


Fig. 3.



YOUNGS' GOLD DREDGE.

2. That it can move heavy boulders and take up the gold that so often fills the cavities around and under them. The boulders are nature's riffles and there the gold is found. 3. That it will handle 5000 or more yards per day, the capacity being an important factor. 4. That the suction is not hindered by clogging of the pipe, the rock ejector obviating that difficulty.

The following is a technical description of the pump and the operating machinery:

After five years of practical experimental work with our dredger, we have been able to ascertain more closely the changes necessary to be made to enable it to fully overcome the obstacles of nature, as well as others to be overcome, which have necessitated the making of some material changes—changes that are for the better, and which have not only lessened the weight of several parts, but strengthened and simplified the construction and reduced the cost of operation by increasing the capacity.

It was found that, in order to allow the suction pipe to reach the bedrock in deep gravel, a large percentage of the deposit had to be removed, and to do this a larger suction pipe had to be used, which of course necessitated the use of a larger pump. With the improvements made, the Youngs' Gold Dredger is completed and perfected to work under all conditions.

Referring to the general drawings (Fig. 1), note that the centrifugal pump is laid flat on the deck, at the bow of the boat. The shaft being vertical, is to be driven by bevel gearing from an engine placed aft; the suction is divided into two branches extending from opposite sides of the ball-shaped swivel tee on top of the pump. Short lengths of 18-inch O. D. wrought-iron pipe extend from each side of the ball "tee" to the water-sealed swivel flange. From each of the swivel flanges extends a short length (about 4 feet) of 17-inch suction hose, to the end of which is attached a cast steel elbow. From these elbows, pipes (18-inch O. D. wrought iron) lead forward 34 feet to similar elbows, to which are attached two pieces of suction hose, 7 feet long, ending in swivel joints, which are fastened to two elbows placed back to back, one arm of each pointing downward. These elbows are fastened together and swing from the end of the double boom by a modified form of universal or gun ball joint, giving free motion to the swinging pipe in all directions. Two vertical (18-inch O. D.) pipes lead downward 17 feet from these elbows to the valve chest. From the lower side of the valve chest a single pipe 26 inches inside diameter extends downward about 6 feet; to this is attached the rock ejector and plow blade. In front of the last-mentioned elbow is placed the swinging lever; a small cylinder is placed just back of this lever so as to operate the relief valve and rock ejector. In the rock ejector, in addition to the cross bar, are placed twelve retreating "chuck jaws," which, when the rock ejector is closed, extend each 1 inch into the side of the mouth of the pipe. Rocks can only become jammed into the mouth of the pipe between the face of the "chuck jaws," the sides of the plow blade and the sides of the cross bar.

In the valve chamber, when the rock ejector is closed, the valve is up and closes the relief pipe extending from the forward side of the valve chamber downward to within 2½ feet of the end of the rock ejector. When it is desired to eject the obstruction at the mouth of the pipe, steam or air is turned into the cylinder above mentioned which pulls up on the valve stem. This first opens the relief valve port, allowing water to pass in the pump freely, thus avoiding all necessity of stopping the pump while ejecting the rocks. The valve then swings down, entirely closing the main pipe above the rock ejector. When the valve disc gets within two inches of being entirely

closed, it strikes the ends of the rock ejector rods, which are attached to the cross bar and outer sleeve of the mouthpiece, forcing them downward and thus allowing the "chuck jaws" to retreat into the walls of the sleeve. This will let go of any rock, no matter how hard it may be jammed in; and as the valve is closed, they will drop entirely clear of the pipe. Springs are used to return the rock ejector sleeve to place, when the valve is raised again. This rock ejector and pump are designed to allow rocks 12 inches in diameter to pass through; all gravel less than that size will go through. This means removes practically all of the material on bedrock in most gold-bearing streams, thus thinning out the bar so that the coarse material can be easily moved around, enabling the pipe to reach and clean the bedrock.

Attached to the valve chest cap (45—Fig. 1) and the elbows (37) is a lever (70), to the upper end of which is fastened the double block (69). The line (77) passes from the masthead through the blocks (68, 76 and 69) and down to the hoisting drum (22). By pulling on the line (77) the pipe is drawn up and outward, when it is let down to the bottom; then, by pulling on a similar tackle (78), which is fastened to the lower end of the suction pipe, the pipe is pulled towards the boat through the gravel, it being essential that the pump be started and primed before lowering the pipe into the gravel to prevent it from choking.

A circular piece of angle iron (27—Fig. 1) is attached to the ball tee (3), to which is fastened a chain (25), leading to the drum (24). By this means the suction pipe is rotated through an angle of 150 degrees. A thrust roller (26) is attached to the ball tee (3) and runs on the beveled edge of the top plate of the pump. This relieves the thrust of the suction pipes on the swivel flange.

The weight of the extended pipes is carried by the trussed beam (72), which is in turn supported by the double boom (71).

The pump is designed especially for handling large gravel. It is built entirely of cast steel, with the exception of the shell, which is sheet steel. It is fitted throughout with cast steel liners, which may be replaced with new ones when they become worn out.

For the purpose of regulating the volume of water for sluicing there is provided two separate acting centrifugal auxiliary pumps, 8 and 12-inch, by the action of which the sluices are furnished with a uniform volume of water.

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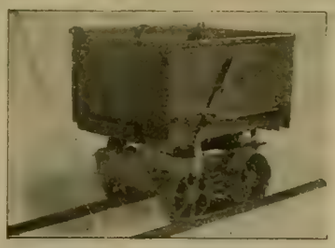
WASCOTT.

Seattle, Wash., Dec. 15th, '98



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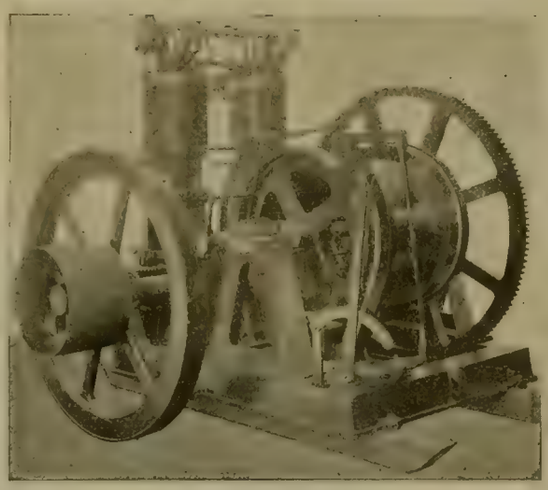

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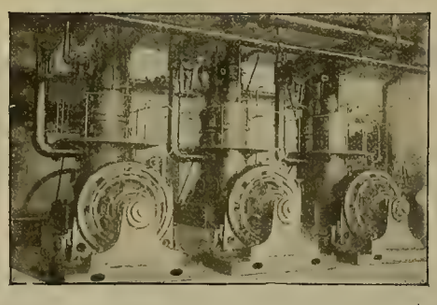

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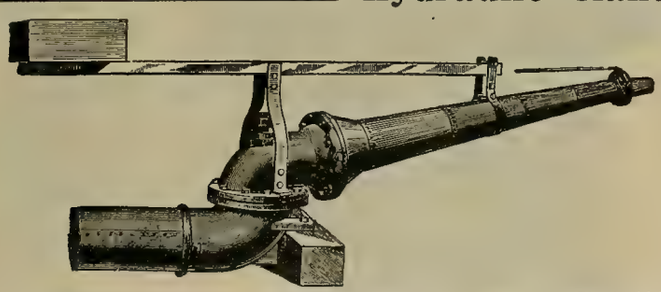

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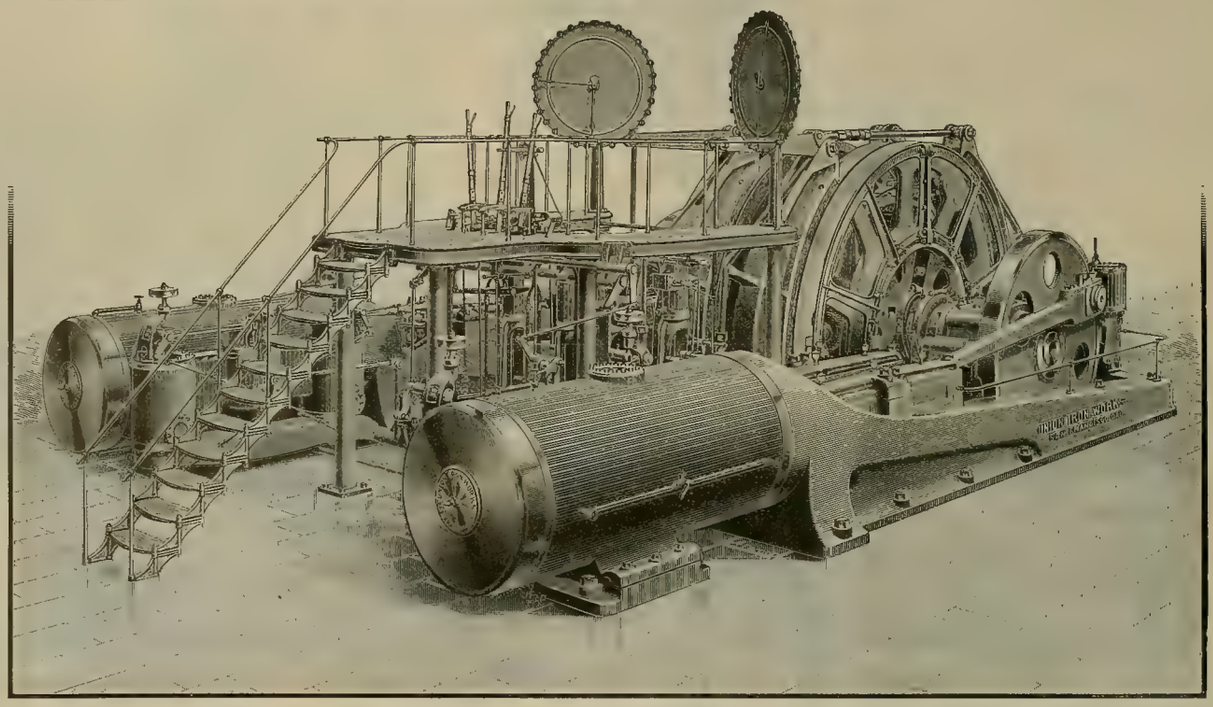

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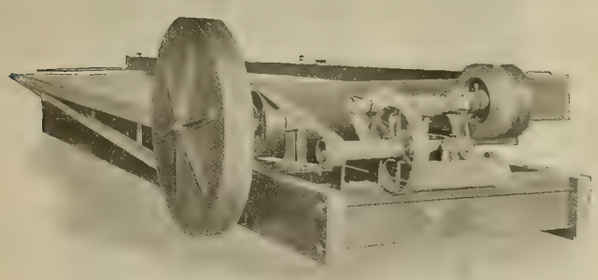

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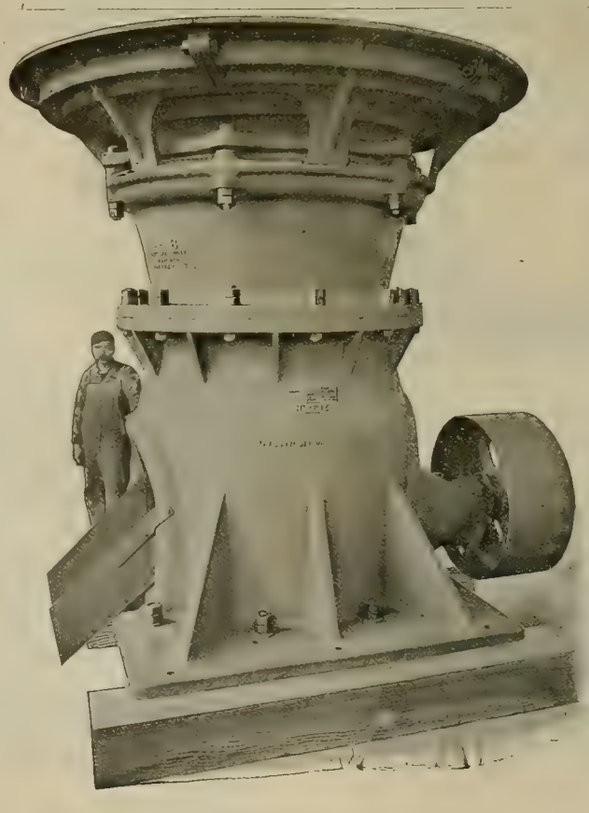

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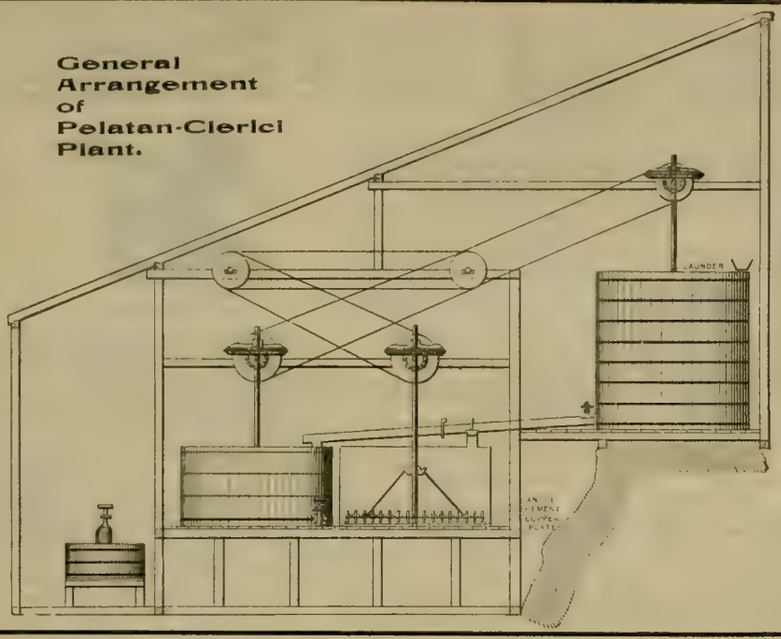

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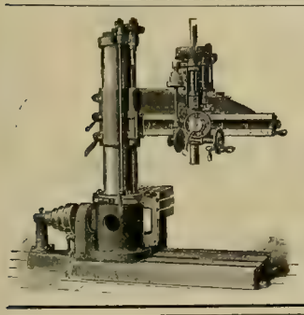

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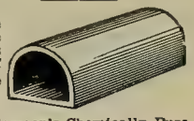

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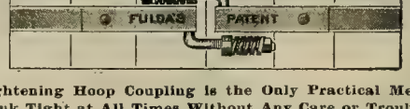

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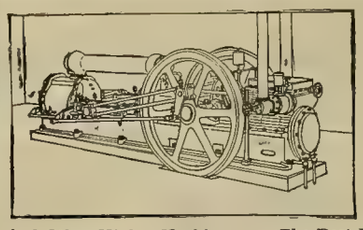

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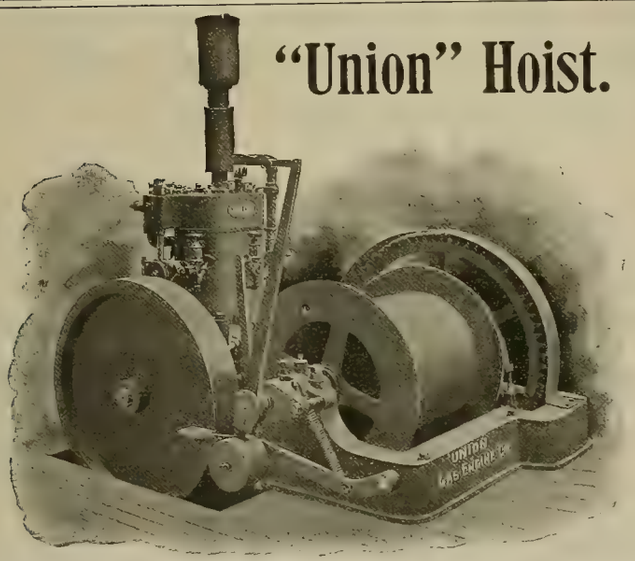

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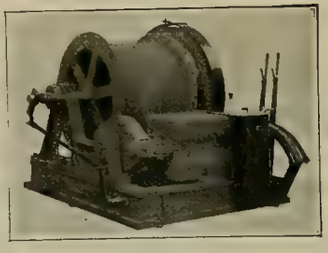

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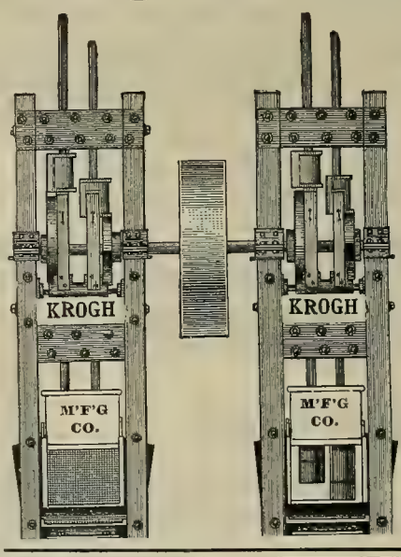

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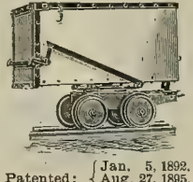

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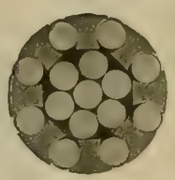

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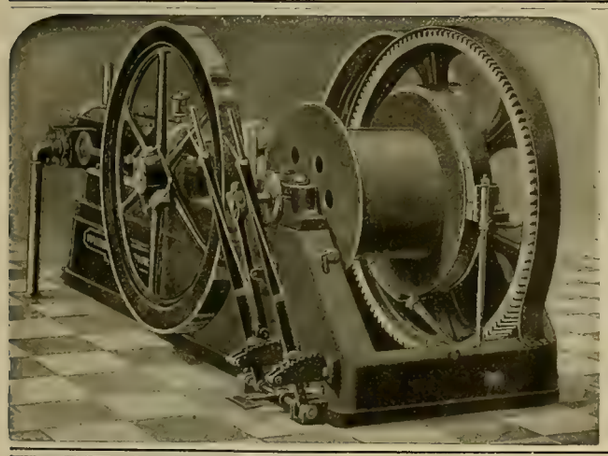

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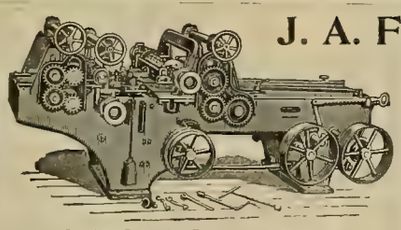

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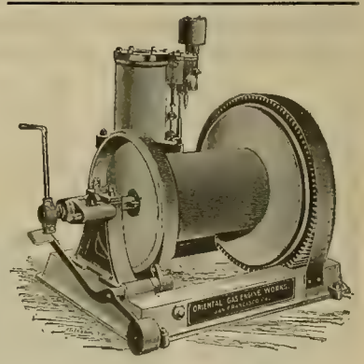

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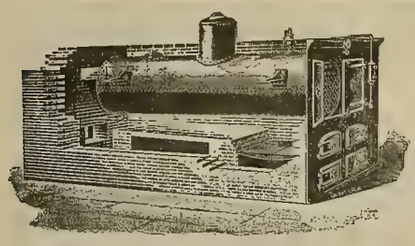

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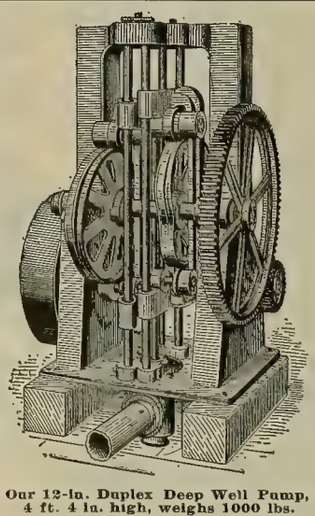
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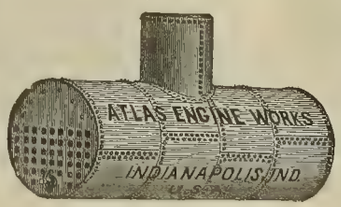

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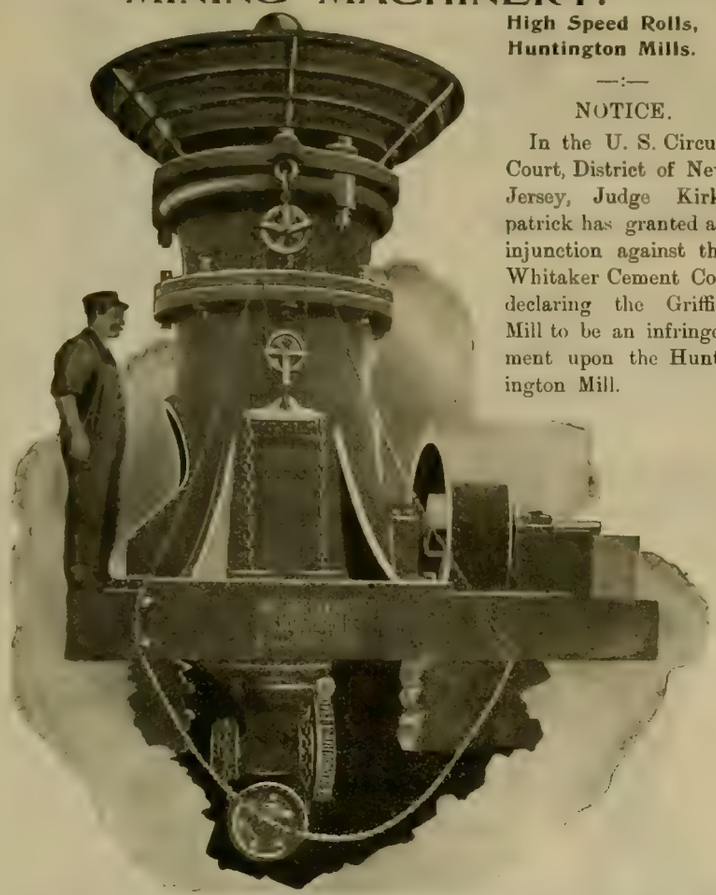

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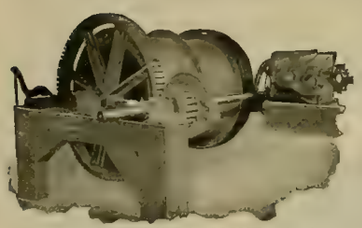

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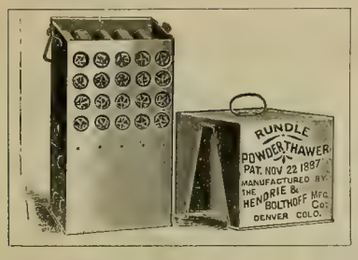

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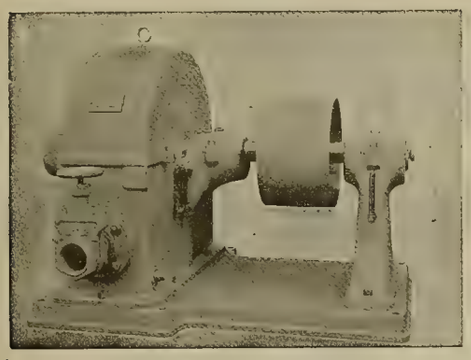
The Pelton Water Wheel Company



Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods.

An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Aggregating some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries.

Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

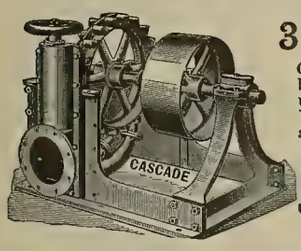
The Pelton Water Wheel Company,

121 AND 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

3 Feet to 2000 Feet.



Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.

JAMES LEFFEL & CO.

SPRINGFIELD, OHIO, U. S. A.

LINK-BELT ELEVATORS —AND— CONVEYORS.

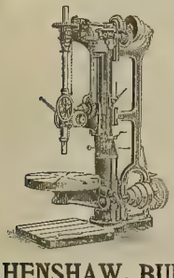
MALLEABLE IRON BUCKETS, Electric Coal Mining and Haulage Machinery, Luhrig Patent Machinery for Washing and Classifying Coal, Shafting, Pulleys, Bearing Rope Sheaves, Clutches, Etc.

Machinery designed and erected to suit existing conditions and available space.

THE LINK-BELT MACHINERY CO.,

Engineers, Founders, Machinists. CHICAGO, U. S. A.

Denver, 1328 17th St.
A. E. LINDROOTH, Manager.



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Manufacturing Company,

NEW HAVEN, CONN.

Iron : Working : Tools.

Engine Lathes, Pulley Turning Lathes, Iron Planers, Slotters, Upright Drilling Machines, Horizontal Drilling and Boring Machines, Etc.

HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.

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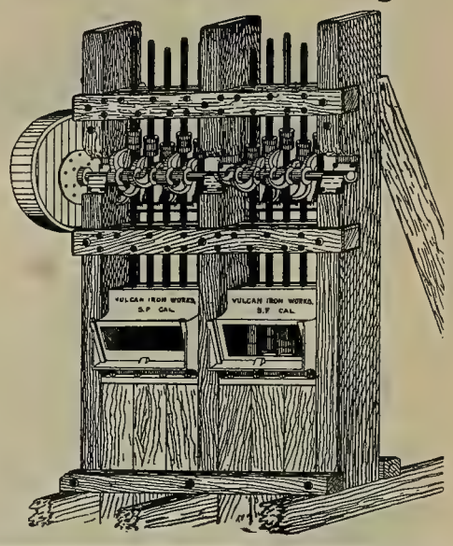
Mining Machinery.

Stamp Mills

Of the Latest Improved Design for

Gold Milling.



VULCAN WIRE ROPEWAYS

For Conveying Ore, Etc.

Vulcan Iron Works,

Office: 505 Mission Street, San Francisco, Cal.

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Rock Drilling, Air Compressing, Mining and Quarrying Machinery,

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BRANCH OFFICES IN UNITED STATES AND CANADA:

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Wallace, Idaho. Spokane, Wash.
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ADAMANTINE SHOES AND DIES
—AND—
CHROME CAST STEEL
Cams, Tappets, Bosses, Roll Shells and Crusher Plates.

STAMP SHOES

STAMP DIES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

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THE BEST (MINE PUMPS) IN THE WORLD.
OUR SPECIALTY.

We carry in our Denver store a stock of Cameron Pattern Sinkers and Duplex Station Pumps. Write for Catalogue and Estimates.

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Jeansville Iron Works Co.,
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To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

Every Description of Mining Plates Made.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES REPLATED. TWENTY-SIX MEDALS AWARDED. GOLD, SILVER, NICKEL, COPPER & BRASS PLATING.

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SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

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—MANUFACTURERS OF—

ALCHEMIST BRAND

BLUE VITRIOL, ZINC SULPHATE.

CONSOLIDATED KANSAS CITY SMELTING & REFINING COMPANY.

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GOLD, SILVER, LEAD AND COPPER ORES,

Bullion, Mattes and Furnace Products,

GOLD BARS, SILVER BARS, SULPHIDES AND CYANIDE PRODUCTS.

GENERAL OFFICE: Argentine, Kas.

FOR PRICES, ADDRESS:
J. E. Jackson, Salt Lake, Utah.
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SMELTING WORKS: Argentine, Kas.; El Paso, Tex.; Leadville, Colo.

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In United States— Denver, Colo. Cripple Creek, Colo. Salt Lake City, Utah. Spokane, Wash. New York City, N.Y. St. Louis, Mo. Joplin, Mo.

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THE COLORADO IRON WORKS CO., DENVER, COLO.

Established 1860. ✦ ENGINEERS AND MANUFACTURERS OF **Ore Milling and Smelting Equipments.**

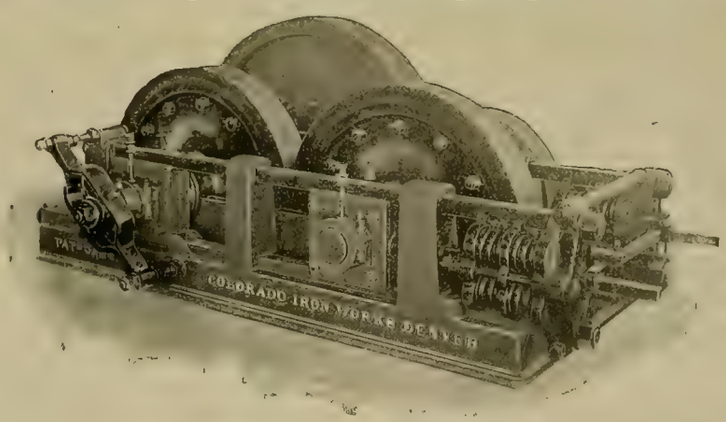
We beg to call attention to our

High Speed Special Rolls

as being the most efficient and the most economical machine for fine dry crushing ever placed upon the market. The rolls having

NARROW FACES and LARGE DIAMETERS

can be fed evenly over the whole width of faces with certainty, and hence the faces or crushing surfaces are easily kept true. Descriptive pamphlet on application.



HIGH SPEED SPECIAL ROLLS, WITHOUT HOUSING.

Double rope tramways are acknowledged to be superior to those of the single rope type, and any one contemplating the erection of a tramway should investigate the merits of the . . .

THE ONLY AUTOMATIC TRAMWAY BUILT.

FINLAYSON PATENT AUTOMATIC WIRE ROPE TRAMWAY.

In this system the cost of transportation is brought below any figure heretofore reached. Its tonnage capacity is unsurpassed. Further information on application.

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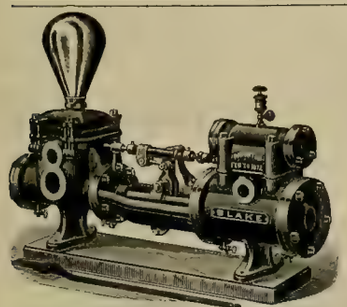

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Boiler Feed Pumps,
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Drainage and Irrigating Pumps,
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RIVETED SHEET STEEL WATER PIPE
For Placers, Water Powers, Irrigation, Etc.
THE WEIGELE PIPE WORKS
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For Testing Placer Ground.

Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes.

Write for Catalogue and full information.

KEYSTONE DRILLER CO., Beaver Falls, Pa.

Market Reports.

The Markets.

SAN FRANCISCO, Jan. 12, 1899.

From San Francisco during the year ending Dec. 1st, '98, was shipped treasure as follows:

Gold Coin	$44,366,855
Silver Bullion	3,657,578
Mexican Dollars	6,089,674
Peru Soles	152,689
Silver Coin	508,116
Gold Bullion	4,000
Gold Dust	4,715
Currency	535,952
Total	$55,319,579

The destinations of the above shipments were as follows:

New York	$45,231,661
Hongkong	8,200,717
Shanghai	230,468
Japan	3,000
India	514,900
Honolulu	953,100
Central America	181,782
Mexico	1,500
Tahiti	2,451
Total	$55,319,579

SILVER.—London, 27 3-16d; New York, 59; San Francisco, 59½; Mexican Dollars, 47½@48. New York exchange, sight, 15; telegraphic, 17½ cents premium.

LEAD. — New York reports "firm" $4.10 bid, $4.15 asked. The firm naming the settling price for leading miners and smelters at the West quotes Lead $3.80.

Local, pipe, 6@6¼c; sheet, 6¼@7c; pig, 5¾c; bar, 6c.

COPPER.—New York reports Lake strong and higher, $13.62 bid, $14 asked. Local, bar 20c per lb.

IRON.—American, soft, $21.75 and $23.75 per ton; Scotch, $24.25. Local bar, 2½c per lb.

SPELTER.—8½@9.

TIN.—Pig, 22c per lb.; Bar, 25c. A Pittsburg dispatch says: "The tinplate combine has announced an advance of 25 cents on each standard 100-pound box and the jobbers have put up prices 30 cents, thus jumping from $3.10 to $3.40 within twenty-four hours. It is believed quotations will advance until $4 is reached."

ANTIMONY.—14.

BABBITT METAL.—No. 3, 7c.

QUICKSILVER. — Steady. Local, $41.00; export, $37.50 @ 38.00; carload lots, special rates. The quicksilver companies which control the United States production report a small visible supply amounting to about 6000 tons.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13¾c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 30 @ 31c per lb.; carloads, 29c; in 10-lb. tins 37c; sulphuric acid, 2½c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9¼@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ℔ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11¾c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

CANDLES.—Electric Light Candles—6s, 16 oz., 7½c; 6s, 14 oz., 6½c; 6s, 12 oz., 5½c; 6s, 10 oz., 4½c; Granite (Mining) Candles—6s, 16 oz., 8¾c, 6s, 14 oz., 7¾c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $2.40; cut, $2.25; 10 to 20d, wire, $2.45; cut, $2.30; 8d, wire, $2.50; cut, $2.35; 6 and 7d, wire, $2 60; cut, $2.45; 4 and 5d, wire, $2.70; cut, $2.55; 3d, wire, $2.85; cut, $2.70; 2d, wire, $3.10; cut, $2.95. In carload lots, 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 12, 1899

9:30 A. M. SESSION.

200 Andes	05c	500 Justice	11c
100 Best & Belcher	39c	500 Sierra Nevada	75c
900 Chollar	12c	100 Union Con	31c
100 C. Cal. & Va	$1 25	100 Utah	12c
200 Gould & Curry	26c		

2:30 P. M. SESSION.

100 Ophir	51c	100 Chollar	12c
300 Mexican	32c	500 Hale & Norc's	09c
300 Gould & Curry	26c	200 Overman	06c
300 Best & Belcher	38c	100 Andes	05c

Recent Mining Incorporations.

Eleanor G. M. Co., San Francisco; capital stock, $500,000; subscribed, $250,000; directors, F. L. Wooster, D. E. Hayes, D. R. Hinckley, E. E. and W. W. Potter.

Manzanita G. M. & M. Co., San Francisco; capital stock, $20,000; subscribed, $50; C. L. Hovey, G. Goetinger, W. F. Fisher, W. K. Flint, E. Pohli.

Victor M. Co., San Francisco; capital stock, $200,000; subscribed, $5; C. W. Howard, M. B. Kellogg, J. M. Duke, F. Pauson, G. Lezinsky.

Sumdum M. Co., Alaska; capital stock, $200,000; subscribed, $700; W. H. Payson, J. Cross, W. L. B. Mills, W. T. Wallace, H. R. Martin, J. McCutchen.

Norton Sound M. Co., San Francisco; capital stock $250,000, subscribed $35; G. H. Kellogg, J. E. Spencer, C. Hersberg, J. W. Wright, D. A. MacDonald, A. Hinz.

Klamath Con. Hydraulic G. M. Co., San Francisco; capital stock $200,000, subscribed $30; H. C. Gilbert, J. L. Gilbert, W. S. Wood, J. R. Ryan, L. Shores.

Acetylene Gas.

A handsome new illustrated catalogue will tell you where and by whom the new light is being used, and what the verdict is. Mailed upon application. PACIFIC ACETYLENE GAS CO., 115 New Montgomery St., San Francisco.

Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from S. S. Taylor, in the Silver Star Flume and Mining Co.'s Mine, near Spanish Ranch, Plumas Co., to deposit tailings in a worked-out pit; from H. S. Byam, in the Bonanza Claim, in Amador Co. near Michigan Bar, to deposit tailings in Arkansas Creek; and from the Badger Hill and Cherokee Gravel Mining Co., in the Badger Hill Mine, at Cherokee, Nevada Co., to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 30, 1899, at 1:30 P. M.

FOR SALE.

4 Woodbury Concentrators with new belts. Machines in good condition. For price and particulars, apply to EDWARD GOODWIN, Supt. Montauk Con. G. M. Co., Newcastle, Cal.

HERRIN & REINER,

Mine and Stock Brokers.

Reliable Quotations given on all the Standard British Columbia, Washington and Idaho Mining Stocks.

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Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

Cable address Edbec Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

J. D. BETHUNE,

(Late Associate Justice Supreme Court.)

Attorney at Law,

Mining Law,

PRESCOTT, ARIZONA.

A Valuable Gold Property for Sale.

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Mines—Dividend Paying and Investment Stock.

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(A CORPORATION.)

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. Extra sizes and lengths made to order on short notice

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226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork All communications *strictly confidential.*

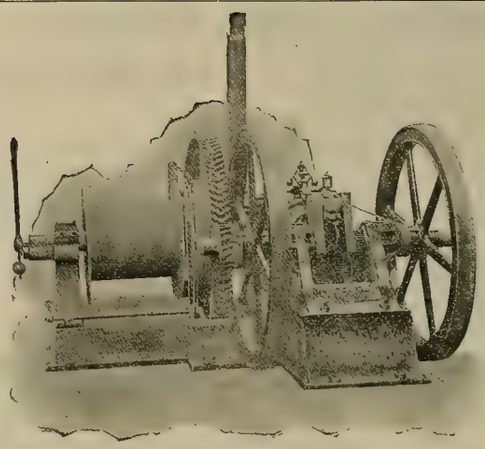
Placer Miners' Attention

Is called to the fact that we are purchasers of

OSM-IRIDIUM

In lots of one ounce and upwards.

SELBY SMELTING & LEAD CO., 416 Montgomery Street, San Francisco.



FRESNO, June 25, 1898.

Hercules Gas Engine Works, San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,

305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,

MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,

ALSO REPAIR AND JOB WORK OF ANY KIND.

Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.

34-36 Main Street, - San Francisco.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

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The Vancouver Assay Office and Ore Testing Works.

MINING ENGINEER, METALLURGIST AND ASSAYER.

Working Tests by Amalgamation and Cyanidation. Ores Purchased. Assays and Analyses.

Representative for:

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REPUBLIC and ROSSLAND Mining Stocks

Bought and sold for non-residents. SOLID DIVIDEND PAYERS as an investment. Prospective producers as a speculation. Write for information.

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Supported by the State of Michigan. Practical work. Elective system. Special advantages for men of age and experience. For catalogues address DR. M. E. WADSWORTH, President, Houghton, Michigan.

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Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited. W. E. Holbrook, Pres't. L. F. Haskell, Sec'y. 29-30 Chronicle Building, S. F.

Assessment Notices.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business San Francisco, California, location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of December, 1898, an assessment (No. 32) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, 10th floor, Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of January, 1899, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on THURSDAY, the 23d day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Mills building, room 31, 10th floor, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of December, 1898, an assessment (No. 5) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 20th day of January, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of February, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, Cal.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of January, 1899, an assessment (No. 12) of Ten Cents (10c.) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 6th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, secretary.

Office 237 12th street, San Francisco, California. The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of January, 1899, an assessment (No. 20) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, Rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of February, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 21st day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, Rooms 15 and 17, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of December, 1898, an assessment (No. 15) of ½ of 1 cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of January, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 2nd day of February, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—No. 1209 Claus Spreckels building, San Francisco, California.

ANNUAL MEETING.

Dutch Mining and Milling Company.

The Regular Annual Meeting of the Stockholders of the Dutch Mining and Milling Company will be held at the office of the company, No. 319 California St., City and County of San Francisco, State of California, on MONDAY, the 16th day of January, 1899, at the hour of 2 o'clock P. M. on said day, for the purpose of electing a Board of Directors for the ensuing year, and also for the transaction of such other business as may be brought before the meeting. Transfer books close Thursday, January 5th, 1899, at 3 o clock P. M. GEO. W. GERHARD, Secretary.

Dated San Francisco, December 31st, 1898.

ANTIMONY.

We buy Antimony Ore in any quantity and pay prompt CASH for same. Write us and let us know what you have.

Chapman Smelting Works Co.,
(INCORPORATED.)
422 Battery Street.....San Francisco, Cal.

DELINQUENT SALE NOTICE.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 22) levied on the 3rd day of December, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. F Anderson	93	3,000	$60 00
Calvert Meade, Trustee	196	200	4 00

And in accordance with law, and an order from the Board of Directors, made on the 3rd day of December, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 106 Liedesdorff street, San Francisco, California, on MONDAY, the 30th day of January, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale. CALVERT MEADE, Secretary.

Office — 106 Leidesdorff St., San Francisco, California.

THE

F. M. Davis Iron Works Co.,

723 to 743 Larimer St., Cor. 8th St.,
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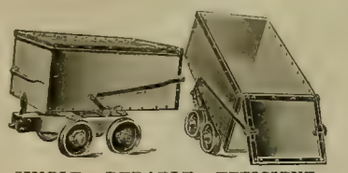
THE DAVIS AUTOMATIC ORE CAR.

Patented Jan. 7, 1896.



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ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the HORSESHOE BAR CONSOLIDATED MINING COMPANY will be held at the office of the company, Room 36, No. 330 Pine Street, San Francisco, California, on MONDAY, the 16th day of January, 1899, at the hour of 1 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. Transfer books will close on Thursday, January 12th, 1899, at 3 o'clock P. M.

D. M. KENT, Secretary.

Office—Room 36, No. 330 Pine Street, San Francisco, California.

Seattle & Everett Navigation Company.

Go on the GREYHOUND.

SEATTLE, EVERETT and EDMONDS ROUTE.

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E. B. SCOTT, Manager, Seattle, Wash.

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SILVER CITY, GRANT COUNTY, NEW MEXICO.

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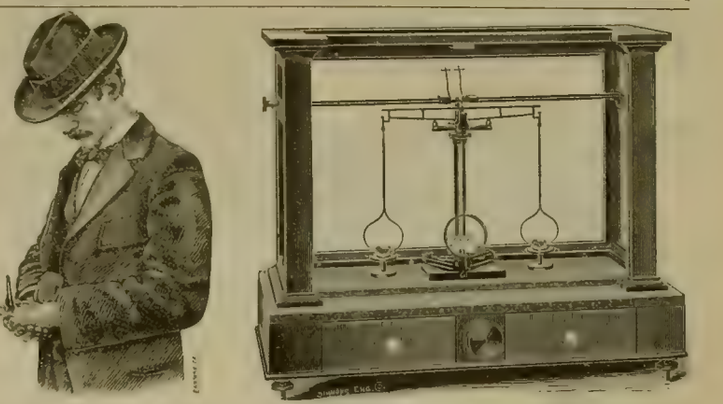

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Guaranteed 99% and over.

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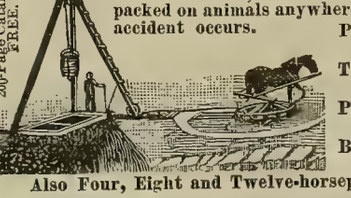

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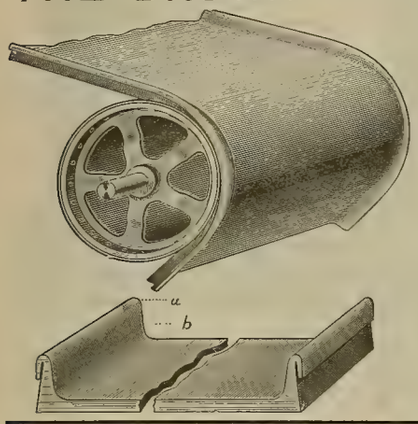


It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

RAWHIDE GOLD MINING COMPANY,
JAMESTOWN, TUOLUMNE CO., CAL., Feb. 21, 1897.

J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

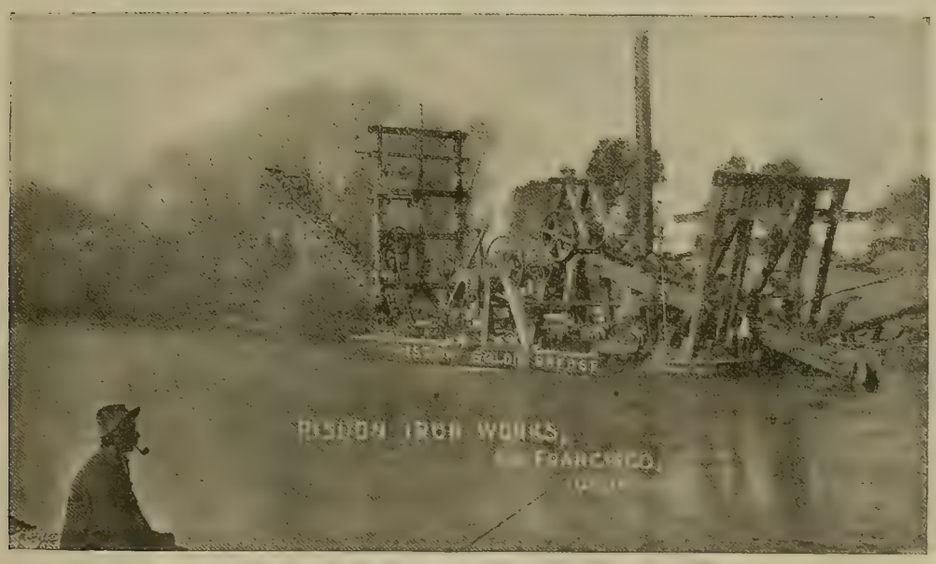
AMADOR CITY, CAL., Feb. 18, 1897.

MR. J. S. BROWNELL—DEAR SIR: I take pleasure in saying that I have used your Patent Lipped flange belt for several years while connected with this company, and I consider them the best that we have used. The quality of rubber in the flange seems to be the best, and we are not bothered with the flange cracking and thereby destroying the life of the belt. At present we are using 14 concentrators, and have in use several kinds of belts. We consider your Patent Lipped flange the best. Yours very truly, THE CONS. SOUTH SPRING HILL G. M. CO.
By JOHN R. TREGLOAN, Superintendent.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.

(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.



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We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.
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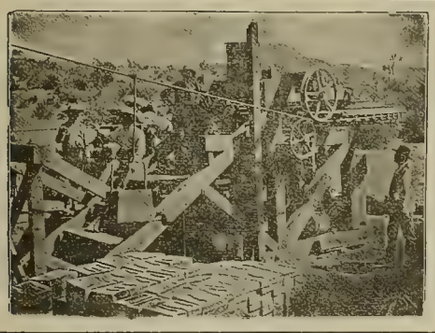

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LOADS MECHANICALLY. DUMPS AUTOMATICALLY. **Send for Ropeway Pamphlet No. 20.**

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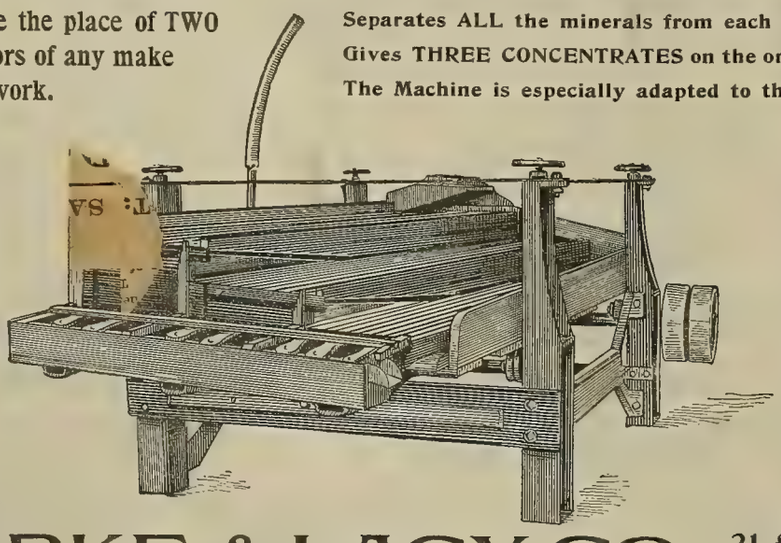
One of these Machines will take the place of TWO or THREE Belt Concentrators of any make and do as good work.

Separates ALL the minerals from each other at one operation.
Gives THREE CONCENTRATES on the one Machine at the same operation.
The Machine is especially adapted to the separation of Zinc and Lead.



SIZE OF MACHINE.....4 ft. by 8 ft.

WEIGHT.....1000 Lbs.

CAPACITY.....10 to 30 tons per 24 hours.

CAN BE SET UP ANYWHERE.

REQUIRES NO SPECIAL FOUNDATION.

THREE CLASSES OF MACHINES ARE MADE.

Table A is adapted to concentration from 2 into 1 to 8 into 1.
Table B, 6 into 1 to 16 into 1.
Table C, 12 into 1 to 32 into 1.

Parties desiring tests made can send 500 lbs or more, charges prepaid, and a run will be made and reports forwarded of the results, free of all charges, except for the assays, which will not exceed $10.00.

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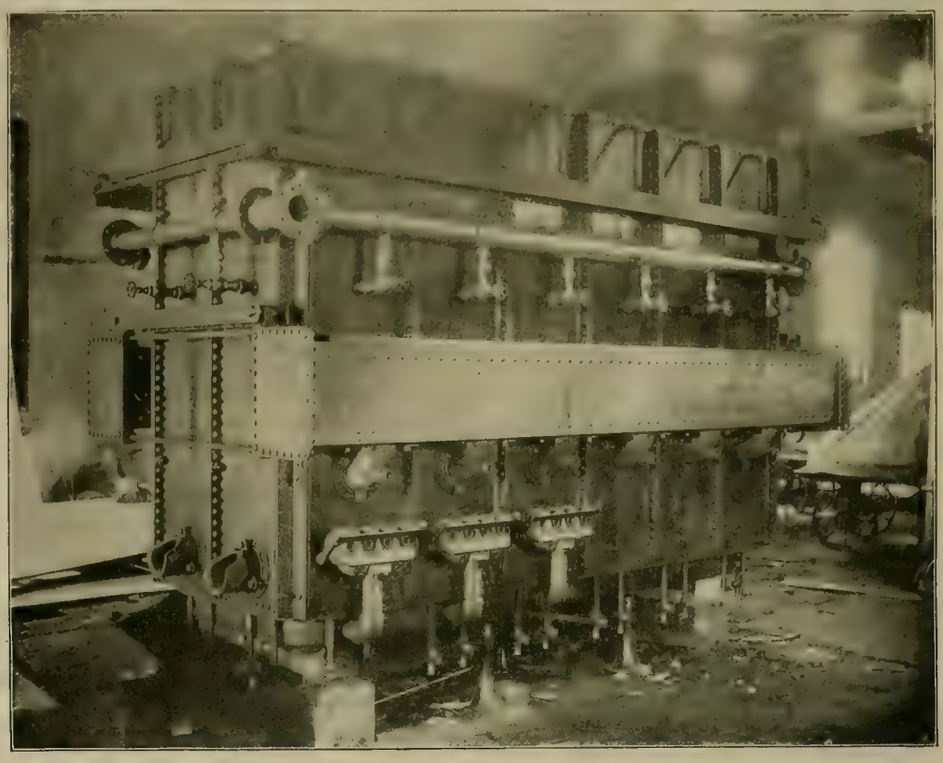
MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2011.—VOLUME LXXVIII. Number 3. SAN FRANCISCO, SATURDAY, JANUARY 21, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Garretson Furnace.

The Garretson furnace, illustrated herewith, is intended for smelting and converting raw sulphide ores to metallic copper. The one depicted on this page has a stated capacity of 250 tons per day. The plan embraces a combination of pyritic smelting and continuous converting in a water-jacket furnace. It is a single-stack, arranged for two pressures of blast, intended to be so operated that copper bottoms or black copper may be tapped from one end, while more than ordinarily clean slag runs from the other end. This is in its simplest form. Constructed as a lead-copper smelter, with intent to treat complex ores, the plan includes primarily the reduction of lead, bismuth, etc., to a metallic state, they settling to the bottom and thence withdrawn, obviating loss by volatilization. A hot-blast is added when the furnace is built to operate as a pyritic smelter. The idea is one of economy of operation in carrying on in a single furnace the three operations of roasting, smelting and converting. The claim is made by the inventor that ores carrying sufficiently high percentages of sulphur, iron, arsenic, etc., can be smelted and converted into copper bottoms or black copper at one operation without the continued use of any carbonaceous fuel in the furnace. Bessemerizing low-grade matte ordinarily causes formation of slag on its surface. Securing its continuous flow and displacement by fresh matte arriving from the fusion of the ore is intended to overcome this difficulty: the corrosion and destruction of the quartz and clay converter linings by ferrous oxide formed is supposedly obviated by allowing the molten ore charge to directly rest upon the matte and slag bath



THE GARRETSON FURNACE.

surface. A saving of fuel by heat recovery from the slag is further claimed, and additional economy in mechanical handling of the slag. The accompanying illustration is of one built for the Compania Metallurgica Mexicana, San Luis Potosi, Mexico.

VIEWS OF THE BOILER EXPLOSION WRECK AT THE IONIA, MICH., INSANE ASYLUM.

Disastrous Boiler Explosion.

Herewith appear several views of a recent wreck caused by the explosion of a boiler in the power plant of the Ionia, Mich., State Insane Asylum, showing the ruin wrought in the boiler house and to the machinery. Strict investigation fails to determine the cause. A new boiler was being installed, was set, and the masons were bricking it up when the explosion occurred: two boilers were under steam, the one that exploded being that farthest from the new boiler. Three men were killed outright and several others injured.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Oldest Mining Journal on the American Continent

Office, No. 330 Market Street, San Francisco, Cal.

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J. F. HALLORAN.....Publisher

San Francisco, January 21, 1899.

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PRESENT indications are that the Quebec Commission which is preparing a reciprocal trade treaty between the United States and the Dominion of Canada will place coal on the free list, but leave the United States import duty on lead and lead ore as it now stands, and all the Canadian papers sound the slogan, "Smelt Canadian lead ore in Canada."

AS THE several State Legislatures meet, proposed mining legislation is noticeable. Colorado, Montana and Washington have each a program, that of the two former being in line with progress and manifest requirements. What is proposed to be enacted in the Washington Legislature is mainly a reproduction of the Federal statutes thereon which do not need State affirmation. So far the California Legislature seems content with what it did in that line two years ago. It ought to be.

THE same indomitable spirit that in California changed the courses of rivers and overturned mountains is still in evidence. In Alaska, some California hydraulic miners have drained a lake 3000 feet long, 2000 feet wide and 150 feet deep—Gold lake, in Pande basin, near Sitka—in the belief that in its bottom would be found gold-bearing gravel. Six months of tunneling resulted in drawing off the waters of the lake last week, and the enterprising prospectors hope to recoup sufficient to pay for the effort and expense.

HOW CREDULITY sticks to its belief in a charlatan is exemplified in the case of the Keely Motor Co. While Keely lived it was of lesser wonder that his extraordinary personality should impress itself on stockholders in his company to the extent of securing subscriptions to enable him to experiment with his "motor" for twenty-five years and live comfortably. But with Keely dead it is surprising that a successor should arise and be sustained by men who in the past quarter of a century have contributed nearly $500,000 in perpetuating the folly known as the "Keely motor."

THE Standard oil people figure that an increase in the price of copper of one cent per pound equals an annual profit of $5,250,000, basing the calculation on the '97 copper output of the United States. They further figure that, by consolidation and control, a saving in production of one cent per pound could be effected, making another $5,250,000; and thus find warrant for the assumption that, by putting up $200,000,000 to enable their securing such consolidation and control, in addition to the present profit, they could assure an annual gain of $10,500,000, or, say, 5% on the amount named.

AS in other domains of science electricity is now greatly utilized in metallurgy. It is calculated that last year over one-third of the world's copper output was produced electrolytically; similar result is reported in the production of aluminum, and returns from the Pelatan-Clerici and similar processes show material advance in the electrolytic production of gold and silver. In addition is to be noted the more economical production of several other metals through the agency of electric action. It is now practicable to produce chemically pure chromium by ignition of a mixture of aluminum and chromic oxide; manganese, titanium, tungsten, etc., are susceptible of similar production.

FOR forty-five years the gold yield of California for one year—'53—has been unequaled by the aggregate gold output of the entire nation. In that year the lowest statistical figures place California's gold output for that year at $65,000,000; some as high as $80,000,000. Taking the former figures, the lowest estimate, as approximately correct, it appears from recently compiled statistics, that for the first time in the history of the nation the aggregate gold yield from all the States and Territories of the Union in '98 was some hundreds of thousands of dollars in excess of that of California for the year named. It would be of equal interest a year from now to note the probable fact that great though the '99 gold yield of the country will be, the value of the copper mined in the United States during the present year had exceeded that of the gold product during the same time.

MECHANICAL engineers look with favor on the proposed substitution of mechanical draught in place of chimney draught for furnaces. The former can be accomplished either by forcing the air into a closed ash pit and maintaining therein a pressure in excess of the atmosphere, or by exhausting the air and gases from the flue or uptake, thereby creating a partial vacuum, causing a constant onward air flow to the combustion chamber, the first method being a forced, the latter an induced draught, centrifugal fans being used in both cases. Two main advantages are claimed—independence of weather conditions and adaptability. Economically there is also something to be said in favor of the proposition, and from a health point of view—the suppression of smoke—the advantage is manifest. The chimney is an ancient device that in large plants to be built will begin to disappear.

IT is expected that the Wilmerding School of Industrial Arts will be in practical operation in San Francisco by Oct. 1st, '99. The creation of another school of technical instruction is of general industrial importance. It is to such schools that scientific progress largely looks for personal activity and practical requirements. Such trade schools are of an aim and intent equal to any institution designed to educate and should be accorded hearty support and recognition deserved alike from employer and employed. There is too often indifference on the part of the employer and latent or active hostility on the part of employes. This last mainly rises from a mistaken idea among trades which discourage apprentices, that in some way the graduates of such trade schools will come into competition with them. This is an old underlying question upon which pages might be written. Suffice it to say that the opposite is the case; that instead of inaugurating competition on the low level of "two men for one job," such schools are in the end creative of new conditions involving new requirements and increased demand for skilled labor. Boys and young men will drift in, if they are not steered in; better to have them enter the ranks of mechanical workers with skilled brains and a general ground plan of regular requirements than to enter the crowded ranks of bread winners with no training, little ambition and prospects dulled from the start. It is to the Wilmerding School and such institutions that the mechanical industries of this country should rightly look as they advance from the narrow past and face the broadening future.

IN the California Legislature now in session, a Los Angeles member has introduced an amendment to the State law approved March 27th, '97, prescribing the manner of locating mining claims, etc. The proposed amendment is an addition to the present law, as follows: "9. No person or persons who, after locating any mining claim under the provisions of this act or under the provisions of any statute of the United States, or who, having heretofore located such mining claim, shall fail to perform the labor required in this act or the labor required by the laws of the United States, and who shall permit the mining claim so located, to become subject to relocation, shall be allowed to relocate the same or to acquire any interest in or to any such claim by reason of the location thereof by another, and any relocation made by such person or persons, shall be void. Section 2. This act shall take effect and be in force from and after its passage."

BRITISH COLUMBIA papers very properly call attention to the large sums of money being spent in the Cariboo and other districts on preparatory hydraulic work, in some cases nearly $300,000 being put out in opening up and getting apparatus in shape for paying operations. The assertion, however, that such similar extensive preparations have never been equaled elsewhere, is open to successful contradiction. Everywhere that large areas of such ground are thus made ready, equal amounts are spent in preliminary work. In Idaho, Montana, Colorado and California such sums have been and are being expended. A notable instance in California is the Malakoff hydraulic property in Nevada Co., where nearly $3,000,000 was put out before the mine was on a permanently paying basis; it has since been credited with a gold output of nearly $5,000,000. So with other hydraulic mines. Such large preparations have become a necessary feature of the business. Time was when the individual miner, or two or three together, could start paying operations in a hydraulic mine on a prime expenditure of $500, but that era has passed. Those rich surface placers have been nearly worked out; and it now requires an aggregation of capital and the spending of large sums of money before there is any tangible result.

Temperature of Battery Water.

Considerable has lately been published in these columns on this important point, from practical millmen. On this subject, one whom this paper considers as authority writes us as follows:

"The main points to be remembered in this matter are that there is a point of temperature (4° Centigrade) at which water is densest and that there are temperatures at which mercury becomes sluggish in cold water. If these two points are avoided there is no particular definite degree of temperature which might be designated as absolutely the best. If the water is held warm the mercury becomes thus liquid and will coat a larger area of gold particles than in its more sluggish condition, hence under such circumstances it becomes necessary to reduce correspondingly the quicksilver feed to the battery. In cleaning up, the amalgam obtained from very fluid mercury will be naturally found to retort better, that is, higher. From actual working I have seen amalgam that retorted up to one-third gold change during winter months to one-fifth, but regain the higher percentage upon the occurrence of warm weather; in both cases the balls of amalgam were squeezed by the same operator to the same relative degree of dryness."

CHICAGO reports an increase of 15 per cent in the tonnage of electrical machinery handled there in 1898 as compared with 1897. Sales and repairs during the year amounted to $15,000,000. The great specialties are batteries, dynamos, motors, telephones, wires, telegraph instruments, etc., but the catalogues contain lists of about 3000 articles, large and small. As electricity grows in application, this list multiplies with the growth.

Concentrates.

IN '98 Utah produced 112 tons lithographic limestone.

WATER freely falling 196 feet acquires a velocity of 112.35 feet.

A MINERS' INCH will in twenty-four hours discharge 2160 cubic feet.

NEVADA got thirteen medals for exhibits at the Omaha Exposition.

THE largest zinc manufactory in the world is at Hazard, Carbon Co., Pa.

A FLOW of 1 cubic foot of water per second equals 50 inches under 4-inch pressure.

THE Australian mints that have been coining gold at a loss will now be permitted to coin silver at a profit.

MINING machinery may be exhibited at the London Mining Exhibition, but "mining products" are excluded.

TO ARGUE an axiom is a waste of time and space. The process must be suited to the ore—not the ore to the process.

C. POULOT of the Wood mine, Gilpin Co., Colo., says he will "send a 700-pound block of uranium to the Paris exhibition."

A TUBE or pipe 3 inches in diameter, 8 inches long, 5 feet head of water in the center, will discharge .718 cubic feet of water per second.

BY weight, dry atmospheric air is composed of: nitrogen, 75.5%; oxygen, 23.2%; argon, 1.3%; by volume, 78.06, 21. and 0.94%, respectively.

THE Omaha Exposition directors awarded the medal "for the best display of free gold in quartz" to the Smuggler-Union M. Co., Telluride, Colo.

AT the Silver Lake mine, Silverton, Colo., E. G. Stolber has four electric rock drills in successful operation. With ⅞-inch steel an average boring of 7 feet per hour is made.

AS long ago as '57 iron pipe 40 inches in diameter was laid for hydraulicking at Timbuctoo, Yuba Co., Cal. Recently, near Boise, Idaho, 48-inch pipe 1700 feet in length was laid.

THERE is practically nothing doing at present in mining chrome iron ore in California. Good ore exists in several parts of the State, but foreign importation makes the price unprofitable.

A BILL has been introduced in the U. S. Senate giving the right to take up and patent saline and soda lands under placer land laws. It limits holdings to 160 acres, and sets the price at $1.25 per acre.

THE inspector of explosives for Great Britain states with positiveness that "acetylene gas is capable of forming an explosive compound when brought in contact with copper." Nickel-plated brass is probably safe.

SILVER is now being exported to Europe from N. Y. City at the rate of 500,000 oz. weekly; gold is being imported from Australia to San Francisco at the average rate of $2,500,000 per each steamship arriving therefrom.

IN '98 Colorado mining corporations paid dividends aggregating $22,467,828. It is noticeable that that amount approximates that State's gold yield for the year. In the figures are not included mines of private ownership.

THE act making it mandatory in California for a second shaft on a quartz mine where exists a perpendicular shaft or incline 300 feet in depth from the surface, passed the Legislature March 16th, '72. It has not been repealed.

DEPUTY MINING INSPECTOR HUNTER of Montana says that there are 3336 men employed in and about the Anaconda mines, 864 in the mines of the Boston & Montana Co., and 549 men in the mines of the Butte & Boston Co.

THE war with Spain unfavorably affected gold mining investments; recent action, however, more than makes up for the temporary diversion of capital from what continues to be in general the most profitable present form of business enterprise.

IT is suggested in Los Angeles that a Southern California Miners' Association be formed, the point being made that at the meetings in San Francisco of the California State Miners' Association that section of the State was entirely unrepresented.

WITH from 10 to 25 feet of snow in the high Sierras, rivers running bank full in the valleys and a general continuation of heavy, soaking rain all over the State, California miners feel that the season of '99 will be in marked contrast to the dry one of '98.

A BILL has been introduced in the California State Senate to prevent the throwing open of ground for relocation when the assessment work has been done, but the necessary affidavit has not been filed. It should get no further than the committee room.

ALL the required apparatus for the Comstock, Nev., drainage, including the Evans pump and the big pipe, is on the ground, and the pipe is being placed in the C. & C. shaft. It is expected that in ten days water will be flowing through the Sutro tunnel.

THE California Anti-Debris Association having failed to institute a quarrel with the Almighty, has transferred effort in that direction in an attack on the California Debris Commission. It has also concluded to save $150 a month by doing without a manager.

THE Fresno Co., Cal., petroleum contains 48% kerosene, 20% gasoline, 10% heavy fuel oil, and 22% benzine and tar. So far efforts have been futile to successfully manufacture good illuminating oil from California petroleum, by reason of the very small percentage of paraffin it carries.

BRITISH COLUMBIA lead miners figure that during '98 they practically paid a duty of $33 per ton on the lead in the ores they exported to United States smelters, amounting to about $750,000. This 1½ cents per pound duty is remitted when the lead is re-exported from the United States.

REGARDING ilvaite, it may be further stated that it is a basic orthrosilicate of calcium and iron, in which manganese may replace part of the ferrous iron. It is iron black to dark grayish back, with a black streak inclined to green or brown; hardness, 5.5—6; specific gravity, 3.99—4.05.

THE California Legislature will be asked for a $100,000 appropriation to make a display of the State's mineral resources at the Paris Exposition. The bill provides for three commissioners to have charge of the exhibit, to be appointed by the Governor, to have no salary, but each one to be allowed $2500 for expenses.

A MULTITUDE of commendable mining editions of daily and weekly papers at the close of '98 has been received. Taking all things into consideration, it is believed that the Grass Valley, Cal., *Union* and the Telluride, Colo., *Journal* are entitled to special mention for their variety, value and typographical excellence.

ESTIMATING a consumption of 14 pounds of coal per square foot of grate per hour, about 8 pounds of water may be taken as the rate of evaporation per pound of coal, which can be done with natural draft. With forced draft and 28 pounds of coal per square foot of grate, the evaporation would be about 6 pounds of water to 1 of coal.

THE builders of the 328-mile long pipe line to Coolgardie Australia, propose providing for the five-eighths of an inch temperature expansion in 100 feet by a special expansion joint, formed by a double stuffing box with rubber rings, placed at intervals of 120 feet. Experienced engineers are dubious as to the success of the whole scheme.

CLARENCE KING places the average fineness of placer gold found in different localities as follows: Oregon, .872; Idaho, .780; South Dakota, .923; Montana, .895; California, .883; Colorado, .820. In specific cases much higher fineness has been noted, as in the case of a Cherokee Flat, Butte Co., Cal., correspondent who cites the production of gold there .970 fine.

THE U. S. gold imports for the year '98 were $158,036,252 and the exports $16,194,954, or an excess of gold imports in '98 of $141,841,298, as compared with an excess of gold exports in '97 of $255,309. The silver imports for the year '98 were $29,029,724 and the exports $53,797,104, an excess of silver exports of $24,767,380, as compared with an excess of silver exports in '97 of $25,578,990.

TO LIQUEFY air requires special apparatus, exact conditions and thorough knowledge of all attendant requirements. A pressure of about 200 pounds to the square inch, or nearly 150 "atmospheres" is necessary; the air so compressed must at the time of compression have a temperature of about 225° Fahr. below zero. The two requisite conditions are ordinarily impracticable.

"THE chief difference between an American miner and one of other nationality" is, perhaps, the versatility of the former. In other countries a man employed in or around a mine or mill does one thing and only one. In the United States he is liable to be everything at intervals, taking a hand at anything and everything in and around a mine, and sometimes acting as carpenter or cook.

EDUCATION by correspondence is widely advertised at present. An appreciative correspondent at Seattle, Wash., who has asked and had answered several questions on this page, says that "Concentrates" is a pretty good "education by correspondence" itself. Several hundred questions on every conceivable subject connected with science, mining, metallurgy, electricity, etc., are annually satisfactorily answered by this paper.

THE latest official report on New Zealand gold dredging gives the weekly cost of operation of one elevating and washing 90 cubic yards gravel per hour as sixteen tons lignite at $3, five men at $3 per day, and one man at $5, and "repairs and official expenses" $100, aggregating $248. The last item seems disproportionately large. Working ground containing 1⅓ grains of gold to the cubic yard, such a concern paid in dividends $5625 in '96 and $9375 in '97.

AT smelting works where metallic copper alone is treated, the refining slags must also be reduced by means of a blast furnace. The following may be given as one of the smelting mixtures: Refinery slag, 500 pounds; coke, 300; carbonate of lime, 500; dump slag (high in iron), 100; cobbings (material from furnace repairing), 100; refinery slag, 500; coke, 500. The resulting products from this smelting are a black copper, some matte, and a clean slag which is discarded.

THE Apollo mine is on one of the Shumagin islands, Unga, in the North Pacific, near Delarof, Alaska. It is remarkable in its situation. Considerable of its value is from "kidneys" of free gold ore. Galena is mined with the gold, and in some instances tiny shreds of native copper are embedded with the specks of gold in the quartz. The average gold yield is $8 per ton, about 80% coming off the plates. In some of the mine's features it resembles the deposits of Bodie, Cal.

ONE series of superimposed flows of lava on the western slopes of the Sierra Nevadas extends southwesterly from the summits on the California eastern boundary line sixty miles to Knights, following in a general direction the present course of the Stanislaus river. This lava flow poured out after a geologic interval of sharp erosion, which cut out the channel down which it flowed. It was subsequently partially covered by a flow of andesitic breccia above the foothills.

THE temperature surrounding electrical apparatus should never go above 212° F. As that of engine-rooms sometimes reaches 130° F., this means a limit of 82° F., or 45° C. above the air. But when this is taken with thermometer, the rise indicated by it should be much less. With the introduction of high-speed rotary engines, one may expect to see much higher field strengths, hotter armatures and different insulations, say armatures with copper bars enameled in the iron sheets.

IN a modified way the same advice may be of value to the man looking toward the Klondike in '99 that was offered in '98 and all the preceding ten years by this paper. Conditions of transportation and living are bettered, but unless fitted in every way for the adventure and prepared to spend two years there, no one should entertain serious thought of the trip. The possibility of quick returns is the sole incentive, and against such desperate risk the miner going to the Yukon region wagers life itself.

WHILE the cost of the new explosive, liquid air, is comparatively light, being merely the cost of liquefying the air, yet its general use will depend upon the removal of some of the present dangers accompanying its manufacture. So far as known its only practical test as an explosive has been made in a coal mine near Munich—reported to be a success. One thing will commend it to some miners—after a short time it ceases to be explosive, so that there is no danger of its hanging fire or going off unexpectedly.

THE price of 16 candle-power incandescent lamps in '82 was about $1; at present it is about 18 cents. The best lamps at that time, under laboratory conditions, gave about 0.28 mean horizontal normal candle-power per watt, and under commercial conditions about 0.20. The highest pressure for which they could then be obtained was about 110 volts. At the present time, under commercial conditions, the average lamp normally develops about 0.25 candle per watt. They can also be obtained, at 0.25 candle per watt, for pressure up to 240 volts, and are frequently installed on 220-volt mains.

THE largest known deposit of manganese ore is in Chiauturi, Kutais, in the Caucasus mountains, furnishing about one-half the world's supply of manganese ore, which carries from 40 to 60% of the metal. About 2700 men are employed at a daily average wage of forty cents. The workings are of a primitive and wasteful character. The total cost at the mine is about 95 cents per ton. Transportation, loading, storage, insurance, duty, etc., bring the cost delivered at English ports, c. i. f., up to $9.40 per ton. As in California, "overproduction" is locally asserted to make the business profitless to the producer.

THE *Mountain Echo*, published at Angel's Camp, Calaveras Co., Cal., in its issue of the 10th inst., notes the case of a mine owner in Nevada county justly convicted of perjury for falsely swearing to an affidavit of labor. He swore that he performed labor during the year 1898 upon his placer claim to the fair and reasonable valuation of $100, and in September, 1898, filed his affidavit. It was proven at the trial that he had only sunk a hole 15 feet in depth by 3½ feet in diameter, the same being in loose gravel. It was also proven that the labor performed could be done in three to four days at a cost not exceeding $24, hence the conviction.

ACETIC ACID, like other chemicals, is governed in price by quality, even more than quantity. "Acetic acid" is quoted this week in New York City at $1.87 per 100 pounds; "acetic acid" is also quoted this week in New York City at $22.50 per 100 pounds. The former is "28% commercial;" the latter is "Glacial, 99.5%." If the purchaser wants it in quantity he can buy say a 50% acid in New York City for $3 per carboy in five-carboy lots. A 90-pound carboy mixed with 90 pounds of water will make 180 pounds 25% acid, thus saving the freight from New York to Denver on 90 pounds water and the carboy. The latter are returnable at $1.50 each.

IF, as alleged, last week's action of the British Columbia Parliament, excluding citizens of the United States from holding mining claims in that province, be one of "retaliation," the act is ill-founded. On March 2nd, '97, the Congress of the United States passed an act, immediately signed, which defined and regulated the rights of aliens regarding real estate, in which was clearly stated: "This act shall not be construed to prevent any persons not citizens of the United States from acquiring or holding lots or parcels of land in any incorporated or platted city, town or village, *or in any mine or mining claim*, in any of the Territories of the United States." A little "reciprocity" is in order.

EDMUND DAVY first made acetylene from a compound produced during the manufacture of potassium from potassic tartrate and charcoal, which, under certain circumstances yielded a black compound decomposable by water with considerable violence and the evolution of acetylene gas. This compound was afterward investigated by Berzelius, who showed it to be carbide of potassium, and who also made the corresponding sodium compound, and showed that it evolved the same gas; in 1862 Woehler first made carbide of calcium, and found that water decomposed it into lime and acetylene. The present process of producing calcic carbide is the discovery of Mr. Wilson, a Canadian.

REGARDING the article concerning the use of running water in California and how to appropriate it, on page 631 of the issue of Dec. 24, '98, it is to be noted as stated that the mere posting and recording of a claim to water confers no right upon the appropriator unless, within sixty days after the notice is posted, the construction of works is begun and diligently prosecuted to completion. In that event (and only in that event) rights are acquired, which then date back to the time the notice was posted. Moreover, the water right secured under the notice and by construction of works should not be considered to be that defined in the notice, wherein the amount named is often greatly exaggerated, or, possibly, unintelligible. Regard is to be had to the works and their capacity as actually constructed in interpreting the language of the claim.

THE Mond process for extracting nickel depends on the property of finely-divided nickel of forming a volatile compound with carbon-monoxide, from which metallic nickel may be released by heating to 180° C. Prof. Austen describes the process and an experimental plant at Smethwick, near Birmingham, where about eighty tons of nickel have now been extracted with satisfactory results. The matte is first roasted, after which it contains about 35 per cent of nickel, 42 of copper and a little iron. About two-fifths of the copper is then extracted by sulphuric acid, the remaining copper is reduced to the metallic state by the hydrogen in water-gas, and the nickel taken off by carbon-monoxide in a volatilizer. The ore circulates between the reducer and volatilizer for seven to fifteen days, the residue of about one-third, not much changed from the original composition, then going back to the first operation. The nickel carbonyl from the volatilizer is decomposed in a retort, the resulting metal containing 99.8 per cent of nickel, the gas being collected for use again.

AS TO the sometimes stated electrical theory or conclusion that virtually the only function of a wire is to dissipate energy, Fessenden says: "The dissipation of energy is merely an incident and has nothing to do with the function of a wire, which is to carry what we call the quantity of electricity. Take for instance a copper wire at absolute zero. It then dissipates no energy, but does any one suppose that we could then remove the wire and still have a current? Not unless the ether at absolute zero were a conductor, which is negatived by the fact that the sun's light traverses space, which it could not do if the ether in space were not a perfect insulator. A sensational idea, even in science, is hard to kill, no matter how false; as witness, the often repeated statement that light is due to charges oscillating on the atoms, as in small condensers, though this statement has been refuted time and again, and by the very man who first made it. And so we must be prepared for some years to hear that the ether is the all important thing, whereas, as a matter of fact, it is merely the thing which pushes along the thing which we call the current. Now we know three ways of producing a current: convection, electrolytic conduction and metallic conduction. We know that in convection the current does not travel with the velocity of light, but that, by putting charged balls in the insulated buckets of a coal conveyor, we may have any current we please, and the electricity traveling as fast or as slow as we please. In electrolytic conduction we have very good reason to believe that the electricity travels on the atoms, and at a speed of only a few centimeters per second. Having thus one instance in which the current is known not to travel with the speed of light, and one in which it is almost certainly known not to do so, does not the burden of proof that the current in a wire does not flow also at some slower rate fall upon these all-ether physicists?"

Mill Practice of the Utica Mills, Calaveras County, Cal.*

NUMBER III.—CONCLUDED.

By W. J. LORING, Angels Camp, Cal.

When the battery is first hung up the little spreader plates are taken to the cleanup room and cleaned, and the amalgam obtained from these plates is dropped into the tank, which, after the cleanup, is cleaned out, the product being charged into the amalgamating barrel.

After the mill has been thoroughly cleaned up in this manner, 150 pounds of quicksilver is put into the barrel with water enough to give a depth of 12 inches over the charge of sand. The barrel is then closed, locked and sealed, and the belt is put on, which drives the barrel at fourteen revolutions per minute. This charge is run from thirty to forty-eight hours.

This amalgamating barrel has a tank of equal capacity built under it, whence a sluice 22 feet long and 12 inches wide, with a grade of 1½ inches to the foot, floored with silvered copper plates, conveys the pulp and water to either of two settling tanks, as desired. When the barrel has run its full time it is stopped with the head up, and after the head has been removed a stream of clear water under high pressure is turned on, causing the slimes to come to the top of the barrel, overflow, and fall into the tank beneath. Hence they pass through the sluice into a large tank of 2000 gallons capacity. When all the slime has been washed out the water is stopped, a bucket is set under the 1¾-inch plug hole in the barrel, and the charge is drawn. First comes the quicksilver, which, of course, falls to the bottom of the bucket. A stream of water is kept running through the barrel to wash the sand through the discharging hole, and the bucket is thoroughly stirred, so that the sand will overflow, leaving the amalgam in the bottom, the "iron" next, and the sand on top. This "iron" is taken out as it accumulates, and after it has all been collected it is screened through a ¼-inch screen; the screenings are panned in the cleanup tank, and the result is put back into the amalgamating barrel at the next regular cleanup.

The amalgam from the barrel is thoroughly cleaned and squeezed through white drillings. The amalgam balls weigh from eight to twelve pounds, and yield, when retorted, about 38 per cent of gold.

The day before the batteries are to be cleaned the accumulations on the sluice plates are scraped off with steel scrapers, made of old files turned at one end about 2 inches, and ground to a sharp edge. The first 8 feet is scraped in this way, leaving the 14 feet of silver plates to run six months or more without scraping. Great care must be observed in using scrapers on silvered plates, as it takes but little scraping to cut the silver, which not only spoils the plates but makes a very low grade of bullion—a result to be avoided if practicable. The amalgam thus collected is called "accumulations." It is put in a small amalgamating barrel 15 inches in diameter and 24 inches long, which is run at twenty-eight revolutions per minute, some quicksilver being added, and enough water to make a thin paste of the charge. The barrel is then sealed up and locked by means of a padlock securing an iron bar which, being itself held firmly by iron lugs on the barrel, covers and completely protects a cap, placed over the discharge plug.

This charge is run for twenty-four hours, when it is drawn off in a bucket and cleaned in the usual way, the sulphurets being saved in the cleaning tank already described. This amalgam yields, when retorted, from 28 to 30 per cent of gold.

Quicksilver is fed into each battery every hour. The amount of each feed is regulated according to the quality of the ore under treatment, which is judged by the amalgamator from an examination of the board directly under the splash of the battery, where the pulp first falls from the screen. Different ores and different mills require, of course, different practice in this detail of amalgamation.

Every ounce of quicksilver that is fed into the battery is weighed and recorded at the end of each shift, and at the end of the run the amount of the quicksilver thus fed furnished a practical basis for calculating the probable result of the cleanup before it is made. My own method of making such a preliminary estimate is as follows: Take the total amount of quicksilver fed during the run, and assume a product of $14 to $15 per ounce, and add to this the amount of the "accumulations" mentioned above, assuming a value of $70 gold per pound of accumulations. The total will be very nearly the yield of the cleanup. Of course, these figures would not hold good for all kinds of ore; but if a millman is careful he can soon find out, by observation and a few tests, what grade of amalgam he is producing; and the above method, with the employment of figures based on local experience, will be found useful in judging of the probable result before the cleanup is finished, and in detecting abnormal final results which call for investigation.

At many places retorts are lined with chalk, clay, etc. My way is to take good oak ashes, free from dirt; sift them through a 30-mesh screen; make a paste with water, and with this paste line the trays and retort, and thickly seal the head. The ashes do not shrink, like clay, etc., and the method, which I have practised for many years, is quick, cheap and satisfactory.

The mortars in the mill on which this paper is based are not lined—in fact, were not made for lining. After using them for several years, it was found necessary to do something very quickly, as each end was worn, just above the dies, to ⅝-inch in thickness, which, of course, would not stand a great while. These stamps were set 10 inches between centers, using 8½-inch shoes, and leaving a space of 1½ inches between each two shoes. The 5-inch dies up to that time had an average life of fifty-nine days, the life of the chrome steel shoes then used being 191 days. The average number of stamps running per day for 333 days in 1896 was fifty-seven out of sixty, and they crushed 273 tons per day.

In order to line these mortars I found it necessary to reset the stamps, using a guide with 9¾ inches between centers, and leaving ¾-inch between stamps. In this way 1½ inches was gained at each end of the motars, allowing room for an end liner, which served as key to the front and back liners. The back was filled with wood carefully fitted in place with the liner outside, saving considerable weight of unnecessary iron. This back lining is 13 inches high and stands at 77½°, the foot being 1½ inches from the base of the die, which causes the rock, as it is fed into the mortar, to fall on the die. These dies are made with 8¾-inch face, while the shoes have but 8½ inches. This I have found to give better results than when both shoe and die are of the same diameter, for the reason that the stem guides are bound to wear, allowing the stamp to swing much more at the shoe, causing the shoe to overhang the die. Now, by having the die cast ¼-inch larger than the face of the shoe, we utilize the full brushing surface of the stamp.

On the other hand, if the shoe and die have a greater difference in diameter, the one having the larger diameter will "cup" in wearing, causing a loss in efficiency.

After making the above changes, the mill ran 320 days; average number of stamps per day, fifty-nine; average number of tons crushed per day, 296; average life of 5-inch cast iron dies, 120 days; average life of manganese steel shoes, 296 days.

The chuck blocks are made of wood, covered with copper ⅛ inch thick and 8 inches wide, and as long as the battery. In the center of the copper, for the full length, it is bent to fit the wooden block, the upper half being set at an angle of 45°, while the lower half stands vertically. At the lower edge of block, and projecting ¼-inch over the copper, is bolted a ½x1-inch iron strap for the full length of the copper. At the bend in the copper, or about 2 inches above the bottom iron, is bolted a second iron strap, ½x¾-inch, for the full length. Six bolts are used, passing through the block and copper, ⅝x5 inches in size, with countersunk heads. These irons also act as a protection for the amalgam, as it "builds" between them.

I use eight and one-half gallons of water per battery of five stamps per minute, and two and one-quarter gallons of water per minute on two concentrators, making ten and three-quarters gallons per minute for each battery complete.

The chips and all shoe wedges—in fact all the wood used about the mill—are saved and burned in a 5x8 foot furnace built for the purpose. This furnace has a cement floor, above which are placed grate bars to the full size of the furnace. The furnace measures, from cement floor to top of bars, 15 inches; from top of bars to top of arch, 5 feet. At the top of the furnace is the charging hopper, made of cast iron, with a door to fit. After a charge is burned the ashes are taken out from the ash box and screened, to remove old nails, etc., that may be in the charge. The ashes are then put in the large amalgamating barrel with ten pounds of quicksilver and ground for six hours sharp, as a longer time would cause the charge to "flour," causing a loss. From six ounces to two pounds of amalgam is saved by this method every month.

The floors all have a slight grade, at the foot of which is a trough leading to tanks which are cleaned out as required, the result being put into the barrel. All cleanings from the mill are put in this barrel and ground for such time as the case may be. It is surprising how much gold can be thus saved in a year by watching the little bits that do not seem to amount to much. Many thousands of dollars are saved around a large plant by such minute care.

For grinding the amalgam recovered from the chuck blocks I have an iron mortar 12 inches in diameter, the muller of which has a connection made in such a way that it can be stopped or lifted as desired. This grinding machine will grind a charge weighing fourteen pounds. It has a speed of sixty-five revolutions per minute.

The labor in the mill is as follows:

One man on each shift of twelve hours, called the feeder, who does nothing but look after the feeding of the batteries.

One night amalgamator, who attends to the amalgamating and looks after the mill generally.

One concentrator man on each shift of twelve hours, attending to thirty-six concentrators.

One day amalgamator and helper, who attends to the amalgamating and general repairs about the mill.

One mill superintendent who has charge of everything in connection with these stamp mills and of the electro-plating works where the plates for the mills are silvered; his time being divided among the mills as required.

Seven men besides the superintendent operate the 60-stamp mill.

The cost of ore milled in 1897, exclusive of power, was 13.8 cents per ton. It is not practicable to give exact cost of power; but it is, of course, very small, as the water supply is owned by the company.

The consumption of quicksilver for the same period was 0.076 ounces per ton of ore treated.

* Trans. Am. Inst. Min. Engs., Buffalo meeting, October, 1898.

First Discoveries of Gold.

It is just forty years since the first discovery of gold in the State of Colorado. At what is now known as Idaho Springs, then known as Jackson's Bar, Geo. A. Jackson made the first discovery of gold in the mountains on that side of the continental divide, Jan. 21st, '59—forty years ago to-day. Some time since the spot and adjacent ground was acquired for the purpose of erecting a commemorative monument thereon. Doubtless the three counties of Boulder, Gilpin and Clear Creek, and, probably, all Colorado, will appropriately celebrate the dedication of the proposed monument at no distant date. Jackson's was the initial discovery, and soon led to several others, notably that of Thos. Gregory, on the north fork of Clear creek, on the present site of Black Hawk and Central.

The importance of the event to Colorado and the West is too manifest to need a line of comment.

By a singular coincidence this date, Jan. 21st, is also the anniversary of the demonstration of the fact of Marshall's discovery of gold at Coloma, Cal., eleven years before the Colorado gold discovery. A year ago, with great ceremony, California enthusiastically celebrated the fiftieth anniversary of that great event.

Jackson's Bar, where the Colorado pioneer gold discoverer made his first find, is still worked and still yields a little gold. It is different in the case of the California gold discovery, the site of which now contains nothing that would indicate that the little nugget there found started the great human tide that, rolling over the Sierras, has resulted in a gold output aggregating in value $1,300,000,000. Indeed, the scene of the first great California gold find is now devoted to wine and fruit. On the opposite page appear seven views graphically portraying the present appearance of that famous spot. The little post and the pile of stones are all that indicate the site of the famous "Sutter's Mill," and the two boulders in the smaller picture are still shown as the exact spot where the mill dam stood. On the round-topped hill stands the monument to Marshall, and at its base is the old cabin where California's gold pioneer lived and died. The town itself, embowered in trees and clustering vines, gives little indication of having been the initial point of one of the greatest events in modern history.

PROFESSOR LODGE has been experimenting with a view to conferring a benefit upon the users of the telephone, his object being to construct a telephone that will increase the human voice on the instrument to a bellow, while preserving articulation. The professor's aim is a telephone call for systems of so-called wireless telegraphy. The minute current of his receiver passes through a light, small coil attached to the disc of a microphone placed in a strong magnetic field. The coil sets the microphone in motion; the relay current of the microphone is thus interrupted: these currents pass through a second similar coil, and so on. By using four coils a feeble sound may be magnified to the intensity of the human voice, but not more. It is said that similar experiments with coils consisting of one wire only have been made.

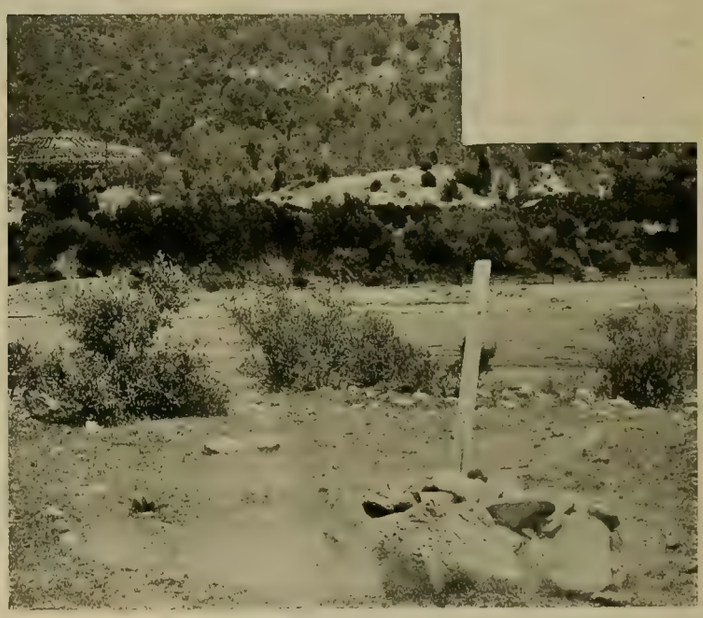
AN engineer, speaking of the new steel cars, said: "Those big steel cars are terrible in a collision. You see, they are so solid and heavy that it takes an immense force to lift them from the rails, and they cannot be demolished, and when a collision occurs the locomotives are crushed like an egg shell. You might as well run into a stone wall as to pitch into a train of steel cars. When we find that a collision is inevitable we jump the nearest fence and take to the fields for safety."

NEVER despise a suggestion. The most ignorant person in the world may have an idea that will benefit you in your business, if you will keep your ears open and listen. Absorb all the ideas you can—some day they may be useful.

Marshall Monument.

Coloma From the Marshall Monument.

Marshall's Cabin.



Site of Marshall's Discovery.

Mining Over Old Ground.

Main Street, Coloma.

American River at Coloma.

PRESENT APPEARANCE OF THE SITE WHERE GOLD WAS DISCOVERED BY MARSHALL, COLOMA, CAL.—*See Opposite Page.*

The "Copper Water" of Butte.

Written for the MINING AND SCIENTIFIC PRESS by GEO. S. BINCKLEY.

One of the most serious and perplexing problems relating to mine drainage is encountered in places where the water is strongly acid and impregnated with metallic salts. The conditions named have existed for years at the Anaconda mines, and almost every conceivable means has been employed to overcome the corrosive action of the water on the pipes and pumps, the destruction being greatest where the velocity of the water is high, for instance, on the valve seats and faces.

Neutralization of lime, of the acid in the water, is resorted to in cases where the value of the metallic contents of the water is low, but in the Anaconda, St. Lawrence and High Ore mines there is so much copper carried in the water that, great as the expense of pumping is, it still pays to avoid neutralization, as almost all the copper in solution is recovered by passing the water through precipitation tanks containing old iron of every description, from tin cans to old boilers, cages, etc.

At these mines it was found long ago that iron column pipes, iron fittings and pump barrels would speedily be converted into a spongy mixture of copper and rust, so that brass fittings were used and the column pipe lined with sheet lead. This did pretty well until it was found that the vibrations of the column, due to the action of the pumps, soon shook loose the lead lining and the pipe would be immediately destroyed. Then, in order to support the lead, it was found necessary to line the pipe inside the lead with nicely-fitted wooden staves, which, when wet, would swell and hold the lead to the inside of the pipe. This is found fairly satisfactory, but, if the least leak exists in the lead lining, a small hole in the iron column pipe is an almost immediate result, and, if the leak is not stopped, the pipe is attacked on the outside by the water from the leak, causing great damage.

The next serious trouble was found in the brass fittings and pump barrels, plungers, etc. It was discovered that, if there was even a small proportion of zinc in the composition, the acid water would relentlessly hunt it out, and, from a sound casting, the piece would be converted into a weak, worthless sponge.

To meet this difficulty all pump barrels, plungers and fittings are made from a special bronze, containing no zinc at all—a very difficult metal, by the way, from which to secure sound castings.

After years of experiment and expense the problem of pumping has been pretty well solved, but outside the pumps and columns the destruction caused by this "copper water," as it is called in Butte, is very great. The destructive effect of this water on iron and steel reaches its most serious phase in its insidious attacks on the hoisting ropes, running in the wet shafts, which are constantly exposed to the action of the water, and the vapor, which is scarcely less acid than the water. The greatest care is exercised in the tarring and repairing of the rope, and there are always several extra ropes kept at each mine in order that ropes in action may be repaired or tarred the instant they show the effects of the water.

The cages suffer severely also, the water flowing over them eating away the iron in a surprisingly short time, and its intrusive effect is so great that it will eat in around a solidly driven rivet and loosen it until worthless. The bonnets, braces and guide shoes on the cage, are all heavily copperplated from the dripping of the water, and it is a constant menace to the security of the kingbolt, which is in a particularly exposed position. The landing dogs and station chairs soon present the appearance of charred sticks of wood, and are notched and seamed wherever the water drips on them—some fibers resisting better than others, with the result that solid wrought iron takes the appearance of weather-worn wood.

Another source of annoyance is the water that comes up on the ropes flying all over the engines, staining the bright work wherever it touches, and the fact that the ropes have to be kept freshly tarred makes it almost impossible to keep the engine rooms neat, for the tar flies as well as the water and keeps the wipers busy scraping it off—a difficult feat while the engines are running, as these do, for twenty-four hours a day.

The water is so full of acid that it speedily destroys the clothes of the men that work underground, rotting the cloth in a few weeks so as to be useless, and a drop of it in the eye is a serious matter, as it means pain and inflammation for hours and sometimes days; and if it is hot, as it often is, serious injury is likely to result.

It is fortunate that such difficulties are not often encountered, or the expense and trouble would prove to be the last straw to many a promising mine, struggling, as most such mines are, under a heavy load of preliminary expense. At the Anaconda mines, however, by means of the precipitation on iron of the copper contained in the water the scrap pile (always an eyesore) is rapidly reduced, and a handsome profit made over the total expense of pumping and maintenance of plant, so that the "copper water," although not an unmixed blessing, has its compensations in this case.

California Miners Employed.

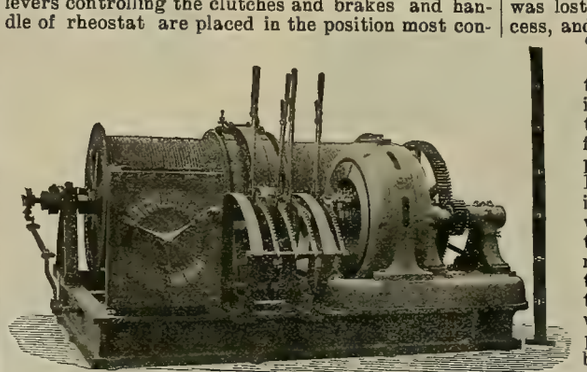
In answer to several inquiries as to the number of miners employed in California by counties, the following is subjoined. It was obtained through the courtesy of Mr. Yale, the statistician of the U. S. Mint at San Francisco, and is considered accurate. It will be noted the list includes only "gold and silver miners." In the case of Shasta Co. the production of gold and silver by the Mountain Mines Co. at Keswick, in addition to copper, has caused their being embraced in the list:

Counties—	*No. of Miners.*
Amador	1,085
Butte	653
Calaveras	1,064
Del Norte	46
El Dorado	943
Fresno	271
Humboldt	63
Inyo	258
Kern	960
Lassen	50
Los Angeles	74
Madera	138
Mariposa	853
Mono	214
Nevada	1,163
Placer	1,165
Plumas	440
Riverside	240
Sacramento	175
San Bernardino	472
San Diego	662
San Luis Obispo	14
Santa Barbara	12
Shasta	1,964
Sierra	574
Siskiyou	977
Stanislaus	20
Trinity	1,126
Tulare	30
Tuolumne	957
Yuba	130
Total	16,783

To the above is to be added a large number of men engaged in quicksilver mining, chrome, copper, salt, manganese, platinum, asphalt, bitumen rock, quarries, oil, clay, and other mineral productions. It is believed that were an approximately correct list secured of all the men now engaged in mining in California it would aggregate about 25,000, this being exclusive of office employes or any one indirectly connected therewith, but representing solely those employed in actual mine labor. Nor would it include the army of prospectors, who are always in advance of all the others.

Double Drum Hoist and Electric Motor.

The electric hoist illustrated on this page shows one of the recent applications of a General Electric induction motor to a double independent drum Lidgerwood mine hoist. It is compact in form, and the levers controlling the clutches and brakes and handle of rheostat are placed in the position most convenient for control by the operator standing on a platform above the floor, and having a clear view over the top of the hoist.



DOUBLE DRUM HOIST AND ELECTRIC MOTOR.

Each friction drum is driven through a single reduction gearing by a 100-volt 12-pole induction motor of 30 H. P. capacity running at 600 revolutions per minute. Each drum is independent and is 42 inches in diameter by 40 inches in face. Together they hold about 420 feet of ¾-inch rope. The maximum hoisting speed is 300 feet per minute and the weight hoisted—*i. e.*, load, car and and cage—2100 pounds. The depth from which the load is to be hoisted is 400 feet from the surface.

Of the 1,288,163 telephones in use in the world, over half, or 772,662, are operated in the United States, according to exhaustive statistics collected by the Swedish Government and reported to the State Department by Consul Winslow of Stockholm. Germany comes next with 151,101, Great Britain third with 69,645 and Sweden fourth with 56,500. In Cuba there are 1818, in the Philippines 452 and in Canada 33,500. Out of the total length of telephone lines of 1,509,499 miles the United States has 805,711 miles.

Treatment of Battery Plates and Temperature of Battery Water.

TO THE EDITOR:—It is pleasant to note the interest taken by mining men in matters connected with their vocation, even such details as the treatment of battery plates. It argues well for the industry. It seems to be agreed by all your correspondents that the final brushing of the plates should be crosswise—that is to say, at right angles with the course of the water as it flows down the plates. It is agreed that this brushing leaves the surface of the amalgam in a series of minute ridges and furrows. Now, if your millman will brush a portion, say, half, of a set of plates crosswise, and the balance lengthwise, that is, parallel with the running stream, then, if the battery should stop after running for a time, the water continuing to run down the plates until clear, he will observe that the surface brushed parallel with the flowing stream is clean and well adapted to the adhesion of the particles of gold passing out through the screen, while the portion brushed crosswise appears dirty and discolored, because the furrows are filled with minute particles of iron and sulphurets coming from the battery, and only the summits of the ridges are presented for the adhesion of the gold, and it will not appear clean until the surface is thoroughly gone over with the brush. Try it.

In regard to the temperature of the water, it occurs to me that sufficient account has not been taken of the increase of temperature of the water in the battery, owing to the concussion of the stamps; but probably more depends upon its quality than its temperature. I recall an instance where the battery water came from springs and a running stream, and the parts continued in good condition; but, the supply running short, the water from the mine was turned in, when the plates developed green streaks at once. Doubtless, water coming from a mine brings with it soluble portions of various minerals, though why these should specially attach themselves to a mercurial surface is not clear; but the purest water passing through a battery in operation might acquire some evil ingredient. N. B. WILLEY.

Blue Canyon, Cal., Jan. 12th, '99.

Cyanide and Comstock Tailings.

Chas. Butters of California, and more recently of South Africa, is having made some extensive tests of Comstock, Nevada, tailings with a view to treat the slimes by the modification of the cyanide process, as explained herein in detail some time ago. Mr. Butters went to Johannesburg in '91, to take charge of a chlorination plant at the Robinson mine. In those days amalgamation was the sole dependence of the Rand mines and about 40 per cent of the gold was lost. But little was known of the cyanide process, and Eastern mining journals pronounced it an "iridescent dream."

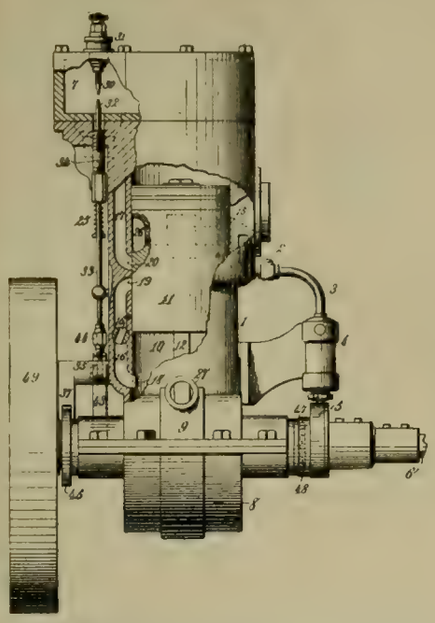
The MINING AND SCIENTIFIC PRESS directed the attention of the mining world to its economic value and explained it in scientific detail so thoroughly that after the first few practical tests its vast metallurgical importance was recognized. Shortly after Mr. Butters' arrival in Johannesburg, he organized the Rand Central Ore Reduction Co., which has ever since been a prominent factor in the gold output of that district. The nature of the Rand gold deposits makes them peculiarly susceptible to the action of the cyanide: it is the ideal process for such wherever found. Probably the most important recent work in that direction has been the practical creation of a new kind of gold treatment, in showing that gold may be profitably extracted from slimes by the aid of dilute cyanide solution accompanied by other economical adjuncts. In the way indicated have been successfully handled solutions containing from 00.01 to 0.01 per cent of cyanide, carrying from six to twenty-four grains of gold per ton. Slimes have been treated assaying as low as sixty grains to the ton. Mr. Butters is of the belief that there is a still wider field for the cyanide process and that "base ores" will ultimately be brought under its solvent influence and profitably worked thereby.

ELECTRICAL POWER from the Missouri river dam near Helena, Mont., has been turned on the engines at the East Helena concentrator and smelters, the Corbin concentrator and the Helena electric light works, street car company and all electrical apparatus in that immediate vicinity, successfully starting one of the most complete electrical plants in the United States. The extent to which this great force is being utilized lends encouragement to the belief expressed by its promoters that many enterprises, and especially that of mining, will be revolutionized in Montana. The dam was constructed at a cost of about $500,000, and two years were required to complete it.

Latest Mining and Metallurgical Patents.

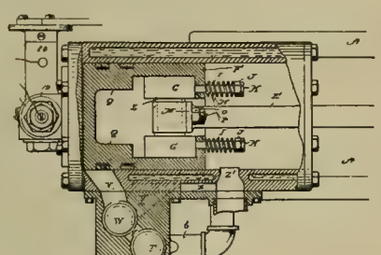
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

EXPLOSIVE ENGINE.—No. 617,372; E. E. Truscott, St. Joseph, Mich.; patent issued Jan. 10, '99.



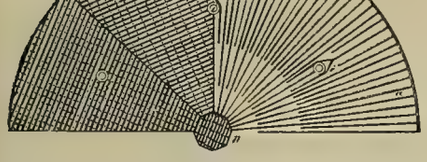
In a gas engine combination, a casing affording a mixing and a combustion chamber, a valve chamber communicating therewith, a valve seated in the valve chamber, passages formed in the casing communicating at their outer ends with the mixing and valve chambers, respectively, and at their inner ends terminating in adjacent ports in the wall of the cylinder, a piston therein having a pocket adapted to span the ports and to form therewith a direct communication between the mixing and valve chambers.

GAS ENGINE.—No. 616,388; E. & W. F. Bauratb, Springfield, O.; issued Jan. 10, '99.



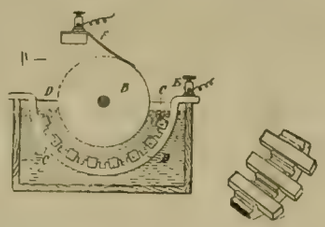
A gas engine combination of cylinder and piston rod, piston connected therewith by a slidable joint having a fixed limit in one direction and a yielding or spring limit in the other direction, the cylinder having an exhaust passage which is uncovered by the piston when it shifts in one direction relatively to the piston rod.

CYANIDE FILTER TANK.—No. 617,497; Philip Argall, Florence, Colo.; issued Jan. 10, '99.



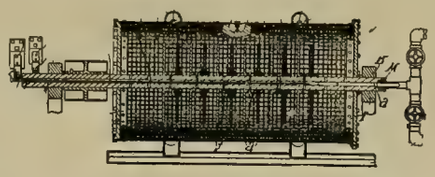
A cyanide filter tank, with a level tank bottom, having a central discharge opening, sloping gutters thereon, converging toward the central opening; a level filter floor above the gutters, having interstices, a permeable layer upon the floor, a permeable fabric as a top filter layer, packed at the circumference, and discharge openings at intervals through the filter floor and covering, having valve seats level therewith, and valves to close the openings, with means for operating them, and extending above the liquid level of the contents of the tank; a vertical metallic side or wall, a horizontal bottom secured thereto, having a central opening, a packing ring secured to the inside of the wall, near the bottom, with a spacing; a system of level joists converging from the perimeter toward the center, a plastic filling between the joists sloping downward from the packing ring regularly toward the central opening, a level floor with interstices laid upon the joists, permeable filtering material upon the floor and a covering of textile fabric, the outer margin of which is packed into the crevice between the packing ring and the vertical wall.

ELECTRO-DEPOSITION OF METALS.—No. 617,526; E. Emerson, Buffalo, N. Y.; issued Jan. 10, '99.



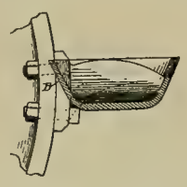
An apparatus for the electro-deposition of copper, the combination with a cylindrical cathode, of a series of horizontal anode bars in proximity thereto, and curved supports therefor composed of lead with lugs or ribs forming receptacles for the anode bars, whereby the latter are maintained out of contact with each other and in the same relative positions as they are dissolved.

SEPARATOR.—No. 617,512; L. E. Porter, Los Angeles, Cal.



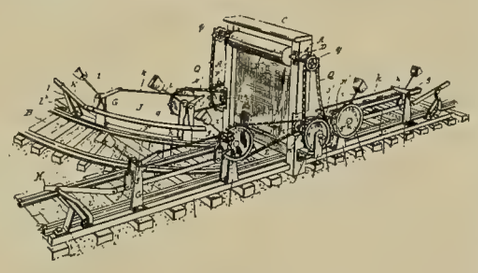
A combination of a rotatable barrel, a lining of filtering material arranged in the barrel and to leave a space between such lining and the walls of the barrel; an opening for introducing inside of the filter lining material to be treated, a closure for such opening, a suitable opening leading through the wall of the barrel into the space between the barrel and the filtering material, a removable closure for such opening, a housing surrounding the cylinder and arranged to catch the filtered liquor discharged through the opening when the casing is rotated and means for rotating the barrel at a high rate of speed, designed to separate precious metals from ores.

WATER-WHEEL BUCKET.—No. 617,555; F. K. Blue, San Francisco, Cal.; issued Jan. 10, '99.



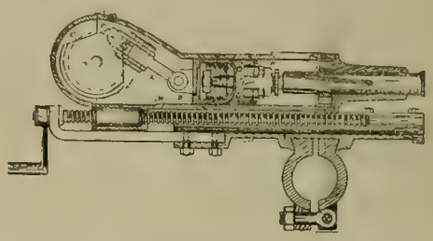
A water-wheel bucket combination with rear and side walls, of an inclined or curved ridge or dividing piece arranged within the bucket, the inclination of the ridge or piece being from front to rear so that the forward end thereof falls a given distance below the horizontal line of the side walls, the front wall of the bucket being united to and having its outer or side portions equal in height to the side walls, the central portion of said front wall being cut away to such a depth as to be substantially in line with the forward end of the central ridge or dividing piece of the bucket.

MINE GATE.—No. 617,669; N. K. Bowman, Lawrence, O.; issued Jan. 10, '99.



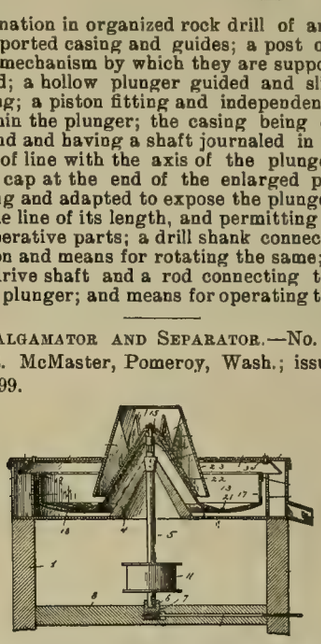
A combination of a track, of a gate frame arranged transversely thereof, a gate curtain mounted on a shaft having bearings in gate frame, provided at one end with a sprocket pinion, standards arranged alongside one of the track rails at opposite sides of the gate and having rock shafts journaled therein, each shaft carrying a crank arm and a counterweight, a rod connecting the crank arms of the rock shaft at each side of the gate to cause the same to move in unison, a master sprocket wheel mounted on the rock shaft of the innermost standard at each side of the gate; a swinging operating bar at each side of the gate and connected to rock shaft, an inclined trip lever connected to the outer end of each swinging bar, a countershaft arranged at one end of the gate and carrying a pair of sprocket pinions and a sprocket wheel, a chain connecting sprocket wheel with sprocket pinion on the curtain shaft and chains connecting the master sprocket wheels with the countershaft pinions, one chain being crossed to cause the swinging bars to move simultaneously in reverse directions, but toward or from the gate frame.

ROCK DRILL.—No. 617,407; Alfred Rosenholz, San Francisco, Cal.; issued Jan. 10, '99.



Combination in organized rock drill of an adjustably supported casing and guides; a post or standard and mechanism by which they are supported and advanced; a hollow plunger guided and slidable in the casing; a piston fitting and independently movable within the plunger; the casing being enlarged at one end and having a shaft journaled in this portion out of line with the axis of the plunger; a removable cap at the end of the enlarged portion of the casing and adapted to expose the plunger chamber in the line of its length, and permitting removal of the operative parts; a drill shank connected with the piston and means for rotating the same; a crank on the drive shaft and a rod connecting the same with the plunger; and means for operating the shaft.

ORE AMALGAMATOR AND SEPARATOR.—No. 617,466; J. R. McMaster, Pomeroy, Wash.; issued Jan. 10, '99.



In an ore amalgamator and separator, a combination of a rotating separating cylinder having a centrally disposed cone, a depressed bottom and an outer wall, a ring detachably connected with the upper end of the outer wall and provided with an inner flange to extend over the upper end of the wall, projecting into the cylinder, and a substantially vertically arranged feeder appearing as a truncated cone mounted to revolve with the cylinder, comprising an inner conical shell and an outer conico-cylindrical shell joined by radial partitions forming passages, the upper ends of the partitions being cut away on upwardly and outwardly divergent lines to form a chamber common to all the passages, the outer shell projecting above the inner shell and having an inwardly extending flange at its upper end.

Seattle's Ship Canal.

TO THE EDITOR:—The Seattle and Lake Washington Waterway Company, which began excavating a ship canal from Seattle harbor to Lake Washington, in 1895, have two dredges at work. Two channels are being cut through the tide flats, which join at the entrance to the main canal. Each tide-flat waterway is 1000 feet wide and 26 feet depth below dead low water. The main canal, 13 feet higher than tide waterways, is 300 feet wide and 26 feet deep, and is entered through locks having a 13-foot lift. The length of the canal from the locks to Lake Washington is two miles. The east waterway through the tide flats, one mile long, is complete and seventy-five acres of flats have been filled in to the depth of 18 feet. Lake Washington has seventy-one miles of coast line and the purpose of the canal is to obtain entrance to a fresh-water harbor.

Seattle, Wash., Jan. 7th, '97. WASCOTT.

THE man who to-day builds a fence around himself, and only progresses in proportion to the ability he has within himself, will soon become a back number.

EIGHTEEN years ago wire fencing cost 9 cents per pound. To-day it costs the consumer 2½ cents, and a pound means a rod of wire.

Electric Mine Signals.

Victor M. Clement, general manager for the DeLamar properties at Mercur, Utah, and DeLamar, Nevada, in a recent paper, discusses the various systems of mine signalling in different parts of the world. The old-fashioned system, the hand-pulled rope and bell, or flapper, is still used in English mines, the difficulty of which is that in very deep mines there is apt to be an uncertainty in its indications, and the engine room cannot always tell if each pull of the rope has produced a sound. In the United States a pneumatic system is used, consisting of a line of pipe and an air cylinder about 6 inches in diameter by 9 inches long, with a piston movable by a lever, which is employed to give a sudden push of air down the pipe line to blow a whistle all over the system. The pipe used is recommended to be at least 2½ inches, and even more, for long distances. The pipe should be smooth inside, as it then can be talked through, which is not possible with rough pipe, although signalling can be effected through rough pipe. Though by no means perfect, Mr. Clement considers electrical signalling, on the whole, the best.

If there are, say, balanced skips for which to arrange signals, there are three wires run down the shaft, two being connected to the poles of a battery and the third or middle wire being used to connect all bells in series and ring them simultaneously when a circuit is made through any push on the system. All bells are, of course, to be placed between the middle wire and the same pole wire, and the pushes between the middle and other pole wire. A separate signal should be arranged from the shaft mouth to the engine-room and vice versa, for the engineer could not otherwise tell whence the signal comes, whether from the top or the lower set of skips.

A bell at the shaft mouth keeps the surface man informed as to what the skips below are doing. Communication with the signals below must only be possible via the engineer's apparatus. The chief disadvantage of the system is that the engineer has no means of knowing the places of the skips except by the correctness of the signal given; but Mr. Clement has never known of an accident, as the bells ring simultaneously through the mine when rung from any one place, and those at any level know thereby where the skip is and what it is doing.

In a second system a separate wire is run to each level, the two battery wires being run to each level also, and when a signal is sounded it rings only the bell at the one place and a bell or indicator at the mouth and in the engine-room. This system simplifies the code of signals; the engineer knows what he is doing, but the cost and complexity are increased. The first system is that which the author advises. The wires may be run in either iron pipes or wooden conduits of deal two-eighths in thickness, run along the roof timbers in an incline, and coated in and out with coal tar, the wires—No. 18 S.W.G. and lead-covered—being held in position by wooden cleats and all bells and pushes being placed in wooden boxes. This system in one instance worked well for eight months, after which the settling of the shaft so stretched the wires that they broke, though no further trouble has since arisen. Though exposed to much acid water, the lead-covered wires had not been affected. When conveyed in iron pipes trouble has been found from internally condensed moisture and from grounding of the wires in the pipes.

In South Africa, among others, the Robinson Deep and the Simmer and Jack discarded a pipe system and installed a bare copper-wire system on double-petticoat insulators of porcelain. Little trouble was experienced. The wires should be at least $\frac{7}{16}$ S.W.G.; should be shackled off at distances of each 100 feet, and a bight made in the wire to run off moisture. Below a bight in the shaft the wire continues, not directly underneath the length above, but to one side. Armored cables should be pure rubber, insulated with a lead covering to the conductor and a steel-wire sheathing. Such a cable can be bent round corners without injury to any part. In vertical shafts it may be hung well up in the corner of the ladderway, and in inclines in an upper part of the skipway. Mr. Clements considers that armored cable is the best for signalling purposes. He considers that one quadruplex cable is fully as good as a pair of duplex cables—*i. e.*, one for the pole wires and one for the two middle wires. Steel-sheathed cable may carry its own weight in vertical lengths of 300 to 400 feet, the connections between the lengths being in water-tight boxes. At pump stations or landing stages connections should be boxed in for 10 to 22 feet above landings, and inclines cable ought to be removed from the risk of having hung on it lamps, tools, etc., and general precautions taken against injury.

There is no satisfactory signal bell known to Mr. Clements. Pushers in general do not give satisfaction. The galvanometer key is better. Pulls likewise are apt to be unsatisfactory, as they depend on springs, which are apt to fail by rust. For batteries the secondary cell is preferable for cleanliness and compactness. The Leclanche primary is satisfactory if properly attended. Whatever form be employed, there should always be an auxiliary. The E.M.F. should range from six to sixteen volts. Bells and pulls must be inspected weekly, at least, and all contacts kept bright.

A Continuous Rivet Heating Furnace.

A rivet furnace which has a fireplace below communicating by means of ports with a combustion chamber, into which opens a hopper surmounted by a chimney, is described by the *Engineer*. The hopper is filled with rivets through the door at the top, and when hot they are withdrawn through the combustion chamber by the upper door in the side. Thus the flame on its way to the chimney is drawn by the draught through a column of rivets 9 or 10 inches high, and while those at the bottom of the hopper are ready for use those at the top—if the supply of rivets be kept up—will always be nearly cold. The heat is taken up by the rivets very rapidly, and each rivet is constantly moving down by gravity into a hotter part till it is taken out ready for use at the bottom. This system of progressive heating results in great economy and speed of working, the furnace, although only 2 feet square by 5 feet high, being capable of heating 3000 ⅞-inch rivets per nine hours with a consumption of 200 pounds of coal, as against 600 to 1000 pounds burnt by ordinary furnaces. Air is admitted through a regulator in the fire door to ensure perfect combustion of the gases before they reach the rivets, and plenty of room is given in the combustion chamber for thorough mixture of the air with the gases. If properly worked the furnace makes no smoke. When rivets of different lengths are wanted they are put in the hoppers in layers, and preserve their relative order in their descent through the hopper. Special rivets may be put into the combustion chamber through the extraction door. The furnace can be easily moved from place to place.

In a borehole, about 300 m. (984 feet) deep, put down near Ostroppa, in the Gleiwitz district of Silesia, by the Ober-Schleische Tiefbohr-Gessellschaft Zollner & Co., the end of a boring rod was broken off, so that it became impossible to continue boring, owing to the pieces of steel in the hole, because all the diamond crowns were ground off. After three weeks had been spent in various but unsuccessful attempts to remove the pieces of steel, application was made to a representative of the Electricitats Aktien Gesellschaft to extract the broken pieces in the following manner: A bar magnet was constructed ½ m. (4 feet 10 inches) long and 70 mm. (2¾ inches) diameter, which was surrounded by a single winding of wire insulated with indiarubber, and was magnetized by the current of a small dynamo driven off the portable engine provided for the work of boring. The current was easily regulated by a simple water resistance, and kept to the constant quality of about 30 amperes. The magnet was let down unmagetized; and, after it had come in contact with the bottom of the hole, the current was switched on to the winding through the rope used for letting down the magnet. On the first day that the arrangement was brought into operation, the pieces of steel in question were drawn up, so that boring could be continued. The pieces stuck so fast to the end of the magnet, capable of lifting 50 kg. (1 cwt.) that they could only be released by the application of force. Inasmuch as the work of boring is often interrupted by pieces of steel being broken off and becoming tightly jammed in the hole, this method, which constitutes a valuable addition to the accessories of boring, will probably be often employed.

The Mansfield Copper Mining Co. in Germany have lately introduced at the Otto mine two machines designed for lifting the mine cars. These lifting cylinders are worked by means of compressed air, their purpose being to effect a quicker and easier transfer of the cars from one track to another than was possible with the hoisting screw previously in use. A compressed air cylinder is arranged upon a movable frame suspended at a height of 6 feet 8 inches. The frame can be moved on the rails with great ease, the air being supplied by an india rubber hose. The piston rod of the air cylinder is connected to an arrangement of levers, which are arranged for the purpose, grabbing and lifting the wagon as soon as the air valve is opened. The releasing and lowering of the wagon is effected by opening the exhaust valve. The arrangement is, of course, very similar to the compressed air hoists which are now largely used in foundries and other shops. Where compressed air plants are laid down the use of these effects great economy, and their construction is so simple that an excellent home-made job is easily possible.

The specific gravity of the earth has been found by Dr. C. Braun to be 5.52765—the earth weighing about five and one-half times that of a globe of water the same size.

Silicification in Ore Deposits.

Discussing Idaho mining districts, Waldemar Lindgren says of ore deposits in general:

Mr. S. F. Emmons, in his studies of the mineral deposits of Colorado and other parts of the Rocky mountains, has admirably and with deserved emphasis brought out the fact that replacement is a process to which many deposits owe their origin, and that it plays an important part in almost all deposits caused by mineral-bearing waters. Carried away with the importance and interest of these results, many geologists and mining engineers have, however, extended the theory of replacement beyond its proper bounds, and speak of every vein-filling and even of veins of solid white quartz as products of replacement. Against this view a strong protest should be entered. In this connection it may be of interest to consider, briefly, the processes by which silicification may be produced.

In the case of ores consisting of carbonates there may be some difficulty in deciding what is filling and what is replaced country rock, for carbon dioxide and alkaline carbonates are very strong solvents, attacking easily nearly every one of the rock-forming minerals and forming pseudomorphs after them. The carbonates may replace a rock completely, wholly changing both composition and structure. As an instance may be cited the coarse-grained mixture of carbonates and mariposite (fuchsite—a chromium mica) resulting from the replacement of the serpentine along the mother lode of California.

As to quartz, the conditions are wholly different. A solution of silica is comparatively inert and does not easily attack any of the rock-forming silicates. Silicification may take place by two greatly differing processes: (1) Cementation, or filling of the interstices of porous or shattered rocks by quartz deposited from solutions; (2) metasomatic silicification, or a substitution of silica for other minerals, the silica either being produced by the alteration of the original minerals or deposited pari passu with the dissolving of the original mineral by active reagents in the waters causing the metasomatic action.

The first process is often observed in the silicification of various sedimentary, porous rocks, chiefly sandstones or tuff or porous igneous rocks, such as certain trachytes and andesites. Silicification by the cementation of shattered rock masses by silica is, of course, a common occurrence in and near quartz veins. But silicification by replacement is a less common process, and is observed chiefly in the case of easily soluble rocks, such as limestone or calcareous shales, when it results in fine-grained or cryptocrystalline aggregates of silica. In the metasomatism of bodies of massive rocks penetrated by chemically active solutions silica is formed in many ways, as by the carbonatization of silicates and sericitization of the feldspars, and if no open spaces are available much of this free silica will be deposited within the rock, usually as fine-grained aggregates more or less mixed with opal and chalcedonite. If no material were added the final result of this would not, however, be a silicification, but merely an increase in the total free quartz of the rock. But in case the rock mass is cut by fissures it appears that most of the resulting free silica is not deposited in the rock, but finds its way out in the open ducts, where, if the solution is supersaturated, it will be deposited. In fact, in the metasomatic processes in the ordinary igneous rocks adjoining gold-quartz veins, late investigations have shown that certain elements are added to the rock, while others, notably silica, are frequently subtracted, to be carried away or deposited in available open spaces.

As for the other possible process of silicification, or a dissolving of the original mineral and a deposition of silica pari passu, it occurs chiefly in easily soluble minerals, such as calcite. In case of the ordinary rock-forming silicates it is apparently not common. The resulting silica is generally in the form of fine, cryptocrystalline aggregates. Rocks silicified by either of these metasomatic processes, or a combination of both, may occur, but, so far as the writer's experience goes, are not often encountered as wall rocks or auriferous quartz veins. But neither of these processes can have produced the massive, white, coarse-grained quartz of gold veins belonging to the normal type. This quartz, which contains native gold and sulphides, shows, under the microscope, a peculiar, coarsely granular structure, the grains being partly bordered by crystallographic surfaces. This structure could have been developed only by free crystallization in open spaces. It is scarcely necessary to call attention, in addition, to the frequency of comb structure, etc., proving also the same kind of origin. This does not necessarily mean that all large bodies of quartz have been deposited in an open space, as large as the volume of quartz now is. Repeated openings of the fissure have doubtless often taken place.

In nature the complication of the fissure veins is often great, and it is clear, in fact, that it must be so, for the walls are often shattered, resulting in alteration of the country rock and deposition of a net of quartz in the interstices. Ground-up mud often fills the fissure, and the result of the action of the solutions on this will be a mass of grains of altered rock, cemented as in a sandstone by quartz.

The Headwaters of the Lewis River.

Written for the MINING AND SCIENTIFIC PRESS.

Although, during the season of '98, the interest of the great rush was centered upon the Klondike and its neighboring streams and rivers, still, as in former years, the upper portion of the Yukon drainage system attracted some attention, especially since the commencement of the Atlin boom, in spite of that being more smoke than fire. This article deals with the limits of the watershed of the lake system, forming the main headwaters of the Lewis river, to its junction with the Teslintoo or Hotalinqu river, a scope of country comprising an area of 100 miles in width by 300 miles in length. While confined to the above area, it is applicable, in almost all of its points, to the rivers that flow into the Lewis and Yukon to and including Sixty-mile river, as the greater portion of their courses run through the same belts of formations and have been subjected to similar conditions. In brief, it is the summing up, from a mining standpoint, of the results obtained from past prospecting, together with the observations, examinations and deductions made during a season's close study of this section by the writer.

As throughout the rest of the Cordilleran system in these latitudes, the formations lie in more or less well defined belts trending in a general northwesterly direction, while the principal deviations in character, latitude and direction are usually the results of local volcanic disturbance. These belts of formations are composed of granites, feldsites, slates, schists, quartzites, sandstones, conglomerates, marbles and limestones, and the series, in its main parts, is repeated over and over again throughout the breadth of the district. These formations contain vast amounts of roofing slates, fine marbles and other building stones, while occasional narrow seams of coal are found.

True fissure quartz ledges are rare, although some of the belts of schists and slates are seamed by quartz stringers which "kidney" more or less. While it is easy to get high assays out of the kidneys, the ore, which usually contains both silver and gold, is not free milling, except when oxidized, and thus far it has seldom been found in commercially valuable quantities. While the writer has not seen any quartz in place which it was worth while to develop under the existing conditions, still he heard of some, which he was unable to visit, that was claimed to be something extra. If there is as much of it as is claimed, and if it will work within 50% of its assay value, it is a remarkably good thing; but the assays are high enough to warrant a searching investigation before accepting them as proof positive of even the average assay value of the ore body.

Aside from the quartz stringers, etc., there are whole belts of formations or quartzite impregnated by sulphurets of iron, with sometimes a slight sprinkling of copper pyrite. In places these mineralized formations are visible for miles. There are also huge chambers or bodies of ore, apparently formed by segregation, in these formations, and in such places the formations strongly resemble those of the Rossland district. Some of these chambers yield fairly good assays, but, although richer, like the rest of the formation they are both base and low grade. It is quite possible that somewhere along the course of these belts mineral districts of value will be found.

Like a large portion of British Columbia, the whole surface of the country is thinly sprinkled with fine gold, which is concentrated into paying quantities in but few available localities. This gold was released from the crystalline rocks and mineralized formations by two agencies: First, by glacial action; second, by the subsequent erosion, which, although far less than the first, both in time and effect, has milled no inconsiderable amount of rock, as is shown in places by the remnants of ancient surface contours. But, although the greater tonnage is to the credit of the glacial action that planed down mountains, carved out lake basins and cut river valleys through range after range, still the subsequent erosion has done and is doing a very important work in reworking the immense glacial and postglacial deposits and concentrating the fine gold contained therein along the lines of the present water courses. In consequence of this, the best pay is to be expected in the river beds, as it collects the most where the greatest amount of reworking is going on. From these bars, such as those in the Lewis, dredgers similar to those employed on the Snake river in Idaho would solve the problem of reclaiming the gold at a profit. In the mountains the grades are too steep and the bedrock unfavorable for the accumulation of gold in paying quantities, and when not too steep they run either among marshes or else empty into lakes, and, on account of the loose character of the gravel, nearly all of the gold works down to bedrock, from whence it can seldom be regained except at a loss, although, when nature shall have drained the marshes and lowered the lake levels, our highly-evolved descendants will find some spots rich in fine gold.

With the exception of where the placer gold is simply the residuum from the wearing away of vast masses of crystalline formations, when fine gold is found along river bars the legitimate inference is that the tributary streams which head in or flow through the mineral-bearing formations will contain coarse gold, but in this district coarse gold is the exception and can only be expected where the mineralized formations are better than usual. As a rule, the streams contain just enough gold to keep a prospector going until he is not only dead-broke but in the hole, and when he has eaten his last bacon rind he is no nearer the pay diggings for which he is searching than he was when the string of gold in his first prospect dazzled his eyes and set his hopes on fire.

In regard to the value of the mineralization of the formations, one tendency has been noted which, while it is distinct enough to attract attention, will require considerable investigation to unequivocally confirm or disprove: That is the apparent tendency to grow richer with the progress eastward from the summits of the passes until the auriferous belts of slates, schists, etc., are reached, in which the Big Salmon heads on the west and near which the Liard heads on the east. These belts follow the usual trend and, as far as can be judged at present, the westerly side crosses the Yukon near the mouth of Sixty-mile river, while the easterly side crosses some distance below Dawson. Should this theory prove correct, and it is in accordance with all known facts, the premier mining districts, both for quartz and placer, will be found along the course of these belts.

Returning to the area under discussion, thus far the best gold has been found in the Lake Atlin country, in the locality where it was first discovered some five years ago. Were it not for the grossly palpable efforts made to boom that region, the excitement of the last summer and fall would merit more attention; but when, at the rate of wages claimed to have been paid, the "big" run that, aside from blow, gave rise to the first excitement, only paid the men during the run itself, without leaving the owner a cent; when pay is being taken out of only one claim, and yet the same men are seen day after day along the line of travel from Bennett to Skaguay, exhibiting sacks and bottles of dust as the results of cleanups from their claims; when returning Klondikers recognize the large nuggets, exhibited as a product of the Atlin claims, as having been mined out of the Skookum diggings; when all of these and more are facts, one is to be pardoned for receiving all glowing accounts with the scrutiny of suspicion.

However, there is some pay there, and, in addition to the omnipresent fine gold, the diggings contain mustard seed and flaxseed gold, which are easy sizes to save. On account of the poverty of the benches and the loose character of the gravels, the spots of pay being below the surface of the water and beyond the action of frost, the flat grades, where the greater portion of the pay is located, the lack of dump room for tailings, and the small size of the claims, the profitable working of separate claims is well nigh an impossibility, even where a company could make money by consolidating the various interests at a reasonable figure and fluming and working the stream from the mouth up. In other words, nearly all of the money made in the Lake Atlin region will be made by companies, and not by prospectors. This is also true of the remainder of the district under discussion.

A. THURSTON HEYDON, M. E.

Reverberatory Furnace Smelting of Ores.*

By THOS. J. DYSON.

Following is a description of a method in use at a European smelting works. The practical results may be of interest, particularly the percentage of extraction of metallic lead. The object of the process at the European works is more the rapid extraction of silver from rich ore rather than that of the lead, but nevertheless the latter does not suffer on that account.

The operation is based on the mutual reduction of oxide and sulphide of lead when heated together, the separation of the reduced lead being assisted by carrying out the reaction on a bath of the latter metal. As the slags formed often amount to 60 per cent of the weighing of the charge, they undergo a liquidation after removal from the bath, to insure the separation of the entangled portions of reduced lead.

The sulphide ore is chiefly a galena carrying about 37 per cent lead and 1 per cent silver, with which small quantities of pyritic ore of like grade in silver are mixed, and the oxidized ore, a carbonate containing 68 per cent lead and 0.048 per cent silver, this being replaced by litharge when in short supply. The sulphide ore is delivered in a fine state and the carbonate must also be fine, but the litharge acts satisfactorily in roughly broken lumps. The furnace is an ordinary softening furnace, with a charge hole in the roof; a sheet iron box, with a lining of firebrick 16 inches thick, serving to confine the lead bath.

From the firebridge a small hearth 3 feet 6 inches, with a door at each end, slopes at an angle of 25° to the edge of the bath, serving as a liquation hearth to drain off the lead entangled in the slags before their final removal from the furnace. On starting the furnace is brought to a red heat in fifteen hours with a consumption of 1600 pounds of coal. The bath is then charged with some 10,000 pounds of blast furnace lead, containing usually 0.1 per cent silver. When melted the drosses are skimmed off with a perforated shovel and deposited on the inclined hearth, the bath being now about two-thirds full of lead.

A sheet iron funnel is introduced into the charging hole, the damper closed to minimize loss of dust, and 500 to 600 pounds of the sulphide ore is dropped on to the surface of the bath, where it readily spreads out. The funnel is withdrawn, the damper opened and the fire urged until the ore begins to cake on the surface, when some 400 pounds of carbonate ore or litharge is spread over it. The drosses lying on the inclined hearth are now well rabbled for ten minutes, then the ore mixture on the bath for a like period, these operations proceeding alternately until the drosses and the ore have been worked over three times. After the third rabbling of the ore charge four or five shovels of coal dust is thrown over the bath to reduce excess of litharge, formed by the exposure of the lead during rabbling, the drosses on the hearth are drawn into slag pots and the slag floating on the bath is removed with perforated shovels and transferred to the inclined hearth.

A fresh charge is let down on the bath and the alternate working over of the ore charge and the slag on the inclined hearth proceeds as before. The time from charging to skimming is two hours, a charge thus remaining four hours in the furnace, *i. e.*, two hours on the bath and two on the inclined hearth.

When some twenty charges of the ore have been worked off the silver in the lead bath rises up to 1 per cent, and the lead is tapped out and sent to the cupelling furnace, the slags in a fully oxidized condition and well fritted to go to the blast furnace.

The following is a record of the ore and lead charged, and the product obtained from 112 charges, the bath being filled and tapped five times:

CHARGED.

	Weight.	CONTENTS.	
		Lead.	Silver.
	Pounds.	*Pounds.*	*Ounces.*
Sulphide ore	60,450	20,771	11,268
Carbonate	37,478	25,485	262
Litharge	10,141	8,619	135
Blast furnace lead	.....	51,697	1,682
Totals	108,069	106,572	13,347

WITHDRAWN.

	Weight.	Lead.	Silver.
	Pounds.	*Pounds.*	*Ounces.*
Rich lead	.....	82,293	12,047
Slag	68,078	20,158	554
Totals	68,078	102,451	12,601

Of the 54,875 pounds in the ore charge, 55.75 per cent is obtained in the metallic state, 36.75 per cent in the slag, and 7.5 per cent unaccounted for.

Of the 11,665 ounces of silver in the ore charge, 88.84 per cent is obtained in the rich lead, 4.75 per cent in the slag, 6.41 per cent unaccounted for. This percentage of silver is not all loss; a great portion of it is recovered when poorer ores are worked in the same hearth, the absorption of silver being heavy when rich ores are treated.

At one time galena containing 70 to 75 per cent lead was roasted to sulphate to be used instead of carbonate ore or litharge, but did not give such economical results. As might be expected, the latter were cheaper oxidizing agents.

Galenas containing 75 per cent of lead, poor in silver, when worked as described for the rich ore, furnished 75 to 80 per cent of their lead ready for the zinkage pots.

The operation I have described is conducted with an ore mixture of about 50 per cent lead; and after a large expenditure of hand labor on small charges, moderate temperature at which the oxidized and sulphide compounds of lead react best, and finally careful liquation of the slags away from the lead bath, the result is 55¾ per cent of the contained lead as metal. When clean galenas are treated in the same way the percentage production of metallic lead at once makes an increase of 20 to 25 per cent.

From a charge of six tons of concentrates the least likely amount of slag is about three tons, and three tons of a slag consisting of a sticky mass of silica, oxide of zinc, etc., more or less saturated with heavy oxidized lead compounds, is liable to hold an unpleasant amount of entangled metallic lead, and still further reduce the production of metal, besides reducing the capacity of the furnace, unless some means of liquation is provided other than rabbling on the surface of the bath. The slimes containing 15 to 25 per cent zinc and 25 to 30 per cent lead might with advantage be left out of the roast reaction process,

*Condensed.

Some Experiences of a Working Miner.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS.

Why is it some men can never learn from experience? Not long after talking myself out of a job at the P—— mine, I found myself at G——. Here I found two men who professed to be miners. In the course of conversation, I learned that they were driving a tunnel by contract at a mine in the neighborhood, and they expressed the belief that they were "stuck," for the reason that they were working through the "hardest ground in the State." I inquired as to the character of the ground and was informed that it was slate. As slate is not ordinarily an extremely hard rock, I volunteered to accompany the boys to their tunnel the following morning, as I wanted to see this particularly hard slate. I found the rock a common, black clay slate, not very hard, but, on the contrary, rather easy ground. A hole had been drilled 18 inches in the face. This hole was driven directly in horizontally and was cutting straight across both strike and dip of the slates. They started to drill the hole deeper, and did put it in 18 inches farther. I thought I would not interfere for a while, and they drilled two more deep holes in the face—one near the top and the other a little above the bottom of the face. Near noon these three holes were fired, and after lunch we all went in to see the result. We found what I had anticipated—the collars of each hole blown off and only a few wheelbarrow loads of rock broken.

"What are you going to do now?" I inquired.

"Load and fire them again," was the answer.

"And what will be the result of this second charge?" I asked.

"It will break out some more rock and 'kinder' shake up the ground; so when we put in the corner holes we can square up," was the reply.

The second charge was fired and a little more ground was broken, but the slates were not much shaken up by it. Well, they worked all of that day and all of the next to square up the tunnel, and half of the third day to clean up. At this rate they were not getting rich very fast. When they had finally squared up their work, I suggested that if a center cut was first made, by pointing holes from the sides toward the center, each hole to be 18 inches deep, and following these by holes pointed at proper angles both above and below the center cut, that proper progress might be made. Acting on this advice, the boys took out nearly double the amount of ground in a given time that they had been able to do before, and used less powder to do it. They were now making money, and concluded that the ground was not so very hard after all.

I worked for some time at a famous mine down on the Mojave desert. It was a good mine and paid handsomely. The vein was clean, well defined, and from 3 to 10 feet wide, dipping steeply south near the surface, but down on the 400 level was quite flat. This mine was timbered with square, sawed timbers, which were placed as props. Every miner knows that posts so used should be placed in the mine nearly at a right angle to the hanging wall—that is, slightly above a right angle—so that, should the hanging wall have any tendency to subsidence, the posts will take the weight and hold the ground in place. Our superintendent had some remarkable ideas about timbering, and had all of these stulls set in an exact line and absolutely perpendicular; had them set in with a hand-level, too; they had to be absolutely vertical—and this with the walls pitching at 30° to 45°. We remonstrated with him, but to no purpose. After a few weeks these posts began to show a disposition to move from the vertical, the foot slipping downward. To counteract this, braces were placed extending from the foot of the posts to hitches cut in the hanging wall. These braces were nearly horizontal, so they did little good further than keeping the foot of the post in position; but then the tops of the posts began to move backward. To make a long story short, those stopes are not open now. The whole business "jackknifed" and the stopes were lost. Fortunately, no one was injured, as the ground had given sufficient warning of approaching collapse, and the men were all elsewhere when the cave occurred. They have a new superintendent at that mine now.

I must tell you about the big mill at H——. This mill was crushing ore from the Q—— mine when I was there, and it seemed to be a pretty fair sort of mill, excepting for the fact that the timber frame was rather frail for the size of the mill, particularly as there were large ore breakers of the Blake type on the upper floor, creating such a vibration as to tend to injure a mill of heavy frame; but in a light structure it is enough to make one seasick. Eventually they had to brace the mill up with long props; but it was not this that I wished to speak of particularly. H—— lies in a little valley among the hills and a first-class mill site might have been selected almost anywhere on the surrounding slopes, but the management did not appreciate the natural advantages about, but chose the center of the flat for a mill site. If there had been an abundance of water at H—— it would not have been so bad, but water is scarce and the tailings soon began to pile up in front of the mill. They might have been conducted some distance in a flume, but they were not, and continued to pile up. After a while they dammed up and began to flow into the mill. A gang of shovelers was kept at work for a time, but that was too expensive. Then bucket elevators were tried, and these piled the tailings higher and higher until they had reached the height of the eaves of the building. I have been informed that the mill has since been moved to a more eligible site. It reminds me of a man I once heard of who allowed the refuse of his stable to pile up about him to such an extent that he chose the plan of rebuilding his stable at another part of the ranch rather than remove the debris. There are many ways to build a quartz mill, but it is a poor plan to build upon a flat when a hillside is at hand, simply to save the cost of grading. Of course, if a large stream of water is flowing by, that would alter the case materially.

I want to show you how little advice is appreciated when it is not paid for. A prominent gentleman now living in the southern part of the State, after describing his mine to me, asked for an opinion as to the advisability of driving a long crosscut tunnel to tap the vein several hundred feet below the croppings. My advice was that he continue sinking his inclined shaft on the vein and develop ore enough to justify the working tunnel he proposed. Two years later I found he had disregarded this advice and had driven the tunnel, crossed the vein where it was very small, and passed more than 200 feet beyond it, without realizing that the vein had been reached. He also erected a mill at large expense and milled about forty tons of ore. The worst feature of the whole affair was that he didn't have enough ore to keep a 1-stamp mill busy, and what he did have was almost worthless. This is one of the failures that condemn mining as a legitimate business. MINER.

Forestry in California.*

By ABBOT KINNEY.

Forestry has two distinct objects: First, the economical utilization of the forest resources. This comprises not only the fuel and timber supply, but also the application of methods that will insure the renewal of the forest crop and protect both the mature and growing forest from waste or destruction by fire. Second, the maintenance of forest conditions upon watersheds for the purpose of regulating the delivery from these of the rainfall. Social and economic conditions, together with topography and climate, determine the relative importance of these two objects of forestry.

In southern California the second reason for rational forestry altogether dominates the situation. Nowhere in the world is there greater need of efficient forest management than in southern California. Nowhere in the world do topography, climate, social and economic conditions so completely unite in indicating the need of forest preservation.

The mountain ranges divide the fertile areas of southern California from the great Mojave and Colorado deserts. These mountains rise abruptly without foothills from the rich, irrigated valleys of the south. The Sierras are steep, difficult of access, practically unoccupied and entirely incapable of agricultural use. The ranges rise like a wall to an average altitude of 5000 feet immediately above the valleys. The peaks are from 10,000 to 12,000 feet in height.

The tendency of the rainfall delivery arising from this topography is toward immediate and destructive floods. The torrent rushing out into the valley with sand, mud, gravel and boulders already alternates with prolonged absence of water in the flood courses. The only modifying influence is the forest covering of the mountains. This forest consists of only small areas of merchantable timber, all of which are immediately about the peaks of San Bernardino and San Jacinto. Even this timber is of such inferior quality and so difficult of access, that it is not now being exploited. The main forest covering of these mountains consists of chaparral and brush. This covering holds the soil on the steep mountain sides and detains the rainfall delivery so that time is given for it to percolate into the water veins and natural reservoirs. Where these watersheds are burned over the importance of the forest covering is at once demonstrated. In such districts the destructive force of the floods increase. Torrents do great damage, both in covering good land with useless debris and in cutting and carrying away other good land. The rainfall is thus suddenly delivered to the injury of all. On the other hand, the perennial character of springs and streams is diminished or destroyed. The water that the forest covering insures to the permanent water supply is wasted and lost when the forest covering is destroyed.

When the forest is gone on these steep Sierras, floods and torrents alternate with wide and arid wastes of waterless torrent beds. The forests are absolutely confined to these steep Sierras.

The Sierra Madre wall has upon one side the great deserts. In these there are a few scattered oases. Promising mining districts are frequent and there are a number of fine productive mines. In the far south there is in the desert an alluvial plain to which the Colorado river may some day be diverted. The climate is intensely dry, almost rainless, and for eight months these deserts are at present a fiery waste. On the other side of the Sierra wall nestle the beautiful protected valleys of southern California.

In these valleys, settlements and homes succeed each other and join hands. Thriving towns and cities are supported and the enterprising metropolis of the southland has 120,000 inhabitants. The life of all these homes and towns is in part derived from tourists coming in winter from the northern States and in summer from the desert mining population, from Arizona and even from Texas and the Gulf. About $10,000,000 is annually spent here by tourists, but its main reliance is upon intensive agriculture and horticulture.

All this is due to the condensation of moisture by the Sierra Madre range. All of it is due directly or indirectly to the rainfall in the valleys and on the mountains which supply these districts with water. The condensation of moisture into rain by the Sierra cannot be aided and may be diminished by the removal or destruction of the chaparral and forest on the mountains. Deforestation will surely increase the extremes of temperature in our valleys. It will increase the dryness of the air. It will increase the evaporation and is likely to diminish the moisture condensing power of the Sierra.

Extensive deforestation will diminish condensation of moisture in such areas. If it does not diminish the rainfall it is likely to change its character. The tendency will be to make the precipitation more sudden and violent. The rains then more and more become diluvial. The periods are short and the precipitation heavy.

This sort of rainfall promotes flood action and diminishes springs. Besides these results of deforestation, we know absolutely and from our own local observation that forest and brush destruction on our mountains does increase torrent action and diminish springs. We know that the canyons and streams, the watersheds of which have been thus injured, deliver a greater amount of debris to the valleys than before. Our local experience fully confirms the experience of other countries. Valleys, the world over, have been destroyed and depopulated by the deforestation of their mountains. Hundreds of instances are of record like that of the valley of the Durance in southern France. The forests on the hills and mountains of the watersheds of that river were destroyed and burned over by sheep men to increase the pasture. At first the pastures were improved, but in the end the soil was carried off by the increasing floods and the forest was followed by the grasses and nothing was left but the bare rocks and desolate gulches. The river, which was a perennial stream and navigable, with a well defined channel while the forests existed, became after the destruction of these a torrent and flood course. Navigation was ended. The channel was filled up with the mountain debris. Two hundred thousand acres in the valley were covered by debris from the mountains and ruined. Thus the forests were destroyed and all forest supplies ended.

Southern Europe, northern Africa and western Asia show us not only valleys, but whole nations injured or destroyed in their means of support by forest destruction. In no country is the folly of sacrificing mountain forests to sheep pasture more clearly illustrated than in that once great and now moribund, kingdom of Spain.

We have no sheep interest to contend with in establishing a forest system in the Sierra Madre. We have no enemies from selfish interest to stand in the way of rational forest action in our Sierra. The political office-holding class is the sole handicap to efficient action. The plan that follows says nothing about a civil service or a forest patrol and government by men of forest knowledge and physical capacity to meet the requirements, but that must inevitably grow out of a system fed by a forest school like West Point, in producing competent men of honorable ideals and security of position while the service is efficient. Forest management requires men of special knowledge in forestry. A forest fire alone is a serious study. A mixed gathering of hastily enrolled men under a clever politician is not a promising forest protector or forest fire extinguisher.

The attractiveness of southern California will be lessened by burning off and destroying our mountain forests. The floods and torrent action will increase to the destruction of valley lands and property. The springs and streams will be diminished by forest destruction. The climate will be unfavorably affected. To us forest destruction is all loss and no gain. What shall we do to be saved? You know what has been done. After long fighting and agitation, forest reservations have been made in the most important districts. A few military forest patrols have been sent out, but only in what are called national parks and not at all in the forest reservations proper. This year the Department of the Interior has at last recognized the needs of forest management and forest protection. Its initial work in this line has been inefficient and practically worthless, but it is of great value in recognizing the need of forest management.

*Condensed.

Mining Summary.

ALASKA.

Juneau *Record*: The mounted police of the Northwest Territory have again placed the ban on prospectors risking their lives by plunging into the interior without money and with very light outfits. A required outfit of supplies and money must be carried. They object to prospectors going into the interior with a few hundred pounds of supplies and no money, with the intention of throwing themselves on the charity of the police in case they get stranded. This year the requirements are rather stiff. In order to go to the Yukon one must have three months' supplies and $500 in cash, or six months' supplies and $200. Klondikers who came out past Tagish post were told by the captain of police in charge there that these regulations would be enforced to the letter. The rule does not apply to prospectors going into the Atlin country. Old-time Yukoners, those who have property in the camp and who are returning for the winter, are not compelled to show money and supplies. They are compelled, however, to prove their identity to the satisfaction of the officer in charge.

ARIZONA.

A strike of sulphide ore is reported to have been made on the property of the Cochise Copper Co. near Bisbee and the owners are pushing development work.——Recently J. F. Stone and S. F. Knox made a tour of the Colorado river above the Grand canyon. They belong to a company which proposes to dredge the river for gold. They located 150 miles of the river above Lee's ferry and will soon begin work there on a large scale. At Chicago the company is building a dredge boat which will be worked by electricity. Extensive preparations are being made for the work to begin next spring.——Near Globe the Black Warrior group of copper properties includes many claims, but the great part of the work has been done on the Black Copper mine, which is opened to a depth of 200 feet with crosscuts and drifts in which copper ore has been found. For two years the Black Warrior camp has been a producer of high-grade copper sufficiently rich to make it profitable to haul to the United Globe smelter. An Eastern company is being organized to operate the Sultan group, the Continental, the Black Warrior and the Gerard Co.'s properties. A company has also been organized to build a 20-inch gauge railroad to connect the Black Warrior properties and Eagle iron claims with the Gila Valley Railroad at Globe. As soon as possible an extensive smelting plant will be erected by the Black Warrior.

The London Exploration Co. is operating drills and cleaning up for active work on the Ray mine, near Riverside, in Pinal county.——Clack & Poland, leasers, are said to be taking $20,000 per month out of the Oro Plata mine, near Yuma.

T. Fox recently leased and bonded a lead mine near Stein's Pass for $4000, and several men are taking out ore.——In the Volcano mine, near Stein's Pass, ore is being taken out that averages over 100 ounces in silver. The ledge is reported to be over 3 feet thick.——W. H. Allbritten, near Stanley Butte, encountered a deposit of ore that carries copper up to 35 per cent and gold value $35.——From the Blue Jay mine, near Tucson, at the 359-foot level the gold and silver ore goes $50 a ton.——A cyanide plant will be put in at the Mocking Bird mine, Weaver district, near Yuma, capable of working ten tons daily. The Mocking Bird contains ore that can be cyanided as well as several hundred tons of tailings.——Leasers on the Golconda mine are getting out good ore. The Golconda is in Union Basin.——E. Gilbert has men at work on the Standby, at Cerbat, taking out ore that runs well in gold and lead.

F. Vomicil at Castle Dome has 160 tons of silver-lead ore on the dumps; sacking and hauling it to Vomicil Landing on the Colorado river, twenty miles distant, is in progress. By steamer and rail it will be conveyed from Vomicil to the smelter. This ore carries from 30 to 100 ounces of silver to the ton and 65 per cent lead, and three tons per day is the output.——The Redondo group of copper-gold claims, consisting of seven claims at Copper mountain, has begun development on a large scale.

M. McLeish of Denver, Colo., last week bought a large dump of tailings at the Mammoth mine at Goldfield. There are 30,000 tons of tailings in the dump and a plant will be erected for their treatment without delay.

In the Volcanic mine in the Eagle Tail mountains recently a 4-foot vein of high-grade copper ore has been opened.——From the Loudon and Gallen mines in the Whetstones, on which O. B. Hardy has a bond, there are sixteen men working. A carload shipment of ore was made last week.——G. W. Herdman, of Jerseyville, Ill., representing Illinois capitalists, purchased from G. A. Whiteford a group of four mining claims located on Mineral creek, near Florence, for $25,000 cash. A few men are working on the claims, and as soon as the organization of the company is completed, a larger force will be put to work. They will also erect a stamp mill at the mines.——On the 200-foot level of the Lone Star, near Mineral Park, the vein was crosscut, and a body of good ore was struck.

Near Oro Blanco, a strike at the Ragnaroc mines near Tucson, was made recently. The ore is high grade, free gold, and at a depth of 500 feet, the deepest workings in this section.

Bisbee *Orb*: After over two weeks of idleness the furnaces at the Copper Queen smelters were fired last week and the first copper matte of the output for the year 1899 was turned out. By the introduction of the electric slag cars, the labor of forty Mexicans has been done away with; the cars are run up to the wells and the slag drawn off into them; they are then run out to a siding and dumped into larger cars and the slag is hauled to the dump by the donkey engine. Until the arrival of the electric motor, these cars will be drawn by hand; the wires, etc., have all been fixed for the motor, and when it arrives the trolley system will be put in working order. The Copper Queen Co. produces pig copper 99.2 per cent fine at a less cost per cent per pound than any company in the Territory. The output of the mine for the past year exceeded that of '97 by over 8,000,000 lbs., the output in '97 being 25,953,521 lbs., while that of '98 was 34,000,000 lbs.

CALIFORNIA.

Amador.

In Volcano district, the Douglas shaft is down 400 feet; they are engaged in drifting and crosscutting, and the indications are promising. About twenty men are employed. The company has expended in the neighborhood of $30,000 in development work.——At the South Eureka, near Jackson, they have a drift 300 feet on the 1600-foot level, and while occasional bunches of vein matter are encountered, the main ore body will not be reached inside of 500 feet. The 20-stamp mill is crushing steadily.

At the Kennedy the repairs to the north shaft have been completed and work has been resumed. The south shaft is undergoing repairs. At the new shaft the boiler is in place and the engine will soon be ready for operating.

Sutter Creek *Record*: Rich ore has been encountered on the 210-foot level in the Potazuba mine near Sutter Creek.——Sinking was suspended at the Oneida mine the first of the month, and they are now crosscutting to the ledge on the 1700-foot level. It is expected that a big mill will be erected on this mine this year.——At the Central Eureka the water is out to the 900 level. The shaft is in excellent shape, and there will be no delay in driving development.——At the Lincoln work is going ahead. The crushing made from this mine recently proved to the satisfaction of the stockholders that they have a good mine. Next summer a big mill will be in operation at this mine.

Jackson *Ledger*: Developing at the Zeila it progressing. Drifting is in progress from a new station at 1085 feet depth; a station is being cut at 1360 feet and sinking is progressing.——After a shut-down of a month for repairs, the Amador Queen No. 1 operations were resumed last week ——At Drytown, the new 10-stamp mill at the Pocahontas mine is running steadily on good rock.

Jackson *Republican*: In the Bluebell mine, near Jackson, a vein 18 inches wide has been uncovered. The rock is claimed to be high grade.——It is said that work will resume at the Hazel Dell mine.

Butte.

The shaft in the Magalia mine is 5000 feet deep and the tunnels run 4000 feet from the foot of the shaft.

Oroville *Mercury*: Litigation in which the Cherokee mine bondholders have been engaged for years is at an end. The Lady Alice G. M. Co., for some months the only adverse claimant, has quitclaimed all interest in favor of T. Z. Blakeman of San Francisco, representing the bondholders. Several months ago the bondholders gave C. W. Cross and others, composing the Lady Alice G. M. Co., in consideration of their claim to a portion of the property, an option on the same for six months, the understanding being that if a sale was not made within that time the Lady Alice Co. would withdraw all claims to the mine. This time expired several weeks ago, but as the holders of the bond for sale represented that they had a sale practically made, a postponement was granted. The time again expired, and no money having been paid by any prospective purchasers, the mine reverts to the bondholders, according to agreement, and deeds are drawn in fulfillment of its provisions.

Calaveras.

San Andreas *Citizen*: The mill in Angels Camp is dropping its full number of stamps. There is now enough water in the reservoirs to keep the mines running at full capacity until early fall. In all probability the mines of Angels will not close down again this year.——Kane & Garnett have bonded the Big Four quartz mine at Fourth Crossing.——A new shaft is being sunk on the property of the Fort Wayne G. P. Co. near San Andreas.——Crosscutting has been commenced on the 300-foot level in the Demarest mine near Fourth Crossing.——The foundation for the 10-stamp mill at the Ford mine is nearly completed.

El Dorado.

(Special Correspondence).—Davis & Farmer, in the old Argonaut mine, near Georgetown, on which work was resumed some months ago, continue taking out high grade ore. The ledge is from 20 to 30 feet wide, and the rich seam is from 2 to 10 inches in width. The property is owned by J. Smith of Greenwood.

The Gopher-Boulder property, at Kelsey, is again in operation. The 20-stamp mill and concentrators are run by electricity.

Garden Valley, Jan. 16th, '99.

Placerville *Democrat*: At the Atlantic mine near Placerville, in which the recent strike was made, they are still in good ore.——The Tockey gravel mill is dropping ten stamps. Taylor & Clifton are working the property on percentage.

Kern.

Randsburg *Miner*: The Johannesburg Reduction Works recently crushed fifty tons of ore for the Wedge Co. which yielded $40 a ton; seventy-five tons for the Big Butte, worth $75 per ton; one hundred tons for the Windy, $60 a ton; fifteen tons for the Minnehaha, which went $25 a ton.——The Eureka mill crushed thirty tons for the Wedge Co. recently which went $100 per ton.

Los Angeles *Review*: Considerable ore from the Randsburg district is being shipped to Barstow.——Excavation at the Blackhawk mine has been concluded and everything is in readiness for the mill, which will be in operation soon. Water for running the mill will be furnished by the Squaw Springs Water Co., conducted three miles.——The Quinn & Pridham mill has completed a run of twenty-nine tons on Wedge ore, yielding over $3000.——The December cleanup at the Yellow Aster mines, Randsburg, was about $60,000.

Madera.

(Special Correspondence.)—Wm. Brown has sold his quartz claim on Fine Gold creek near the San Joaquin river. The purchasers have a 2-stamp mill on the way, which is to be put upon the property. The ledge is 4 feet wide and goes $6 per ton.

In the Starbuck, owned by O. N. Williams, the shaft shows a 12-inch vein which mills well in free gold besides a good percentage of sulphurets.

The Mud Springs mill runs constantly, enough ore being in sight to last for three years with the present crushing facilities.

Gold, Jan. 17th, '99.

Mariposa.

(Special Correspondence.)—There is a steady output of bullion from the Whitlock mine, under the management of Wm. Johns, and the Mt. Gaines mine at Hornitos, under the management of Mr. Johnson. They are now erecting poles to bring electric power from the Merced falls to the mine, which will reduce expenses, wood being $5 per cord. The Doss mine, we learn, has again started up, with the addition by purchase of the Thorn mine, adjoining. The Thorn has been noted as a rich ore producer. The No. 9, the Quartz Mountain, the Root and Old Washington are bonded.

Hornitos, Jan. 16th, '98.

(Special Correspondence). — The Porter Ranche and Keystone mines were sold by order of Probate Court at Mariposa last week to Galey & Co., who are operating the Murphy mine, adjoining the Mary Harrison. The purchase price was $10,000. The property comprises 240 acres under agricultural patent, including one mile of the west vein just south of the Malvina and Tyro properties. A 6-stamp mill is being erected on the property.

The Golden Crown Co. has postponed the erection of its mill until spring.

Tuolumne parties have bonded a group of claims from Spencer, McLennan & Adams for $8000, part of which sum has been paid. The claims are on the north fork of the Merced.

The Columbus M. Co. is taking out some very good ore from its claims on Horseshoe Bend mountain.

The Louisiana mill is again running at its full capacity.

The Bean Creek M. Co. has been incorporated in San Francisco to operate the Kohler-Hill mines just west of the old Red Cloud, and owned by Dr. J. O. B. Gunn of San Francisco.

Coulterville, Jan. 16th, '99.

Nevada.

A. M. Gray has a force at work running a tunnel in the Mack mine near Nevada City. In former years this ledge produced high-grade ore, but until now there has been no systematic effort to go down on it.——Hydraulicking began at the Gray & Bullard mine near Nevada City this week.——Water power will be used at the Texas mine Feb. 1st. The new mill will also be ready to start by that time. Drifts and crosscuts are being run from the 250-foot level.

Grass Valley *Union*: The New York corporation under the management of C. R. Corning has relinquished the option it had on the Orleans mining property near Grass Valley. The old company has resumed operations and are unwatering the mine.——Part of the machinery for the new mill being erected by the Pennsylvania M. Co. will soon be placed in position. The recent storms have delayed work, and it will be a few weeks before the mill is in working order.——The W. Y. O. D. mine and other properties, formerly owned by the W. Y. O. D. Co., has passed to the Grass Valley Exploration Co. The Board of Directors are J. & J. Weissbein, and J. K. Nuttall, L. B. Parrott and W. S. Keyes of San Francisco. The W. Y. O. D. employs sixty men on day's pay.——The Cherokee & Badger Hill M. Co. have applied to the Debris Commission for permission to work their mine near Nevada City.——R. Noell has begun suit to foreclose a mechanics' lien on the Golden Gate mine, near Grass Valley. The defendants are the Rocklin M. Co. of San Francisco.

Placer.

Minnesota people are said to be negotiating for the Crandall mine, in Ophir district.

Auburn *Herald*: The Mayflower M. Co. near Forest Hill has bought all the claims between its ground and Smith's Point. At an early date mining on the upper lead of the Mayflower will begin. This lead carries a fine grade of gold, selling for nearly $20 an ounce.

Auburn *Herald*: Stevenson & Whitacre are developing a good milling ledge near Auburn. They have sunk a shaft on the ledge in which the ore shows good prospects. They are running a tunnel on the ledge to drain and work the mine. If the tunnel develops as good rock as the shaft they will put up a small mill.

Riverside.

The Gavilan mine made a big shipment of gold after a twenty days' run on high-grade ore. The mine is employing twenty men and good ore is found on the 200 and 300 levels.

San Bernardino.

(Special Correspondence). — In performing assessment work in December on the San Bernardino iron mines, indications of a body of copper ore underlying the iron were frequently visible. These mines are now under ninety days' bond to Pittsburg, Pa., interests.

The Peacock copper mines, near Lavic, are being worked, and some high grade ore is being shipped.

The Pacific Coast Borax Co. is working a force at its mines, conveying the ore by its narrow-gauge railroad to the company's calcining works, between the mines and Daggett, on the Santa Fe Pacific. After calcining, the ore is shipped East.

The Waterloo mills, near Daggett, are now going on their sixth year of idleness, owing to the decline of silver; the plant cost $240,000.

The plant of the new borax company at Daggett has closed down till warmer weather.

San Diego, June 16th, '99.

San Diego.

(Special Correspondence). — The cyanide plant at the Stonewall mine is ready for work.

The sale of the Noble Bros.' mine in Pine valley recently reported at $30,000 was premature. The buyer announced himself ready to close the deal, when the Noble Bros. declined to sell at the price previously agreed upon, they in the meantime having encountered a body of rich ore.

Near Barrett's dam a big ledge of iron ore was discovered the past week. Near the same point galena ore has recently been discovered.

An option has been given English people on some of the Laguna property for $50,000.

A vein of free milling gold quartz was discovered two weeks ago near Banner.

Near Descanso G. W. Marsh and others found a vein of valuable gold ore.

The establishment of a large blast furnace plant by a Pittsburg party for the reduction of the Tepustete iron ores of Lower California is talked of.

San Diego, Jan. 16th, '99.

H. Johnson of Socorro brought to San Diego last week three pieces of gold amalgam weighing fifty ounces each, the whole worth $2500. He has fifty-two claims there, water being brought in a ditch eighteen miles.

Shasta.

The Mountain Copper Co. will build a foundry at their smelting works at Keswick.

O'Shay & Co. have taken a long lease on the Milkmaid quartz mine, near French Gulch. This is the property which Senator Jones of Nevada and his associates bought less than two years ago from J. Souter for $20,000, and on which they placed a mill. It has generally been credited with having paid for itself and equipment and leaving a small margin.

Siskiyou.

The Gum Boot quartz mine of Scott river is locally reported to have been secured by D. H. Moffatt of Denver, Colo., who is said to be making arrangements to work it on an extensive scale.

Yreka *Journal*: Work is progressing at the Commodore mine, near Yreka, both in getting out quartz and crushing.——W. N. Wilbur left last week to open up the Yellow Jacket quartz mine, on Barkhouse creek.——The Greenhorn Blue Gravel mine, is gaining a better supply of water since the late rain, and the returns from cleanups will be considerable more. Instead of wholly depending on pumping up bedrock water for sluicing, the company will now get a large quantity of water in the creek.——At Hawkinsville, the miners will have an opportunity of working their claims with success, as the free water supply is good this season.——The Spengler Bros., since the late storms, will begin work in their hydraulic claim soon.——The Jillson Roberts quartz mine at Henley is worked day and night.

Tuolumne.

Trouble is said to exist at the Rawhide mine over the control of the property. Ballard & Martin of San Francisco, who own two-thirds interest, have been at the mine for some days and, it is locally reported, have placed S. Sprout in charge of the property, to supercede W. H. Nevills in the management of affairs. The latter owns a third interest and has held the management of the property for nearly ten years. It is said that adverse legal proceedings will be instituted by him.——At the Santa Ysabel mine, near Quartz, the mill was started up on the 2nd inst. with plenty of water. The company has a large supply of ore on hand. No. 1 shaft is down within 39 feet of the 600-foot level. When the 600-foot depth has been reached drifting will be started north and south. No. 5 level is being driven to cut the Central ore chute.

Jamestown *Magnet*: The Rawhide mill was started up last week. The force at the Rawhide will be increased soon; 100 men will be put on.——At the Jumper mine at Stent an additional twenty stamps will be put in.——Operations at the App mine were resumed last week and the mill began dropping its stamps. It is expected that electric power will be used soon.——In the Longfellow mine at Big Oak Flat, at 280 feet, they struck a body of high-grade ore recently.——A strike of a good body of ore is reported in the Golden Rule mine at Stent.——At the Confidence mine they are sinking a winze from the bottom level. It is down 275 feet. The canvas plant, which began operations two weeks ago, is working with satisfactory results.

Sonora *Independent*: At the Bonanza mine, near Sonora, the water pipes are being repaired preliminary to reopening the mine.——The main tunnel of the Fox mine at Sawmill Flat has been retimbered and put in good order.——The Hudson & Calhoun mine is being worked and the chute which had been lost was found last week.——The Excelsior mine, in the Sugar Pine district, is being developed by the Standard G. M. & D. Co. of Bodie.——The O'Hara & Elsbree mine, Brown's Flat, is yielding specimens of gold averaging from a few ounces to a piece of solid gold weighing twenty-two ounces.——The Street mine at Tuttletown was started up this month. Twelve men are at work. There is a six-stamp mill on the property.——The Bown mine is working full capacity and has been for some time past. Grading is in progress for a

mill. A large force is employed.——It is locally reported that the Marryatt mine will resume operations.

Sonora *Democrat*: The Black Oak mine is running steadily under steam. In the mine they are stoping from the 800 level.——The Columbia Gravel & Expl. Co. discontinued the original boring at a depth of 220 feet, owing to the chipping of the hole's rim, after which the pipe could be driven no deeper. Forty feet of pay gravel had been passed, though bedrock was never reached. A new boring was started and is down over 60 feet.——Some good ore has been opened in the Standard, near Columbia, in a 6-foot vein. The Standard looks well, and, if developments result as satisfactory as those already made, the property will be equipped with a mill.

COLORADO.

BOULDER COUNTY.

The Puzzler mine, near Ward, has been started up by A. E & F. W. Hawes of Boston.——F. M. Leach recently bought for Pittsburg, Pa., people the Boulder County mine, near Cardinal, and a large tract of land adjacent to it. The deal also includes the Midget concentrating mill at Nederland, a plant of twenty-five stamps, the construction of which has recently been completed. The price was $250,000. The property has a tunnel and two shafts. Drifts aggregating 1000 feet are driven on the vein. A recent mill run on 300 tons of ore from the mine gave values of $16 a ton in gold. The mine was recently retimbered and is in good condition for further development. Mr. Leach's plans contemplate the construction of extensive tramways from prominent mines near Nederland to connect with the mill.

Boulder *News*: A strike has been made in the Village Belle mine at Boulder. The vein is from 3 to 5 feet wide with a streak of sylvanite ore from 1 to 3 inches wide that assays high in gold.——In the Helene W. on Mineral mountain a 3-foot vein of tellurium ore was broken into last week.——The Somerset has opened an ore body containing 9 feet of smelting ore.——The Mogul tunnel is in 850 feet whence one branch will be run to cut the Gold Coin, Virginia, Village Bell and Enterprise while the left branch will cut the Clara, Terror, Bonanza, B. & M. and Goldstone. All of these properties will be cut at a depth of 900 feet.——In the Maud W. a vein was opened that is over 6 feet wide and contains a 10-inch streak of tellurium and sylvanite ore.

CLEAR CREEK COUNTY.

Georgetown *Courier*: The Aliunda mine at Georgetown shipped seven tons of ore last week from the new strike in the 850 level. The ore is of good grade, milling 408 ounces in silver per ton and 12½ per cent lead.——Holbrook & Tipple opened up a streak of solid ore on the New Boston. They have been running on a 5-foot streak of concentrating ore that carries from 10 to 15 per cent lead.

Idaho Springs *Gazette*: The Anchor group, at Freeland, has become a steady shipper. The owners and ten leasers are working and all doing well. The last two shipments averaged $32 per ton.——The Diamond, at Freeland, produced last month some ore running $400 per ton.——Winters & Co. are making shipments of ore from the Bismarck that runs from 240 to 250 ounces of silver per ton.——J. Buxton is shipping 400-ounce ore from the Snow Drift mine, near Georgetown.

The Griffith mine is a heavy shipper, and all of the leasers are taking out pay ore. This mine was idle for years, but after the present management expended a few thousand dollars in opening up new ground, miners are paying as high as 75 per cent royalty.

EAGLE COUNTY.

Red Cliff *Times*: The Iron Mask mine, near Red Cliff, has shipped four cars of ore this month.——Arrangements have been completed for the starting up of the Raymond, under lease to Houston & Stonebraker. The mine has been idle a number of years. Work started this week.

EL PASO COUNTY.

The Independence mine at Victor, owned by W. A. Stratton, made a gross output since 1893 of $4,000,000, with a net profit of $2,000,000. The depth of the three-compartment shaft is 900 feet; length of drift, 29,711; length of winze and upraise, 2160. The Independence group contains 150 acres and much of the ground still remains unprospected. The hoisting plant consists of two 300 H. P. engines and a smaller hoist for the use of workmen timbering the shaft. Two air compressors furnish power for the drills and a private electrical plant thoroughly illuminates the buildings and workings of the mine. The pumping station at the 900 level is capable, under pressure, of raising 2000 gallons of water per minute, and at the 600-foot level there is a plant that can handle 900 gallons a minute.——The Hull City mine at Cripple Creek has paid the owners $700,000 in royalties and Jan. 1st reverted to the owners, a big mine.——A 20-ton shipment of ore graded from two to four ounces was sent from the Lafayette mine at Victor. Work began last week sinking another 100 feet. The shaft is down 600 feet.——F. Saunders, lessee on the Silver Tip, made a shipment of ore which gave values of $173 a ton and the second-class ore $73 a ton.——From its own shaft the Vindicator is producing over fifty tons a day and lessees are producing an additional fifty tons a day. There are seven shafts on the property from which pay ore is being shipped.——Du Bois & Carnell, operating the Wallace lease on the Vindicator, shipped last week one carload of screenings worth $40 a ton, and also a carload of mineral that will run five ounces a ton.——The Porcupine shipped one lot of five tons vanued at $473 per ton, another of 242 pounds valued at $326.40 per ton.——The Orpha May shipped one lot of 531 pounds valued at $763.20 per ton, another lot of five and one-half tons valued at $64.40 a ton.——The annual report of the Gold Coin Co. shows that the mine during the past year produced 31,833 tons and 430 pounds, with a gross value of $1,051,149.20. There was paid out $313,000 for freight and treatment charges and $130,000 in dividends. The cash on hand amounted to $336,000.——The Last Dollar was started up last week with fifty men. In about thirty days a larger force will be employed.——The C. C. & C. C. M. & L. Co. shipped about $6000 worth of ore during December.

The Pinto Leasing Co., at Victor, will maintain its production at 120 tons daily until the expiration of the lease in February.——Three carloads of ore were marketed from the Hoskins & Johnson lease on the Vindicator Co. this week, estimated to return $30 to $40 a ton.——The lessees on the Whisper shaft of the Gold Sovereign are working twenty-two men and are producing ten tons daily of an average grade of two ounces. At a depth of 175 feet a new vein 18 inches wide has been encountered that is all pay.——Another shipment of ore was sent from the Isabella mine last week. It consisted of fifty tons and is the richest that the Isabella has yet shipped, and will exceed the $65,000 which was the value of the preceding shipment.——The Simmons & Co. lease on the Zenobia marketed fifty tons of two-ounce ore last week and have another high-grade shipment ready for the smelters.——The new shaft on the Jack Pot, being sunk by the Creston Leasing Co., broke into the vein at a depth of 309 feet last week. The lease is employing ninety men this week, and expect to have fifty more miners on its payroll. Estimates have been asked for furnishing the mine with machine drills.——Daily shipments are made from the Abe Lincoln. The ore is marketed in two grades. Screenings carry about an ounce. Coarse rock has been averaging 1½ ounces.

The Finn Leasing Co. last week shipped from the Morning Glory No. 2 fifteen tons of ore estimated to run from five to eight ounces. The rich ore is coming from the 350-foot level where the vein is 2 feet.——The Elden Leasing Co. on the Republic will soon start heavy shipments of good average grade mineral. In the 900-foot level stoping has been started on a 2-foot vein of three-ounce ore, while on the 250-foot level a drift is being run on the vein, with 10 inches of ore, good for ten ounces.——Block 2 of the Vindicator, under lease, marketed a carload of two ounce ore receatly.——Hobbs, Morse & Co., leasing on the Wisconsin, made a shipment this week on which values run $300 a ton.

The first shipment since the big improvement made at the Lillie mine, Cripple Creek, went out last week. In consisted of fifty tons and there is between 300 and 400 tons yet in the bins.

The Wild Horse mine, at Victor, is shipping about twenty-five tons daily.

GILPIN COUNTY.

The Lotus mine near Central City is shipping 300 tons of ore to the Newton mill at Idaho Springs. Shipments of smelting ore were also made last week.

GUNNISON COUNTY.

The Bull Domingo group of mining claims, near Gunnison, was purchased last week by S. I. Hallett of Aspen for $50,000, of which $5000 was cash.

LAKE COUNTY.

The Catalpa M. Co., Leadville, is making heavy shipments of steel iron ore to South Chicago. The shaft is being sunk with two shifts while ore is being hoisted from the stopes eight hours a day.

The Silver M. Co. on their extensive sulphide mines near Leadville, worked through the Moyer shaft, announce definitely that the unwatering is entirely completed. At present the Gordon & Maxwell station pump is required to handle only 300 gallons of water per minute. The payroll carries ninety names and the average daily output is close to 150 tons. Considerable development is under way which has proven up large ore reserves of iron as well as zinc-lead sulphides. The gold values in this ore carry from one-fourth to one-half ounce in gold. The unwatering of the extensive workings in this combination has been done at the cost of $20,000.

MINERAL COUNTY.

Last week the ore shipments from Creede were 145 cars—2381 tons.

PARK COUNTY.

At Fairplay the Peerless Maud mine is producing silver-lead ore that averages $41 a ton.

ROUTT COUNTY.

At Columbine an English company known as the Golden Eagle Syndicate has leased a group of fifteen claims and development work is being done on two claims.——The Elkhorn, at Whisky Park, has lately started taking out ore which they are freighting to Rawlins, Wyoming, shipping thence by rail to Denver.

SAN JUAN COUNTY.

The output from the Upper Aspen mine, at Silverton, is four carloads a month.——The Shenandoah is still shipping a carload of high grade ore every ten days.

SAN MIGUEL COUNTY.

At Saw Pit the Nancy Hanks is shipping four to five cars a week to the smelters.

San Miguel *Examiner*: In the Smuggler-Union mill at Telluride a continuous record of 200 tons a day will be achieved throughout the year. It is given out that the gold strike made last summer in the mine brought the company $300,000. According to the estimated amount at the time, 3000 pounds, this shows that the ore brought $100 a pound.——Owing to the large amount of ore accumulated in the drifts at the Silver Pick that mine has been compelled to lessen its working force by twenty-five men. The mill had to be closed about the first of December on account of the scarcity of water and it will be impossible to put it in operation again until spring. About forty carloads of the best ore have been shipped to smelters since that time, but as the cost of transportation is large it is only a high grade ore that will stand shipment, consequently the ore has accumulated at the mine to an extent to almost stop production. The greatest problem the company has confronting it is milling capacity, and an addition to the mill is being planned.

SUMMIT COUNTY.

At Frisco the Victoria mine is mining four cars of gold ore a week.

IDAHO.

The Twin Sisters mine, near Centerville, has been secured by Pittsburg people interested in the Trade Dollar at Silver City. The new management is working a number of men. It is the intention to explore the property during the winter, and if it proves as good as it now indicates, a large mill will be erected. There is a 5-stamp mill on the property.

Three lots of ore from the Cœsus mine near Hailey, weighing 2000 pounds, were shipped to Boston, to the Massachusetts Institute of Technology, to be analyzed and tested by the various processes of reduction as adapted to that class of ores, upon the result of which depends the erection of a reduction plant.

The ledge on the Big Buffalo is said to be 40 feet wide and 30 feet of it will average $30 per ton, while 10 feet will go $60. A mill test of the ore taken from a 10-foot hole sunk about the center of the ledge made at the Banner mill in Florence plated $20 per ton in gold. The concentrates were shipped to Tacoma and the return was $2747 in gold and sixty ounces silver per ton.——At Murray seventeen property transfers were placed on the county records last week. Of these six were for the nominal consideration of $1 each, but the total of the seventeen was $16,625.87. The Cœur d'Alenes are so well covered with old surface locations that there has been little room for the tunnel site man to get in his work, and claims of that nature are seldom recorded.——R. H. Britt, Mgr. Poorman mine at Silver City, says the outlook for the Poorman is brighter than it has been for years, and will soon again be a steady producer. The mine has been thoroughly developed. At a depth of 900 feet, 250 feet below the old workings, a vein 4 to 5 feet wide was encountered. From this 450 tons of high-grade free milling ore was extracted and milled last year while the development proceeded.

Near Gibbonsville, leasers on one of the claims of the A. D. and M. group, after doing several months' dead work crosscutting and drifting for a lost ore chute that had been cut by a fault, cut into the ore body last week and made a good strike. The ore was 3 feet thick.——The Springfield Gold & Copper M. Co., at Wallace, let a contract last week to run a tunnel 200 feet on their Stevens Peak property.

MONTANA.

The strike at the converters in Anaconda has been declared off, the strikers giving up the fight as hopeless. About 300 men are out of employment with no chance of getting back. The converters are running full blast again. Applications for work have come thick and fast—about five men for every job.

The Hope shaft at Basin has reached a depth of 40 feet below the 500 level.

It now seems certain that all grades of ore can be profitably worked in the Mussigbrod mill at Garnet and the probabilities are that the mill will be enlarged and run on custom ore.——The water has been pumped out of the Martha W. mine at Winston and eight men are developing it.——The Bear Gulch M. Co., near Livingston, is pushing the work of placing their new turbine wheels, and soon the company's 20-stamp mill will be in operation.

Philipsburg *Call*: It is locally reported that additional men will be put to work in the Bimetallic mine, near Granite, on the 15th inst., and information from a reliable source is at hand that a general resumption of the Granite and Bimetallic mines will occur about that time. The Bimetallic mill will be run to its full capacity and the present force of miners doubled. Both mines will be turning out ore and bullion shipments will again be resumed. The tunnel connecting the Granite mine with the Bimetallic at the 1400-foot level is nearly completed, and as soon as the water is pumped from the Granite to that depth the connection will be made. Both mines will be operated, and the ore is to be hoisted through the Bimetallic shaft. It is stated that there will be no cessation of operations as long as the ore bodies in the mines hold out.

Clancy *Miner*: In Montana mines—copper, gold and silver—the highest grade of activity was manifested in '98. At the close of '97 nearly all of the mines in which silver is the major value were closed down. No additional mines closed during the year, and some have again begun operations. Nearly all of the silver produced was a by-product of either copper or lead, while much of the gold was likewise a by-product of the copper.——In the 250-foot level of the B. & G. mine, in addition to the ore of a shipping character, there are quantities of good concentrating ore—about 4 into 1. This may lead to the building of a concentrator of 100 tons daily capacity. The output of the B. & G. is treated at the East Helena smelter, where they have obtained a rate on the basis of $10 per ton.——The Mocking Bird mine has disclosed a vein of from 4 to 15 feet in width. Only the rich pay streaks in the vein matter are sorted and shipped.——The shaft on the Madisonian mine of Madison county, of which J. H. Conrad of Salt Lake City is the principal owner, is to be put to a depth of 300 feet.

NEVADA.

The Dexter of Tuscarora shipped last week a gold bar that weighed in at $3000. Recently the full battery of forty stamps began dropping and the next cleanup will be of greater value.

At the Con. Cal. & Virginia, the Comstock Pumping Association, worked in the C. & C. shaft the past week. The hydraulic pipe of the old rope-transmission system has been secured from the surface to the 1500 station. A station below the 1650 level has been cleaned out and a tank is about to be placed in position to receive all the water that has been caught up at different points in the mine, and conveyed through pipes and boxes to the Sutro tunnel drain from the 1650 level. The tank will be substituted for the boxes on the level and iron pipes for a wooden box that is now in the shaft. The 1750 station is being remodeled. Heavy foundations are being provided to receive the 1500 feet of hydraulic pipe that is now on the ground, to form part of the pumping system about to be installed by the Risdon Iron & Locomotive Works.

The railroad from the Adelaide copper mines in Humboldt county to the reduction works at Golconda is completed.——A good strike has been made in No. 3 tunnel on the Murphy-Curieux group of mines in Bull Run basin, Elko county. The ledge is 4 feet in width.

J. A. Blossom has been shipping several carloads of high-grade ore to Salt Lake City from his Kennedy group of gold mines in Humboldt county.——The Glasgow & Western Co. is placing a steam hoist plant at their mine near Battle Mountain.

The Wells *Herald* hears that the Glasgow Co. during '99 will build a railroad from Wells to Cherry Creek.

Austin *Reveille*: J. Johnston has leased the Wilson mine in Galena canyon and put men at work extricating ore.——J. Mellendar of Galena is making a carload to be shipped to Salt Lake.——The Glasgow & Western Expl. Co., which operates the Mammoth Adelaide copper mines near Golconda, are also interested at Copper canyon, near Battle mountain. A large hoisting engine has been placed and the number of miners will be increased.——W. H. Dean in his mines at Dean intends starting the Burleigh drills the 15th inst.——J. A. Blossom has been shipping several carloads of high-grade ore to Salt Lake City from his Kennedy group of mines.

Carson *Appeal*: Senator Wasson and J. Chatovich have returned from New York, where they have been in the interests of the Silver Peak M. Co., operating in Esmeralda county. The company has finished litigation over mineral ground, mill sites and water claims and won the case. Wasson has been Supt. of the mines for a number of years, and some time ago ran a tunnel into the big ledge, uncovering a large ore body. As soon as the company heard of the strike, the mine was taken off the market and will be operated by the company.

NEW MEXICO.

The output of the mines of Hillsboro for '98 was 10,840 tons of ore, which produced 17,361 ounces of gold, 52,858 ounces of silver and 117 tons of copper. The total value was $404,916. The average value of the ore is estimated at $34.86 per ton. The increase in the output of ore is 1500 tons above that of '97.——The net profits of the Snake group, owned by H. M. Porter of Denver were $37,000.——Sinking was begun on the Thayer shaft near Pinos Altos last week. It is now 500 feet and it is to be sunk 100 feet more and drifts are to be run north and south on the vein.

Santa Fe *New Mexican*: The Confidence M. Co. of Elizabethtown are increasing the mill's capacity to fifty tons daily.——The Blue Bandana shaft near Elizabethtown is down over 200 feet and in good quartz.——At Socorro a 150-ton concentration plant for the Timber Peak Co. is being built. The mill will be ready in three weeks.——At Pinos Altos the Hearst estate is increasing its local mining capacity to 200 tons per day.——R. C. Wilson of Cripple Creek and Teller of Denver, with Chicago capitalists, have secured a bond on the new Aztec discovery and will operate the same. The discovery is a 12-foot vein carrying $12 to $60 ore in gold. Twenty stamps are already at work on the ore and twenty more will be started soon.——Baron Van Zulen sold one of his Aztec properties to Colorado people for $10,000, one-half being cash.——The New Moon mine at Elizabethtown yields $60 per ton in gold and $2.20 in silver from a 3-foot vein.——Since the La Huerta grant, located in Santa Fe and Bernalillo counties, has been thrown open to the public mining operations have begun there, and ore is being hauled nine miles and then carried thirty miles by rail to the smelter.

OREGON.

Near Hillsboro, while ditching on his beaver dam, G. Robinson struck a gold-bearing quartz ledge, which assays $42 to the ton. The ledge is between 2 and 3 feet in width.

The concentrates and ore shipped from Sumpter to Baker City for December were 387,493 pounds, and the shipments for the six months ending Dec. 31st, '98, were 2,840,957 pounds.

Baker City *Democrat*: On the Deer Lodge mine, near Baker City, recently purchased by the Rock Springs M. Co., a large mill plant will be erected the coming season.——The May Queen mine will erect a mill plant at once.——In the Collateral mine the upraise is nearing the surface, and, when completed, a large force will be employed and the Virtue mine started for a long run.——A 10-stamp mill is being built on the Prairie Diggings mine, near Canyon City.——A single blast in the Bonanza mine last week, at a depth of 500 feet, through eight holes made with Burleigh drills, brought down about thirty tons of ore and waste. Twenty tons of this ore contained $63,000 worth of gold, almost all of which was free gold. The ledge in this place is 3 feet wide, and the value of the ore knocked down in a single shot is said to be the biggest ever recorded in Oregon.

Baker City *Republican*: The Virtue Con. mines last week shipped $8500 from a recent cleanup.

Jacksonville *Times*: Piping was resumed at the Sterling mine, near Jacksonville, last week, with a good supply of water.——The Black Channel mine, in Foots creek district, is being operated by M. Lee, who has leased the property.——Kitchen & Huggins have leased the Miller mine, in Farmer's Flat dis-

trict, and have everything in readiness for a big run.——At the Shorty Hope mine, in Wagner creek district, operations on a large scale have begun.——Beekman & Huffer have put a small force to work in Shively gulch district.——Near Roseburg, thirty-five men are employed at the Gold Bug mine, in Mt. Reuben district, and a twelve-days' run with a 5-stamp mill produced $3700. —J. Behrman, Mgr. Black Butte Quicksilver M. Co., in Lane county, says that statements that the mine has shipped $90,000 worth of quicksilver are misleading. They are getting the mine into shape. The sum of $75,000 has been expended on roads, bridges and other improvements. Next spring the mine will begin shipping.

Grant's Pass *Journal*: The Black channel mine near Grant's Pass has a force of men getting ready for the winter work.——F. R. Wardle has a force at work on the Houston property, which his company recently bought. ——The Eureka mine has plenty of water, good rock, and mill and concentrator at work day and night. —J. D. McMahon and some Portland people have bought the Bliss mine near Gold Hill, named it the St. Lawrence, and have begun work.

SOUTH DAKOTA.

The Crown Hill M. Co. at Crown Hill has an ore vein 4 feet wide at the 100-foot level, and at the 150 level it fills the shaft. The ore carries an average of 30 per cent lead and fifteen ounces of silver. Streaks are occasionally found where the ore will run forty ounces of silver and 50 and 60 per cent lead. The company has been shipping ore for some time; a carload was shipped last week. The company has also been concentrating ore. It is concentrated to five to one and then carries values of $60 a ton.

UTAH.

At the Four Aces mine at Silver City raising of high-grade silver and lead ore has resumed. The new machinery is working well and in a short time the output will increase to a carload a day.——The Sunshine mine at Sunshine has found new ore in new workings.——Another shipment of gold dust was made this week from the Golden Gate at Mercur.——The saltpeter company, owner of the saltpeter deposits near Salt Lake City, has decided to put its material into commercial form.

Last week's shipments from Tintic were seventy-one cars of ore and four bars of bullion.——The sinking of the shaft on the Swansea at Silver City to a depth of 950 feet will be pushed; the lowest level at present is 750 feet.——The Red Wing of Bingham shipped recently two carloads of concentrates and a consignment of crude ore. The latter yielded 4 per cent copper, 48 per cent lead, 20 ounces silver and $1 gold.——At Lehi W. F. Butts has tied up the Sir Victor group on an option for $50,000 for eighteen months.——The South Daisy, West Dip, will begin the erection of a mill as soon as the weather is settled. The vein has been extensively prospected and assays show a satisfactory milling average.——The Massachusetts M. Co. at Park City will sink a new shaft as soon as the snow is gone. In the meantime developments will continue in the old workings, where there is a streak of 18 inches that goes 63 per cent lead, 14 ounces silver and $1 65 in gold.——On the property of the Bingham Copper & Gold M. Co. at Bingham the force will be increased as rapidly as room is made for it.

The Ajax at Mammoth made a strike in the 600-foot level that shows 17½ per cent copper in addition to silver and some gold. In the meantime another lot of high-grade copper and gold ore is being raised and exploratory work is being prospected.

At Price the first of the teams arrived last week with copper ore from the Dyer mine near Vernal. About sixty teams are on the road with ore from the Dyer mine, and about three carloads will be loaded from this property each month. Considerable gilsonite will be brought in the coming month.——In the Old Jordon & Galena at Bingham has been found a wall of galena 35 feet in length; assays show an average of 40 per cent lead, fifteen ounces silver and $3 in gold; its value is appoximated at $250,000.——Returns from the recent shipment of Geyser-Marion gold dust show a valuation of $8300.— At Bingham will be built a large concentrator for use of the Highland Boy and Boston Con. M. Companies. In the development of the "smelting classes" in these properties is exposed a volume of milling ore containing gold, copper and silver. Experiments have satisfied the management that these ores may be more marketed in the form of a concentrate, showing 30 per cent in copper, $10 in gold and twenty ounces in silver.——In the Chloride Point mine at Mercur the disclosure of new ore bodies was made in eight different places in new ground, from which returns show thirteen ounces silver and $2 in gold to 327 ounces silver and $4 in gold. The chute shows 3 feet of mineral.

The Mercur *Mercury* is informed that the Geyser-Marion mine at Mercur will soon enlarge the mill to a capacity of 200 tons.——The new incline at the Mercur has reached a depth of about 200 feet and has cut the third ore vein. The ore carries good values. The Mercur made a last shipment of cyanides last week that consisted of 1600 pounds, the result of two weeks' run.——The Geyser-Marion annual report showed receipts of $131,295 88, representing the net proceeds of 37,315 tons of ore treated. The average saving was $3.51 per ton, the cost of mining $1.43, of milling 70 cents and the net profit $1.38. The company paid $33,000 in dividends during the year bringing the total up to $96,000. The mill is treating 150 tons per day.

Eureka *Miner*: The shaft in the Mollie Gibson at Eureka is going down in a 4-foot vein of silver ore of from seventeen to twenty-five ounces and also carries a small value in gold. The company accepted an offer from the Connecticut Reduction Works which will net them for this ore $10 per ton on the dump.——High-grade copper ore was encountered on the 600 level of the Ajax mine last week that will yield a shipping value of $60 a ton, nearly all of which is in copper.

Park *Record*: The shipments of ore from Park City last week were 1,469,730 pounds. ——In the Daly-West Co., all matters relating to the adjustment of the internal affairs of the company are said to have been straightened out and the opening of work should occur the next two weeks.

WASHINGTON.

(Special Correspondence). — Sonneman & Branscombe of Spokane, Wash., have just closed the sale of a fourth interest in the Cumberland mine, Silver City, Idaho, to S. E. Smith and associatss of Kenosha, Wis., for $50,000. The selling parties hold a bond on the Cumberland. It is the intention to erect a large combination mill on the property.

Spokane, Wash., Jan. 16th, '99.

The Republic Big Six is in 200 feet, the face being in porphyry, with seams of quartz They are making 3 feet per day.——The Blue Bird has run a surface cut 20 feet across the ledge, and obtained assays as high as $16.17. ——At the Republic the values hold out well. When the machinery is in place the mine will be run at full capacity.——A 300-foot tunnel is being run on the Caliph.——The Golden Lily tunnel is being pushed night and day.—— Work will be started immediately on the Anaconda.——The Golden Leaf tunnel is in 315 feet. Considerable quartz is coming in.

At Republic the Ben Hur struck a ledge that assays from $17.96 to $37.67.

At Boundary a contract has been let by the Red Top M. Co. to drive a tunnel 250 feet. Work will begin at once.——At Fish creek, galena and chloride ore have been found in the Gladstone group of claims. F. A. Heinze is interested in these claims.

Last Wednesday W. C. Butler of Everett gave a receiver's deed of all the property of the Pride of the Mountains and the Monte Cristo Mining Companies to J. B. Crooker, John D. Rockefeller's representative. The purchase price of the Pride of the Mountains as stated in the deed is $167,501.95, and the Monte Cristo Mining Co. $160,569 98.

At Republic the Lost Lode has been developed by a 300-foot tunnel that cuts the ledge at a depth of 102 feet. There is also a raise of 100 feet.——The First Thought has upward of 300 feet of tunnel. Work will be shortly resumed on it.——The Princess Maud tunnel is in 305 feet and there is a shaft down 102 feet. There is 5 feet of $35 ore in the bottom of the shaft.——The Republic mine continues to ship its high-grade ore. Work is progressing in the development of the property. The drift being run from the lowest tunnel toward the Jim Blaine end line is in 270 feet and shows ore averaging $45 across the face of the drift.

Near Republic, in the Lorna Doon claim in Cody Camp, the assay values run $10.80, $16 10 and $19. The ledge is 35 feet in width, so far as known. The entire ledge averages $8 per ton. It is free milling rock.——In the King Solomon and Daisy claims on Myers creek, on the reservation, a 2-foot vein of good ore has been struck.

Spokane *Electrician*: Capt. Buchanan, Mgr. Ferguson group of mines near Chelan, states that his company will run a tunnel this year, a mile in length. The Ferguson group comprises sixteen veins of silver, lead and copper bearing ores, which will be cut by the proposed tunnel.——Of the mines near Loomis, the Palmer Mountain has some 1400 feet of tunnel. The company is operating two power drills, and 125 feet per month is being made. Several ledges have been cut.——The Double Standard G. M. Co., near Northport, has again resumed work. The company has also secured the Minneapolis and Stockholm claims.——Near Chelan, development work is being pushed on the Eureka group of mines. Four ledges have been discovered on the Little Jim and Dolly claims, one of which is 18 feet wide.

WYOMING.

Near Rawlins an average of sixty tons—two carloads—a week of high-grade copper ore is being shipped from the Rudefeha mine. The returns from a car shipped recently were $1195. On this basis the weekly output of the mine exceeds $2000. This is not counting the low-grade ore being accumulated on the dump, which will not pay to ship under present conditions.——The Rocky Mountain C. & I. Co. turned out about 160,000 tons of coal in '98. The mines—Nos. 5 and 6—at Almy were operated 269 days with an average of 224 men.——At South Pass the new 10-stamp mill and concentrator at the Carissa mine have started. There is about $200,000 worth of ore on the dump and blocked out in the mine. The ore plates $40 a ton under free amalgamation treatment.——J. J. Merriam is developing his mines on Smith's gulch. He will move his mill from South Pass in the spring.

FOREIGN.

BRITISH COLUMBIA.

There were recorded in Victoria during '98 1505 mineral claims.

The custom house valuation of the minerals exported through the port of Kaslo during '98 amounted to $2,550,669. The tonnage is given as 32,038 tons.

At Rossland work at the Le Roi is being pushed to place it again among the list of shippers. The Center Star is in a similar position and the War Eagle will be sending out from 250 to 300 tons of ore daily after the first of February, when the new electrical machinery will be in operation. The Virginia is nearing the 500-foot level. The Iron Mask is meeting with success in the development of the ore body. The Coxey is producing good ore. The Giant is again being worked after a short shutdown and the Sunset No. 2 has opened a vein at a depth of 450 feet. The Mascot's new electric plant is in operation and the Iron Mask's will be in two weeks.

Near Nelson the Granite and Royal Canadian groups are being operated on a large scale by the Duncan syndicate. The Granite group consists of six claims. The development consists of a shaft 140 feet; 400 tons of ore averaging $37 a ton has been taken out while sinking the shaft. A drift has been driven 200 feet and shows a continuous body of ore, assays from which run from $60 to $100 to the ton. A second level at a depth of 130 feet has been started and a drill has been installed to sink the shaft. The Royal Canadian group consists of 130 acres in extent. From this property several hundred tons of ore averaging $27 to the ton have been taken out. There is no dead work to be done, neither will there be any necessity for hoisting or pumping for years. The ore on both properties is a free milling quartz and it is estimated that the concentrates will average from $75 to $90 a ton. Forty-five men are employed since April, but in the spring the force will probably be trebled.——The Jo Jo, Rossland, is producing good ore, assays returning $5 in gold and 4 93 per cent copper, a total value of $17 81.

The ore shipments from Sandon for the week ending Jan. 5 were 180 tons, and from McGuigan for the month of December 195 tons.——Rosebery is to have sampling works with a daily capacity of 100 tons.

In the Boundary country, a stamp mill is to be erected at Long Lake to treat the ores of the Anchor, Jewell and Enterprise mines.—— The Fontenoy, in Camp McKinney, has been bonded to J. F. Reddy and associates for $20,000, ten per cent being cash.——The shaft on the Mother Lode, near Greenwood, is down 183 feet, all in ore running from $25 to $60.—— The Magnolia and the Copperopolis in Copper Camp have been sold to a company represented by H. Brelich. Both properties have ledges of high-grade copper ore and development has already begun. The price was $40,000.——The Big Copper was sold to G. B. McAuley last week for $50,000 cash.——The Sitting Bull and Mary G. groups, near Windermere, have been bonded to R. R. Bruce for $30,000. The Red Lion group has been bonded to T. Starboard for $50,000. The Alice has been bonded for $5000 to R. R. Bruce.

LOWER CALIFORNIA.

In the Aurora gold mine at Alamo, which had been abandoned a few years ago, Maj. Russell recently resumed sinking from 213 to 250 feet, getting through the dike and finding more of the rich rock produced some years ago.——In the Viznaga mine near Alamo Hartzell & Davis have sunk the shaft 300 feet where good ore is being taken out.

At Agua Dulce the Fortuna M. Co. will at once resume work. The first to be done after overhauling the mill will be to unwater the Teresa mine. Until this is done the stamp mill will be operated with custom work, as there is considerable ore on the dumps at other mines in the district. The company has expended about $100,000 at this camp and has one of the most thoroughly equipped properties in Lower California. Day and night shifts will be put on until the mines are free from water, and then the force will be increased.

MEXICO.

At Bacoachi work has been resumed in the mines and mill of the Sierra Oro M. Co.—— On the 28th ult., Wells, Fargo & Co. shipped to the mint at Culiacan $8000 in silver bars to be converted into coin.——Latz & Bro. of Magdalena are erecting a 5-stamp mill upon their Francisco mine, near Llano station. This mine, which has a small but rich ledge of free milling gold ore, has always paid well by working its ores by the arrastra process.

Under the concession lately obtained by S. Camacho, reduction works of a daily capacity of 300 tons will be erected in Lerdo. An exemption from taxes for twenty years is granted in the concession.——The old San Jose mine near Suaqui Grande, Chihuaha, is being again worked.——A deposit of tin is said to have been discovered near San Miguel Allende and is being explored. —— The old silver and antimony mine, Los Yaquis, near Santa Ana, has been redenounced as the Cyrus.

Another consignment of high grade ore was recently made from leased ground on Harper's Dos Cabezes lead, near Casas Grandes. High grade ore has recently been taken out at Dos Cabezes by other leasers, and awaits pack animals and teams to transport it to the Sierra Madre railway.——The Providence mine, belonging to the St. Louis United Copper M. Co., is working ten men and began development work recently on a vein of copper 34 feet wide and is taking out ore.——The Congress mine, owned by the Candelaria M. Co., has over thirty miles of tunnels and is producing carbonate of lead ore, which carries both gold and silver. The Mexicans abandoned the mine because they had too far to pack the ore.

Two Republics: In the old Sabinal district, on the Sierra Madre railway, the Santo Domingo mine of the Corralitos Co. is shipping from 900 to 1100 tons of ore per month.——The opening of the railroad from Jiminez to Parral is aiding the mines in that camp. Hitherto the expenses of transportation have been too heavy for any but the best ores to be shipped, but now lower grade ores can be sold at a profit.——The Bismarck mine of the Corralitos Co. is shipping from 125 to 150 tons of ore per month, which is hauled by teams eight miles from the mine to the railway station. The Australia mine is also in good smelting ore. ——The San Pedro mines of the Corralitos Co. are shippers of high-grade smelting ores. On account of the steady increase in the output of the company's own mines and the demand made upon it by other mines tributary to the Sierra Madre railway, the Juarez smelter is being enlarged.——A. J. King of the Cinco de Mayo mine in Pilares district, Sonora, is shipping rich ore.——The gold mine of Kraft & Anderson, near Chihuahua, is one of the heavy shippers. The ore goes to the reduction works at the rate of 100 tons per day.

THE KLONDIKE.

Commissioner Ogilvie is reported to have made a recommendation to the Canadian Government that the 10 per cent royalty now collected on the gold output of the Yukon be reduced to 2½ per cent.

Commercial Paragraphs.

THE Lacy Mfg. Co. of Los Angeles, Cal., have the contract for making and laying the pressure pipe line for the hydraulic installation for the Mt. Whitney Power Co., Visalia, Cal. This line consists of 3300 feet of 20 and 24-inch pipe with a fall of 1300 feet. The heaviest pipe is one-half inch thick and total weight will be about 200,000 pounds.

THE advance in the field of electrical machinery the past five years has been stupendous. It is not reflected in the gross earnings of the electric companies because prices are so low. It is only a few years ago that the Westinghouse Electric Co. built the first 5000 H. P. generator. This was for the Niagara Falls power plant. Recently a Westinghouse man declared: "We are selling 5000 H. P. generators by the dozen;" and it was literally true. Including those already delivered to the Niagara Falls Power Co., the Westinghouse Co. has on its books orders for forty-five electric generators, each of 5000 H. P. capacity. Ten of these are for the Niagara Falls Power Co., sixteen for the Third Avenue R. R. Co. in New York City and fifteen for the St. Lawrence Water Power Co. The work at Niagara Falls seemed stupendous a few months ago—the harnessing of a section of this vast water power to drive ten 5000 H. P. generators for the transmission of power—but the thirty-five other 5000 H. P. generators now on the Westinghouse Electric Co.'s books will require to drive them water power or steam machinery to the aggregate amount of 175,000 H. P.

TEN years ago electrical energy was invariably supplied at a fixed rate per month for each installation without much regard to the amount actually furnished. To-day electric stations in this country supply on a meter basis the electricity they manufacture with resultant advantage to the station economy. Some idea of the extent to which the meter business in this country has grown may be gathered from the fact that not less than 200,000 Thomson recording watt meters alone have been manufactured and sold by the General Electric Co. The business has grown from small beginnings by the persistent missionary work which has been carried on by this company through both agents and literature. The latest addition to the meter literature issued from the General Electric press is "Thomson Recording Watt Meters" a handsomely printed and illustrated brochure in a rich cover, dealing with the different types of these recording energy meters, which the General Electric Co. manufacture, their uses and their advantages. Each type of meter is clearly described and so illustrated that its construction can readily understood. Full instructions are given for the care, connection and reading of these meters. The pamphlet should be found in the library of every electric light and power station, and will be sent on application made to the Schenectady office of the General Electric Co.

Recently Declared Mining Dividends.

Montana Ore Purchasing Co., quarterly dividend $1 per share; Jan. 20.

Grass Valley Exploration Co., a new corporation, owning the W. Y. O. D. mine, as well as an extensive group of mines in the Grass Valley mining district, has declared dividend No. 1 of 25 cents per share; Jan. 20. The directors are the Grass Valley bankers, Messrs. Joseph and Jacob Weissbein, and J. R. K. Nuttall, Louis B. Parrott, W. S. Keyes, of San Francisco. Thomas H. Simmonds is Supt. of the mines and works of the company.

Vindicator, Colorado, 5 cents per share, $50,750; Jan. 20.

Alaska Mexican G. M. Co., Alaska, 10 cents per share, $18,000; payable Jan. 28.

Alaska Treadwell G. M. Co., Alaska, 37½ cents per share, $75,000; payable Jan. 28.

Republic, Washington, 3 cents per share, $30,000; Jan. 10.

Morning Star, California, $4 per share, $9600; payable immediately.

Strong, Colorado, $20,000; payable Jan. 25.

Golden Cycle, Colorado, $5000; payable Jan. 25.

Montana O. P. Co., Montana, $80,000; Jan. 20.

Silver King, Utah, $50,000; payable Jan. 25.

Mercur, Utah, $25,000; payable Jan. 25.

Recent Mining Incorporations.

Algol Copper M. Co., San Francisco; capital stock, $100,000; subscribed, $50; C. H. Kingsley, F. Maguire, A. Williams, H. L. Mason, W. Stadtfield.

Moosehead M. Co., San Francisco; capital stock, $5000; subscribed, $60; W. McDonald, J. H. Dickinson, D. F. Baxter, C. R. Bronne, G. Cameron.

Kenai M. & M. Co., Oakland, Cal.; capital stock, $250,000; subscribed, $25,000; O. Morse, B. F. Brown, D. J. Brohr, A. S. Lasee, R. E. Ryan.

Otter M. & M. Co., San Francisco; capita stock, $500,000; subscribed, $25; J. J. Myers, A. B. Bennison, R. N. Graves, A. Cerf, H. W. Mathews.

Industrial Notes.

—Washington State produced $45,000,000 in '98.

—The receipts at the Manila custom house average $20,000 a day in gold.

—Four vessels recently brought $750,000 worth of whale products to San Francisco.

—American authorities at Hawaii have given permission to bring 6000 more Japanese laborers into the islands.

—The Hayward interest in the Coalinga Co. of Fresno, Cal., has been sold to Rawlings & Richardson, being a half-interest, for $121,500.

—Tulare lake, Cal., once the largest body of fresh water wholly within the United States, but which was dry last season, was sown to wheat this winter.

—Lewiston, Idaho, and Huntington, Or., are to be connected by a direct railroad along the Snake river, as it is proposed to build 330 miles of railroad by the O. R. & N. Co.

—The Santa Fe Railroad Co. has contracted for 160,000 tons of new steel rails at a cost of nearly $3,000,000, of the 72-pound class. They will be laid during '99.

—All the Columbia river salmon canneries in Oregon and Washington have combined—twenty-three in number; the capital stock of the trust is $2,000,000, understood to represent $4,000,000.

—In San Francisco the committee to devise methods of raising funds for the proposed Pacific coast exposition to be held in 1901 desires to raise a fund of $1,000,000 and to invoke State and national aid.

—The Pacific coast borax interests, the English Borax Co. and the Societe Lyonnaise of France have combined the business of producing borax and boracic acid. The capital stock of the trust is $7,000,000.

—The Great Northern railroad is credited with intention to operate its trains through the Cascade, Wash., tunnel by electricity, and also the entire distance—sixty-five miles—from Leavenworth to Skykomish.

—On Feb. 10th the sheriff will sell the property of the Tacoma, Wash., Land Co., valued at $3,000,000, consisting of the unsold portion of the Tacoma townsite, together with the docks, warehouse and unplatted acreage. During the "boom" days the company's assets were reckoned at nearly $10,000,000.

—The Redwood & Railroad Co., capitalized for $2,500,000 under the laws of Oregon, has acquired 20,000 acres of redwood timber land in Humboldt county, Cal., with twenty-five miles of railroad property, docks, mills, etc., and proposes to buy steamships, build additional mills, etc., to compass the annual manufacture of 50,000 M. feet of redwood lumber and 75,000 M. shingles.

—The U. S. Postoffice Department has contracted with the Pacific Steam Whaling Co., with offices at San Francisco, for mail service along the southern Alaska coast from Sitka to Unalaska, including all intermediate points. The distance is 1600 miles; every point in that stretch will now have a monthly service during the entire year.

—The Southern Pacific Co. for '99 has ordered fifty-one new locomotives, six to be consolidated freight engines. Each of the latter will weigh ninety-eight tons by itself and about 150 tons with its tender. An average freight engine weighs sixty-five tons; 3300 new freight cars have also been ordered. The company's new steel bridge over the Colorado river at Yuma will be finished April 1st.

—The market which the Philippines and the countries commercially adjacent to them offer to American manufacturers and producers is shown in a series of tables presented by the U. S. Bureau of Statistics. These tables exhibit the imports by articles, both quantities and values, into China, Japan, British India, Australasia, Siam, Corea, Dutch East Indies, French East Indies, the Philippine Islands and Hawaii, in each year during the past decade; also the proportion which each of the leading countries has had of the imports into those countries during the decade. A hundred million dollars' worth of goods go every month into the markets of these countries, whose great ports and business centers are, in most cases, located as near to Manila as Havana is to the city of New York. Their population is more than 800,000,000 and their total imports more than $1,000,000,000 every year, and rapidly increasing. The imports into China in 1886 were $108,000,000; in 1896 they were $171,000,000. The imports into Japan in 1886 were $30,000,000; in 1896, $100,000,000. Imports into British India in 1886 were a little over $100,000,000; in 1896, nearly $150,000,000. Australasia shows imports of over $300,000,000, though this includes the imports of each colony from the other colonies, as well as from the other parts of the world. To the individual producer or manufacturer who desires to determine whether a market is to be found in the Orient for his products these tables will supply detailed information. The following table shows the importation into China of the principal articles in 1886 and 1896, thus indicating the growth of her importations during that period. The values are stated in Haikwan taels, and in determining the increase the fact should be borne in mind that the Haikwan tael, which on Jan. 1, 1888, was valued at $1.15, was on Jan. 1, 1896, valued at $0.81; and that while the figures of the total importations show an apparent increase of more than 100 per cent the actual increase is something less, because of the depreciation of the tael, whose value fluctuates with the price of silver:

IMPORTS INTO CHINA.

	1886. *Haikwan taels.*	1896. *Haikwan taels.*
Coal	1,799,000	3,354,000
Cotton, raw	826,000	1,308,000
Cotton yarn and other	7,869,000	32,010,000
Gray shirtings	7,011,000	12,328,000
Shirtings, other	3,260,000	7,983,000
Other cotton manufactures	10,910,000	26,932,000
Total cotton manufactures	29,050,000	79,243,000
Ginseng	583,000	1,620,000
Machinery	181,000	2,084,000
Matches	805,000	2,100,000
Iron and manufactures	1,758,000	3,808,000
Tin and tinplates	1,311,000	2,357,000
Metals of all kinds	5,349,000	9,759,000
Kerosene oil	2,211,000	8,156,000
Rice	920,000	15,022,000
Sugar	542,000	7,002,000
Timber	695,000	1,182,000
Wool manufactures	5,636,000	5,363,000
Flour (pounds)	88,533,000	230,800,000
Total value of imports	87,479,000	202,590,000

The following table shows the value of the principal articles imported into Japan in 1886 and 1896, stated in the yen, the value of which in 1886 was 81c and in 1896 53c:

IMPORTS INTO JAPAN.

	1886. *Yen.*	1896. *Yen.*
Corn and flour	198,000	10,352,000
Sugar	5,640,000	13,854,000
Cotton, raw	695,000	22,573,000
Iron and steel	288 000	1,636,000
Cotton yarn	5,913,000	11,545,000
Woolen yarn	61,000	1,115,000
Iron, wrought or partly	1,357,000	12,104,000
Cotton tissues	2,295,000	11,636,000
Woolen tissues	2,234,000	14,276,000
Scientific instruments	914,000	10,622,000
Drugs and medicines	972,000	4,303,000
Petroleum	2,358 000	6,331,000
Value of total imports	37,568,000	179,820,000

Personal.

E. T. HALE succeeds W. L. Turner as Supt. Rawhide mine, Jamestown, Cal.

J. D. SPARGO has been appointed Supt. South Daisy mine, West Dip, Utah.

ROBT. DE LARGE is building a 10-stamp mill at Col. Brodie's mine, Briggs, Arizona.

A. S. BIGELOW has resigned the superintendency of the Delhi, Nevada Co., Cal., mine.

GEO. MAINHART, part owner Bullion mines, Grass Valley, Cal., has returned from San Francisco.

H. J. KUBLI, managing owner Golden Standard mine, Grant's Pass, Oregon, is in San Francisco.

J. D. HEARD, Alameda, Cal., managing owner Greenhorn Blue Gravel mine, Yreka, Cal., is spending a week at the mine.

EDWARD N. LINDSAY, who has been examining mines along the mother lode for several months past, is at present in Calaveras Co.

J. SCOWDEN of London, England, is unwatering the Texas mine, at Hart, Cal., with a view to a purchase of the property for his company.

C. A. HAMILTON of San Francisco has returned from Shasta Co., Cal., where he has been examining copper properties for a New York company.

MAJOR W. H. HEUER of the U. S. Debris Commission was in Nevada City, Cal., this week, inspecting the new restraining dam for the Canada Hill hydraulic mine.

A. BELL, London, England, owner of the Gopher-Boulder mine, Kelsey, Cal., is in San Francisco. Mr. Bell's mine was the first in California to introduce electric power.

LIEUT. HENRY T. MAYO, U. S. N., who for a number of years was stationed at Port Townsend, Wash., has been ordered to report for duty at the Union Iron Works, San Francisco.

PHILIP DEIDESHEIMER, the veteran Comstock miner, received a medal from the Omaha Exposition for his model of the Comstock, Nevada, mine timbering system, of which he was the inventor.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JANUARY 10, 1899.

617,355.—WATER WHEEL BUCKET—T. K Blue, S. F.
617,477.—SEAL LOCK—A. W. Coffin, S. F.
617,416.—EGG BEATER—W. R. Ellis, Woodland, Cal.
617,589.—CARPET STRETCHER—C. Gosemann, Medical Lake, Wash.
617,486.—GRAIN SEPARATOR—B. Holt, Stockton, Cal.
617,527.—PROPELLER—A. Howard, S. F.
617,528.—VALVE GEAR—A. Howard, S. F.
617,529.—ENGINE—A. Howard, S. F.
617,530.—POWER APPARATUS—A. Howard, S. F.
617,420.—RAILROAD CURVE SWEEPER—G. Huff, Tropico, Cal.
617,466.—GOLD SAVING APPARATUS—J. R. Macmaster, Pomeroy, Wash.
617,471.—BRIDGE AND WHARF FLOORS—J. G. McMillan, San Jose, Cal.
617,473.—BORING MACHINE—Parsley & Cottrell, Hornbrook, Cal.
617,512.—GOLD SAVING APPARATUS—L. E. Porter, Los Angeles, Cal.
617,407.—ROCK DRILL—A. Rosenholz, S. F.
617,384.—MUSIC LEAF TURNER—A. E. Smith, Los Banos, Cal.
617,619.—PUNCH—L. Van Dorin, San Bernardino, Cal.
617 377.—GANG PLOW—A. V. Wilbur, Stockton, Cal.
617,378.—DISK HARROW—A. V. Wilbur, Stockton, Cal.
617,379.—GANG PLOW—A. V. Wilbur, Stockton, Cal.
29,970.—DESIGN CLOCK BACK—N. L. Whedon, Everett, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

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Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BRIDGE AND WHARF FLOOR CONSTRUCTION.—J. G. McMillan, San Jose, Cal. No. 617,471. Dated Jan. 10, 1899. This invention relates to improvements in the construction of floors for bridges and wharfs. It consists essentially of lengths of timber of alternate thicker and thinner material laid lengthwise upon the bridge and upon supporting timbers which may be thicker in the center than at the sides to provide a proper crown to the surface, the strips being spiked together, with the thicker ones having a greater height than the thinner ones, so as to form channels between for the reception and support of the asphalt or cement surface, which is afterwards placed thereon and which forms the wearing surface of the structure.

SEAL LOCK.—A. W. Coffin, San Francisco, Cal. No. 617,477. Dated Jan. 10, 1899. This invention relates to a device for locking and sealing cars, rooms, receptacles, and is especially designed for use upon freight cars, where it is desirable to seal the doors to prevent any removal or tampering of the goods contained therein. It consists essentially of the combination of a hasp or other attachment having a hook pivoted thereto and adapted to engage a staple or staples upon the side of the car with a rotary disk pivoted upon the hasp and a destructible connection which is operated by the movement of the hasp so that it will be impossible to disengage the hook without breaking the seal. In the present case the seal consists of a slotted strip fitting over bent lugs, which hold it in place when the hook is engaged and prevented from being turned backwardly.

BORING AND MORTISING MACHINE.—G. T. Parsley and G. C. Cottrell, Hornbrook, Cal. No. 617,473. Dated Jan. 10, 1899. This invention relates to a machine which is especially designed for boring and mortising purposes. It comprises a main frame with means for holding it in position horizontally, guides fixed thereon, a supplemental base carrying standards and operative mechanism and slidable within the guides and locking devices, including lever arms at opposite sides of the base, and having rigid fulcrum pins projecting at right angles through the standards and engaging the guides, the levers being so connected that they move in unison so that the bases may be secured at any point of adjustment. Rack teeth upon one of the guides and a toothed segment pivoted to the movable base and standard with its teeth engaging the rack bar allow the apparatus to be moved and adjusted upon the main frame. A vertically disposed rack bar upon the standards is arranged to be brought into engagement with a pinion upon the crank shaft so that by turning the latter the boring or mortising mechanism is raised and an automatic latching mechanism serves to hold it after it is so raised.

GRAIN SEPARATOR.—Benjamin Holt, Stockton, Cal. No. 617,486. Dated Jan. 10, 1899. This invention relates to an apparatus which is especially designed for adjusting and regulating the shaking or oscillating motion of the shoes in grain-cleaning devices. It is especially designed for use upon that class of cleaners which are employed upon harvesting machines and supplemental to the separators, so that grain which has been separated from a great portion of the straw and chaff is afterwards transmitted directly to these cleaners while the work is completed. It consists essentially of anti-frictional rollers or surfaces fixed to the shaking shoes and contacting with rollers, the surfaces of which are made essentially cylindrical at one end and oval at the opposite end, with a gradually progressive change in the surface from one end to the other. A mechanism is employed whereby these rollers may be moved so as to bring any portion of these lengths to act upon the cleaning shoes and thus vary the amount and character of the shake which is imparted to the shoe.

ROCK DRILL.—Alfred Rosenholz, San Francisco, Cal. No. 617,407. Dated Jan. 10, 1899. This invention relates to drills of that class which are especially adapted for perforating rock and other hard substances. It consists essentially of an adjustably supported casing and guides, a post or standard and mechanism by which the casing and guides are supported and advanced, a hollow plunger guided and slidable in the casing, a piston fitting and independently movable within the plunger, said casing being enlarged at one end having a shaft journaled in this portion out of line with the axis of the plunger, a removable cap at the end of the enlarged portion of the casing adapted to expose the plunger chamber in the line of its length to permit the ready removal of the operative parts, a drill shank connected with the piston and means for rotating the same, a crank on the drive shaft and a rod connecting the same with the plunger and means for operating the shaft.

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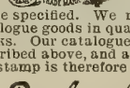
All our catalogue goods, except those listed by us as manufactured by others, are stamped with our name "Keuffel & Esser Co." or our initials "K. & E. Co" and where there is room for it, with our trade mark  Our German drawing instruments bear only the trade marks or
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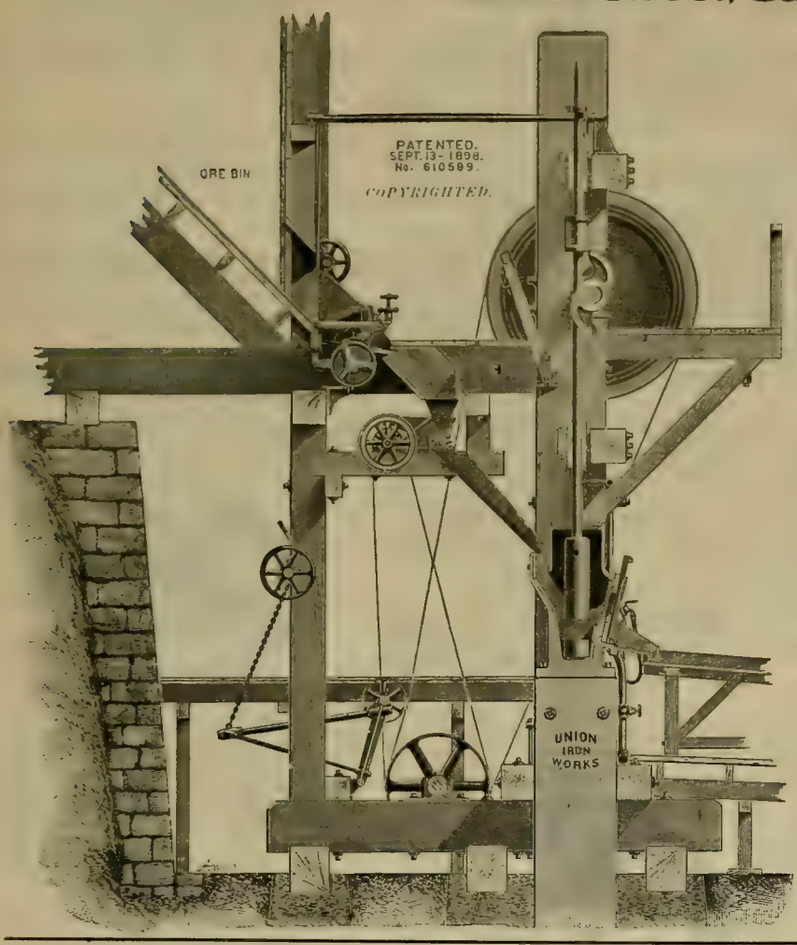

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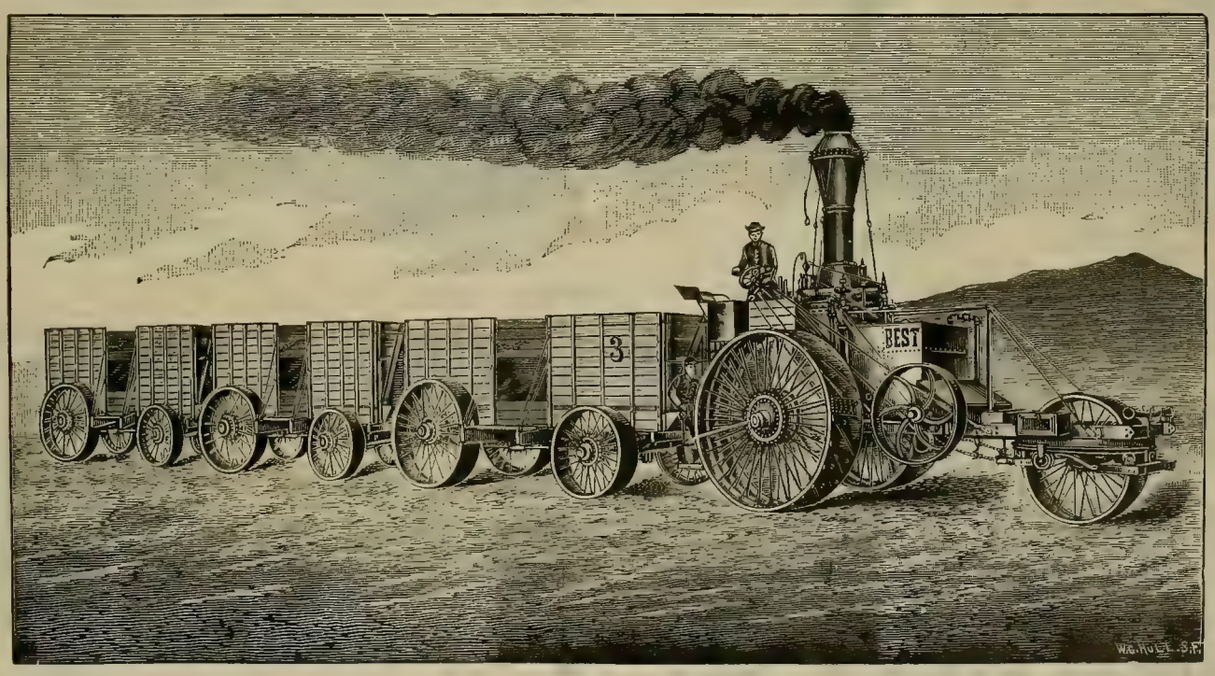

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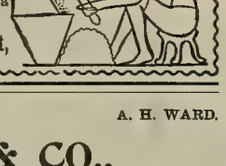

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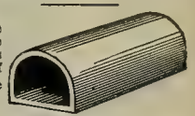

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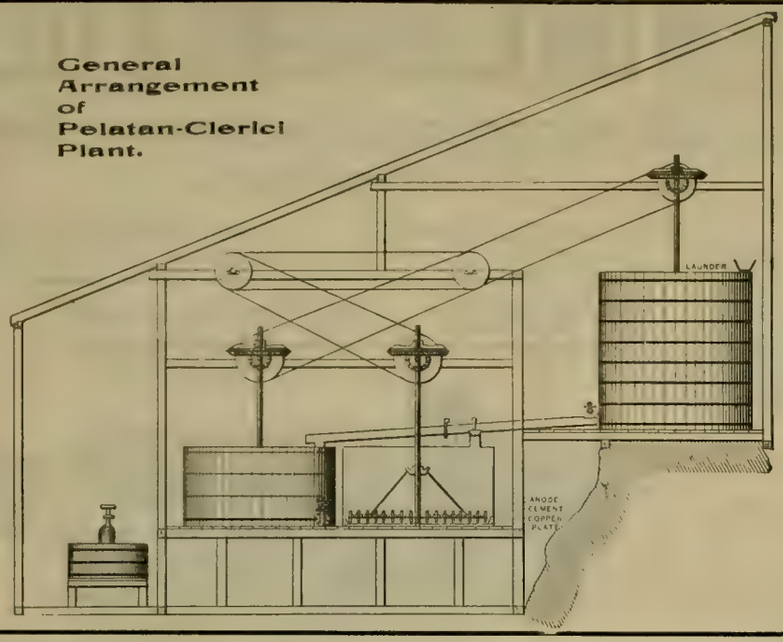

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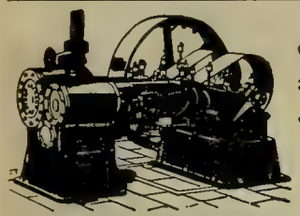

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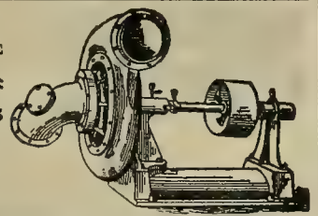

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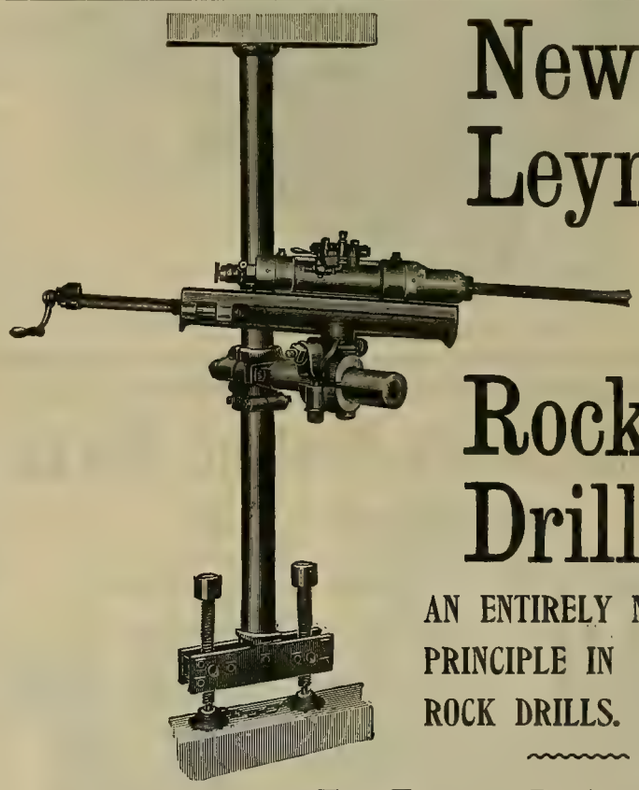

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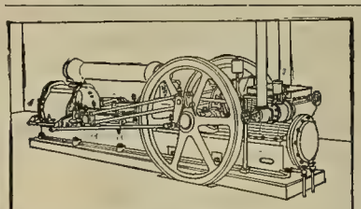

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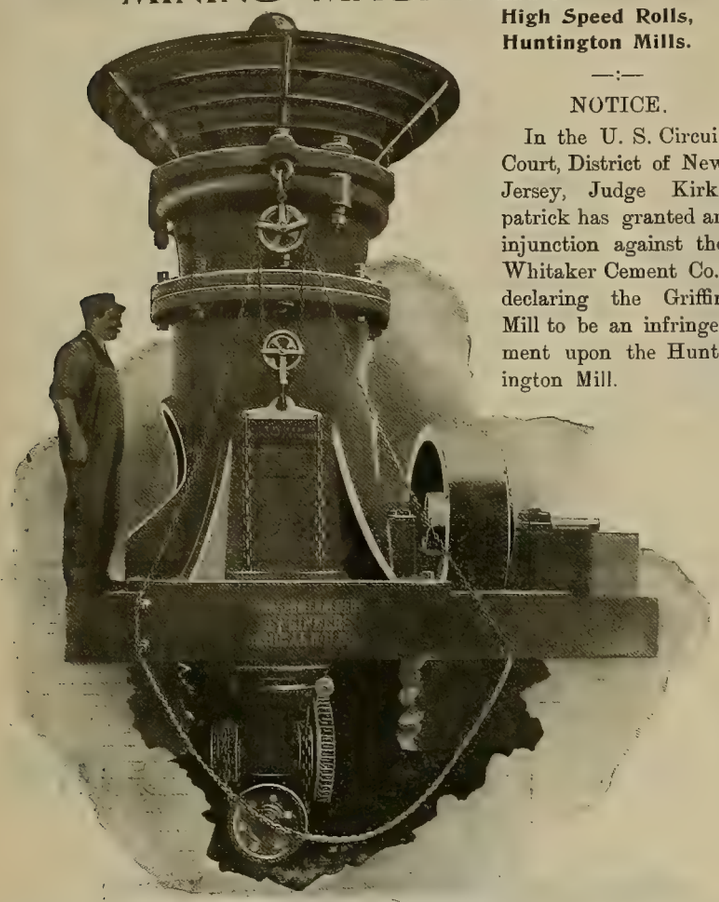

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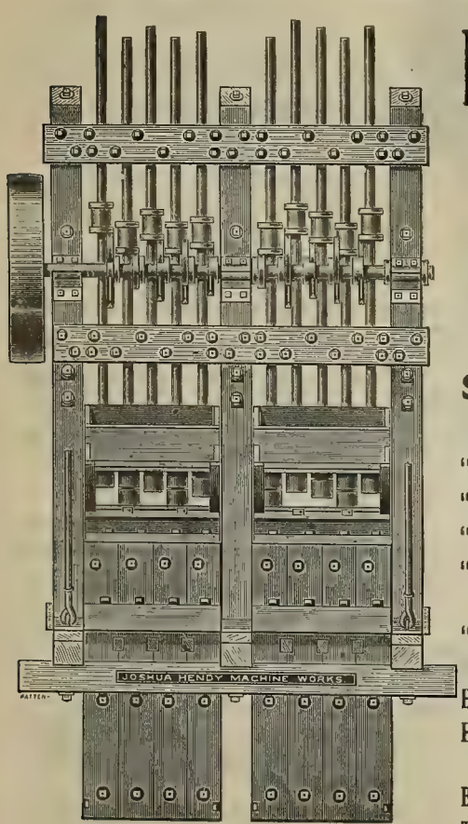

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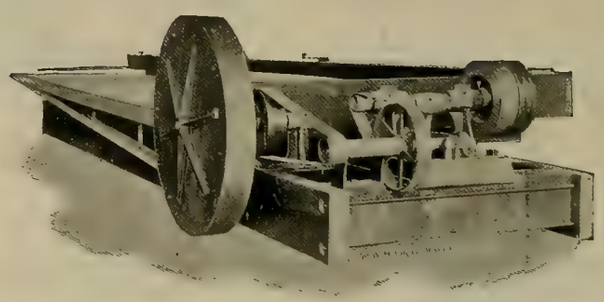

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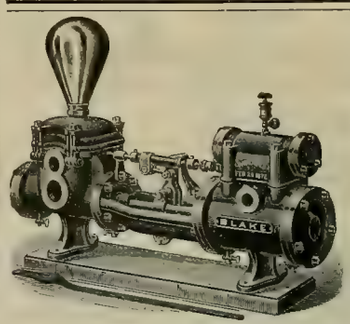

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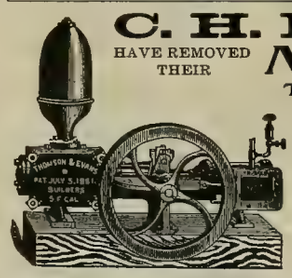

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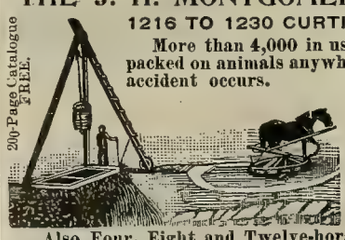

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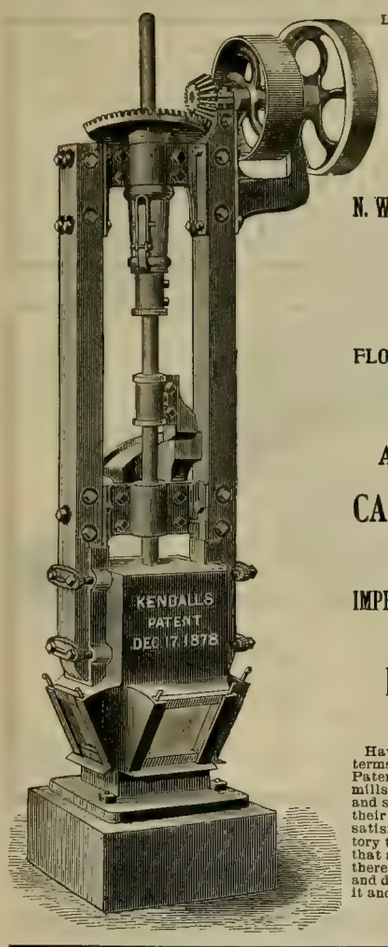

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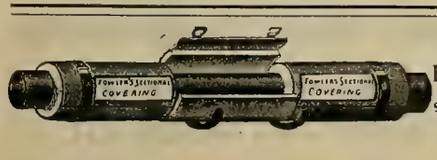

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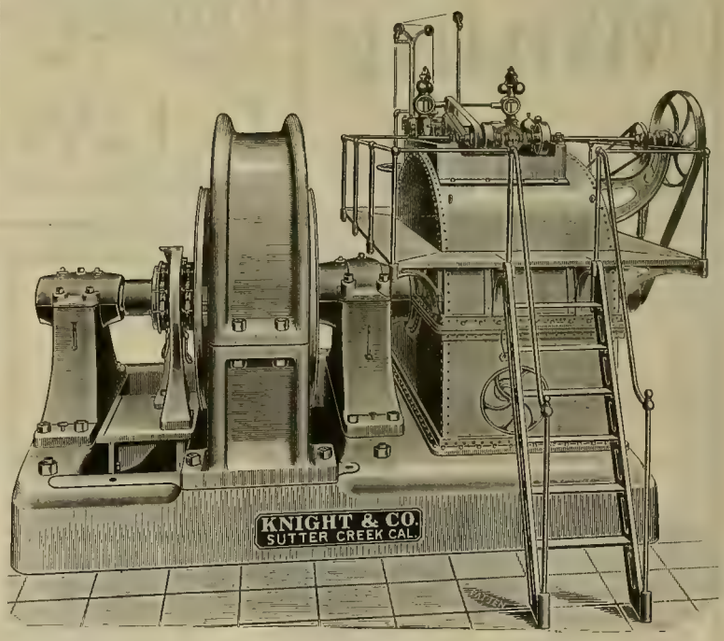

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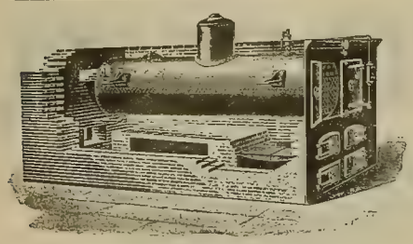

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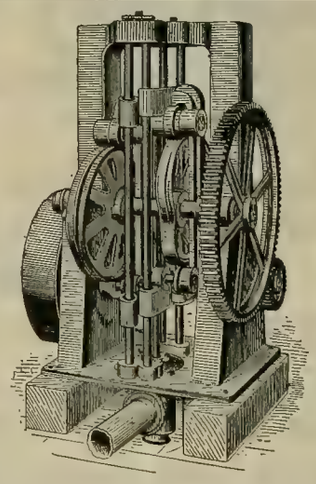
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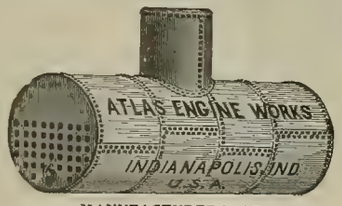

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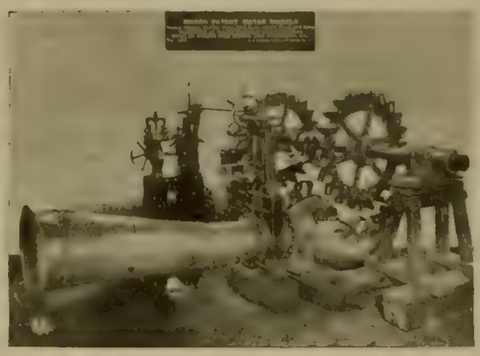

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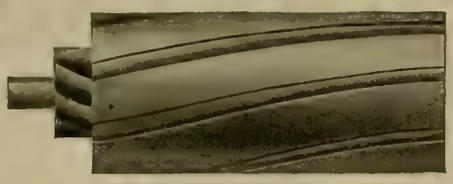
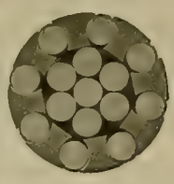
Locked-Coil   Track Cable

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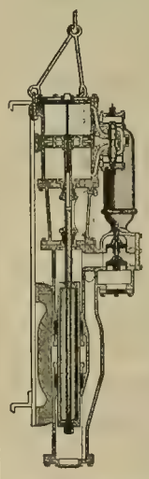

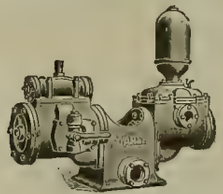

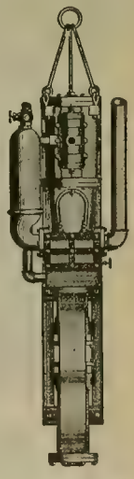

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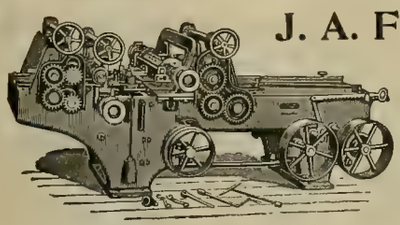

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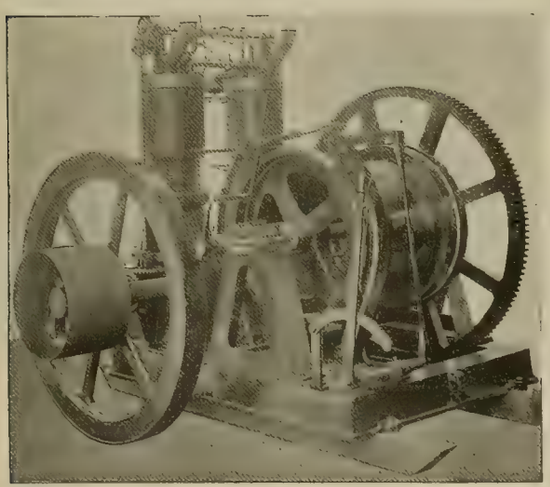

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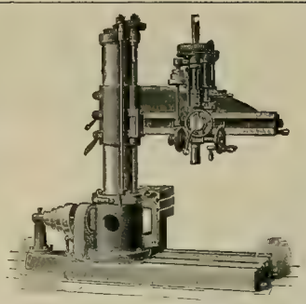

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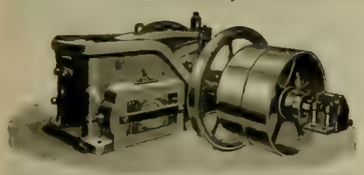

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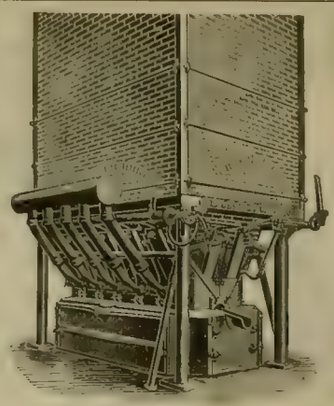

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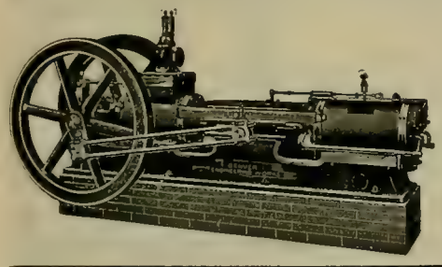

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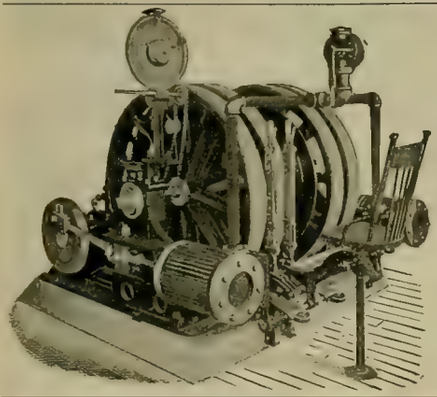

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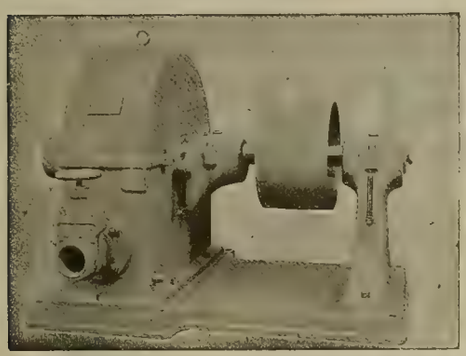

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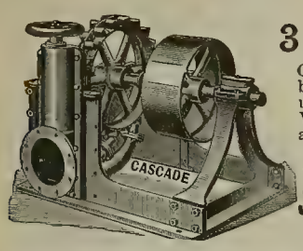


Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.

JAMES LEFFEL & CO.

SPRINGFIELD, OHIO, U. S. A.

LINK-BELT ELEVATORS —AND— CONVEYORS.

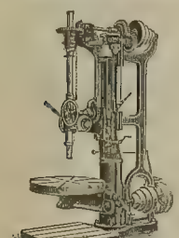
MALLEABLE IRON BUCKETS, Electric Coal Mining and Haulage Machinery, Luhrig Patent Machinery for Washing and Classifying Coal, Shafting, Pulleys, Bearing Rope Sheaves, Clutches, Etc.

Machinery designed and erected to suit existing conditions and available space.

THE LINK-BELT MACHINERY CO.,

Engineers, Founders, Machinists. CHICAGO, U. S. A.

Denver, 1328 17th St.
A. E. LINDROOTH, Manager.



NEW HAVEN Manufacturing Company,

NEW HAVEN, CONN.

Iron : Working : Tools.

Engine Lathes, Pulley Turning Lathes, Iron Planers, Slotters, Upright Drilling Machines, Horizontal Drilling and Boring Machines, Etc.

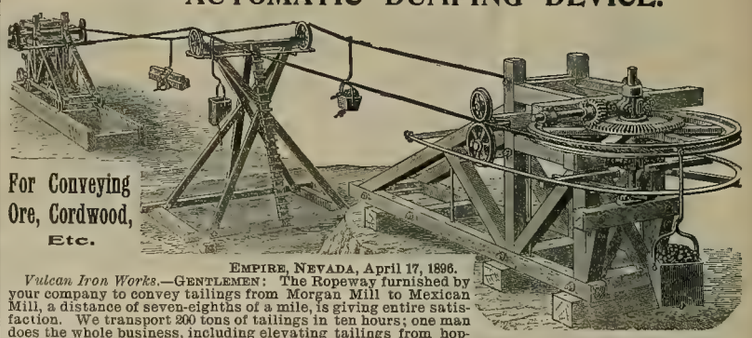
HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

VULCAN ROPEWAY

—WITH—

AUTOMATIC ORE LOADER AND AUTOMATIC DUMPING DEVICE.



For Conveying Ore, Cordwood, Etc.

EMPIRE, NEVADA, April 17, 1896.

Vulcan Iron Works.—GENTLEMEN: The Ropeway furnished by your company to convey tailings from Morgan Mill to Mexican Mill, a distance of seven-eighths of a mile, is giving entire satisfaction. We transport 200 tons of tailings in ten hours; one man does the whole business, including elevating tailings from hopper in the ground, operating Vulcan self-loader, and attending to the Ropeway generally. The self-dumper requires no attention whatever. The Vulcan loader I consider the best feature in the whole Ropeway, making it possible for one man to load 200 tons in ten hours.

Yours very truly, J. P. WOODBURY, Supt.

VULCAN IRON WORKS,

MANUFACTURERS OF MINING MACHINERY,

Office, 505 Mission Street, San Francisco, Cal.

RAND DRILL CO.

Rock Drilling, Air Compressing, Mining and Quarrying Machinery,

100 Broadway, - - New York, U. S. A.

BRANCH OFFICES IN UNITED STATES AND CANADA:

Butte, Montana. Toronto, Canada.
Wallace, Idaho. Spokane, Wash.
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MORRIS & TREGLOAN, Agents, 141 First St., San Francisco, Cal.

ADAMANTINE SHOES AND DIES

—AND—

CHROME CAST STEEL

Cams, Tappets, Bosses, Roll Shells and Crusher Plates.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

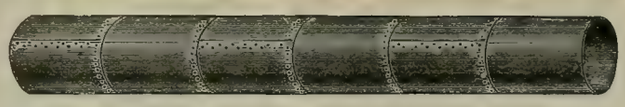
MORRIS & TREGLOAN,

141 and 143 First Street, San Francisco, Cal.,

Pacific Coast Sales Agents.

Stamp Cam.

Mining Pipe!

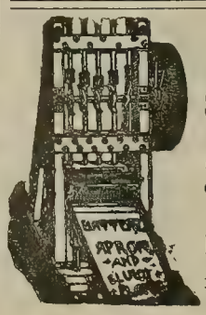


STEEL OR IRON.—We make pipe of either, but recommend STEEL, it being superior to iron in many particulars and inferior in none.

WRITE FOR CIRCULARS OF The Truax Pat. Automatic **ORE CARS.**

SCHAW, INGRAM, BATCHER & CO., Hardware Merchants,

SACRAMENTO, CAL.



To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

Every Description of Mining Plates Made.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES REPLATED. TWENTY-SIX MEDALS AWARDED. GOLD, SILVER, NICKEL, COPPER & BRASS PLATING.

Denniston San Francisco Plating Works,

653 and 655 Mission Street, San Francisco, Cal.

E. G. DENNISTON, - - - - - - - - - Proprietor.

Telephone, Main 5981. Send for Circular.

NOTICE.

The Name of the
RIX COMPRESSED AIR MACHINERY CO.
HAS BEEN CHANGED TO

The Compressed Air Machinery Co.

WM. A. HEWITT. P. H. REARDON.

11 & 13 FIRST STREET, SAN FRANCISCO.

WE WILL CONTINUE TO MANUFACTURE AND SELL

HIGH GRADE AIR COMPRESSORS,

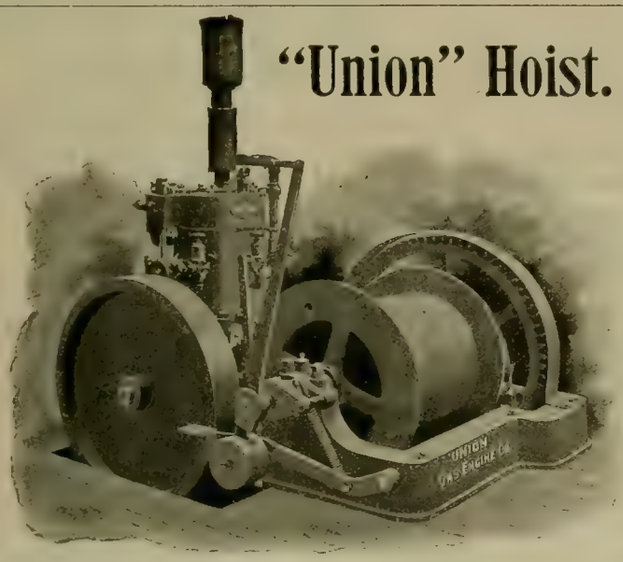
"GIANT" ROCK DRILLS, MINING HOISTS, ORE CARS,

STEAM ENGINES, BOILERS, Etc.

The Compressed Air Machinery Co.

WM. A. HEWITT. P. H. REARDON.

"Union" Hoist.



The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton 125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
TEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office: 314 HOWARD ST., SAN FRANCISCO, CAL.

ALASKA KNOCKED DOWN BOATS AND SLEDS.

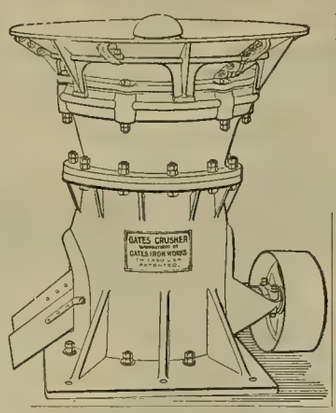
LIGHT DRAUGHT STEAMERS.
Write for Particulars.
H. ENGELBRECHT, Successor to
SAN FRANCISCO LAUNCH CO.,
North Point and Stockton Streets,
San Francisco, Cal.

Cal. Anti-Caloric Company,

SOLE MANUFACTURERS OF
Anti-Caloric Sectional Coverings and Blocks for Boilers.
Telephone Main 5752.

ANTI-CALORIC PLASTER.
The Best and Cheapest Insulating Plaster in the Market.
Used exclusively by the S. P. R. R. Co., Pacific Mail and other large corporations.
Office, 507 Market Street.

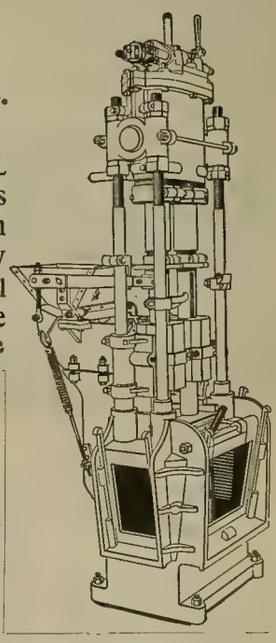
Gates Rock Breaker.



NEW DESIGNS AND PRICES.
THE GREATEST ROCK BREAKER ON EARTH,
Fully Described in Our New No. 1 Catalogue.
OUR
Special Fine Crusher
WILL INTEREST YOU.

TREMAIN STEAM STAMP.

A . . .
Success.



The TREMAIN STEAM STAMP MILL will enable a prospector to pay for his development. It has a capacity of from 10 to 15 tons per day. It weighs only 3350 lbs. and costs less than any mill ever offered the public, considering the results obtained.

Gates High Grade Rolls.
Gates New Vanner.
Gates Standard Gravity Stamps.
Gates Shoes and Dies Stand First.

Original Designers of Rock and Ore-Crushing Plants.
Macadam and Ballast Plants Our Specialties.

GATES IRON WORKS,

Dept. UU. 650 Elston Ave., Chicago, U. S. A.
Sales Agent, GEORGE O. BRADLEY, Atlas Block, Salt Lake City, Utah.

Agents for Gates Rock and Ore Breaker, Pelton Water Wheel Co., San Francisco.
Agents for Tremain Steam Stamp Mill. Henshaw, Bulkley & Co., San Francisco.

The National Feed Water Heater.

800,000 HORSE POWER SOLD.

Delivering Water to the Boiler at 210 degrees F. Thirty Sizes from 5 to 4000 Horse Power. Made of the Best Seamless Drawn Brass or Copper Tube, with Hard Brazed Joints. Unsurpassed for SIMPLICITY, EFFECTIVENESS and RELIABILITY.

HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.

: Send for Catalogue. :

Market Reports.

The Markets.

SAN FRANCISCO, Jan. 19, 1899.

SILVER.—London, 27 5-16d; New York, 59¼; San Francisco, 59¾; Mexican Dollars, 47½@47¾. New York exchange, sight, 15; telegraphic, 17½ cents premium.

LEAD.—New York reports "strong and higher" $4.22½ bid, $4.27½ asked. The firm naming the settling price for leading miners and smelters at the West quotes Lead at $4.

Local, pipe, 6@6¼c; sheet, 6¼@7c; pig, 5¾c; bar, 6c.

COPPER.—New York reports Lake strong and higher, $14.37½ bid, $14.62½ asked. Local, bar 20c per lb.

IRON.—American, soft, $21.75 and $23.75 per ton; Scotch, $24.25. Local bar, 2¼c per lb.

SPELTER.—3½@9.

TIN.—Pig, 22c per lb.; Bar, 25c. New York reports an advance, $22.20 bid; $22.40 asked.

ANTIMONY.—14.

BABBITT METAL.—No. 3, 7c.

QUICKSILVER.—Higher. Local, $42.00; export, $38.50 @ 39.00; carload lots, special rates.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 30 @ 31c per lb.; carloads, 29c; in 10-lb. tins 37c; sulphuric acid, 2½c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9¼@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2½@2¾c; California refined, 1¾@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19¾c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11¼c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

CANDLES.—Electric Light Candles—6s, 16 oz., 7½c; 6s, 14 oz., 6½c; 6s, 12 oz., 5½c; 6s, 10 oz., 4½c; Granite (Mining) Candles—6s, 16 oz., 8¾c, 6s, 14 oz., 7¾c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $2.40; cut, $2.25; 10 to 20d, wire, $2.45; cut, $2.30; 8d, wire, $2.50; cut, $2.35; 6 and 7d, wire, $2.60; cut, $2.45; 4 and 5d, wire, $2.70; cut, $2.55; 3d, wire, $2.85; cut, $2.70; 2d, wire, $3.10; cut, $2.95. In carload lots, 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 19, 1899.

9:30 A. M. SESSION.

200 Andes....10c	300 Hale & Norc's....09c
100 Best & Belcher....38c	200 Sierra Nevada....64c
200 Chollar....11c	100 Utah....11c
500 Gould & Curry....27c	

2:30 P. M. SESSION.

150 Mexican....32c	500 C. Cal. & Va....$1 35
400 Gould & Curry....26c	300 Sierra Nevada....68c

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

Cable address Edbee Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from S. S. Taylor, in the Silver Star Flume and Mining Co.'s Mine, near Spanish Ranch, Plumas Co., to deposit tailings in a worked-out pit; from H. S. Byam, in the Bonanza Claim, in Amador Co. near Michigan Bar, to deposit tailings in Arkansas Creek; and from the Badger Hill and Cherokee Gravel Mining Co., in the Badger Hill Mine, at Cherokee, Nevada Co., to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 30, 1899, at 1:30 P. M.

J. D. BETHUNE,
(Late Associate Justice Supreme Court.)
Attorney at Law,
Mining Law,
PRESCOTT,.....ARIZONA.

A Valuable Gold Property for Sale.

FOR SALE.
4 **Woodbury Concentrators with new belts. Machines in good condition.** For price and particulars, apply to EDWARD GOODWIN, Supt. Montauk Con. G. M. Co., Newcastle, Cal.

PACIFIC EXPLORATION COMPANY
Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.
W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.
29-30 Chronicle Building, S. F.

MICHIGAN COLLEGE OF MINES.
Supported by the State of Michigan. Practical work. Elective system. Special advantages for men of age and experience. For catalogues address
DR. M. E. WADSWORTH, President,
Houghton, Michigan.

Quicksilver
FOR SALE IN LOTS TO SUIT.
Agents for Redington Quicksilver Mine.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

ENGINEERS!
An Improved Tabor Steam Engine Indicator
In a neat black walnut box and in first-class condition, for sale at a bargain.
Address H. R. JONES, SELBY, CALIFORNIA.

ANTIMONY.
We buy Antimony Ore in any quantity and pay prompt CASH for same. Write us and let us know what you have.
Chapman Smelting Works Co.,
(INCORPORATED.)
422 Battery Street .....San Francisco, Cal.

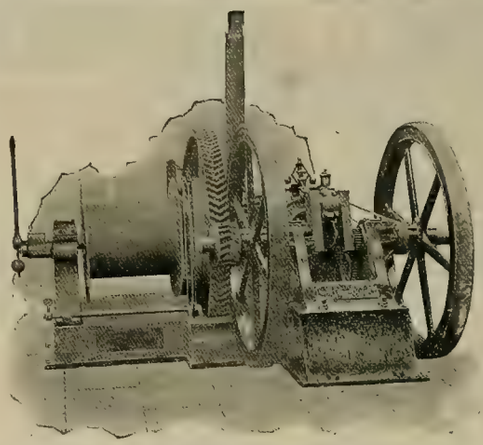
REPUBLIC and ROSSLAND
Mining Stocks
Bought and sold for non-residents. SOLID DIVIDEND PAYERS as an investment. Prospective producers as a speculation. Write for information.
H. P. PALMER & CO.,
Exchange Nat. Bank Bldg., SPOKANE, WASH.

HERRIN & REINER,
Mine and Stock Brokers.
Reliable Quotations given on all the Standard British Columbia, Washington and Idaho Mining Stocks.
Rooms 9 and 10, Zeigler Block, Spokane, Wash.

CREIGHTON & CO.,
Republic and B. C. Mining Stocks.
Reliable quotations furnished on all standard British Columbia, Washington and Idaho Stocks.
ROOM A, ANNEX 606 RIVERSIDE AVENUE,
SPOKANE, WASH.

Silver City Reduction Co.,
SILVER CITY, GRANT COUNTY, NEW MEXICO.
Purchasers and Smelters of Gold, Silver and Copper Ores.
This Plant is Owned and Operated by the Estate of the Late Senator George Hearst of California.

Placer Miners' Attention
Is called to the fact that we are purchasers of
OSM-IRIDIUM
In lots of one ounce and upwards.
SELBY SMELTING & LEAD CO., 416 Montgomery Street, San Francisco.



FRESNO, June 25, 1898.

Hercules Gas Engine Works, San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,
305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,
MANUFACTURERS OF DIRECT CURRENT MACHINERY
For Power and Lighting Purposes.
SPECIALTY
Direct Connected Electric Elevators.
Estimates Given on All Kinds of Mining Apparatus,
ALSO REPAIR AND JOB WORK OF ANY KIND.
Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.
34-36 Main Street, - San Francisco.

WEST COAST OF MEXICO.
WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.
Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

MINE BELL SIGNALS.
Adopted, Used and in Force in Accordance with State Law.

FOR the convenience of our readers in the mining counties we print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

UTAH
Mines—Dividend Paying and Investment Stock.
W. E. HUBBARD & CO., 15 W. 2d So. Street, SALT LAKE CITY.

W.&P. PREPARED ROOFING.
For Mills and Factories.
Will not burn like shingles, nor be eaten out like iron by fumes, gases or vapors. Cheap. Durable.
PACIFIC REFINING & ROOFING CO.
113 New Montgomery St., S. F.
Correspondence solicited.

"DEARBORN SACCHARATED TANNINS"
Instead of "SODA MIXTURES" Clean Boilers Without That Awful Corrosive Action.

Assessment Notices.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of January, 1899, an assessment (No. 12) of Ten Cents (10c.), per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 6th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California.

The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of January, 1899, an assessment (No. 20) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, Rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of February, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 21st day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, Rooms 15 and 17, San Francisco, California.

MARINA MARSICANO GOLD MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of January, 1899, an assessment (No. 17) of 4 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 13th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of January, 1899, an assessment (No. 115) of Twenty cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14 Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on TUESDAY, the 21st day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 13th day of March, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14 Nevada Block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 22) levied on the 3rd day of December, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. F. Anderson	93	2,000	$60 00
Calvert Meade, Trustee	196	200	6 00

And in accordance with law, and an order from the Board of Directors, made on the 3rd day of December, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 106 Liedesdorff street, San Francisco, California, on MONDAY, the 30th day of January, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale. CALVERT MEADE, Secretary.

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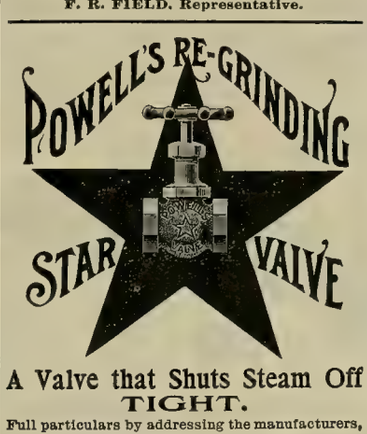

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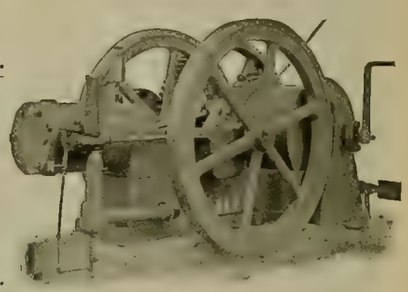

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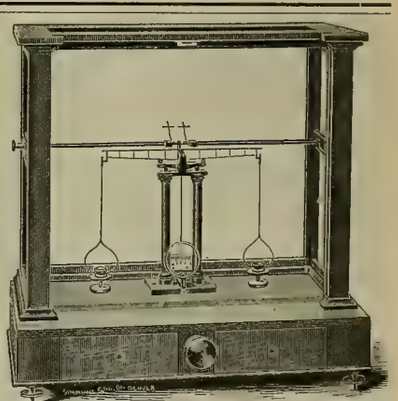

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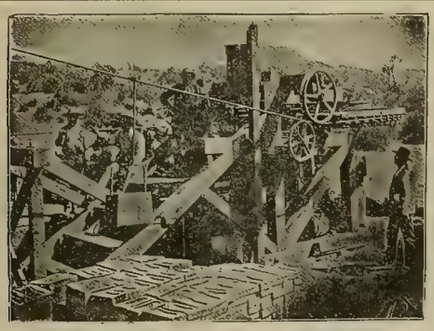

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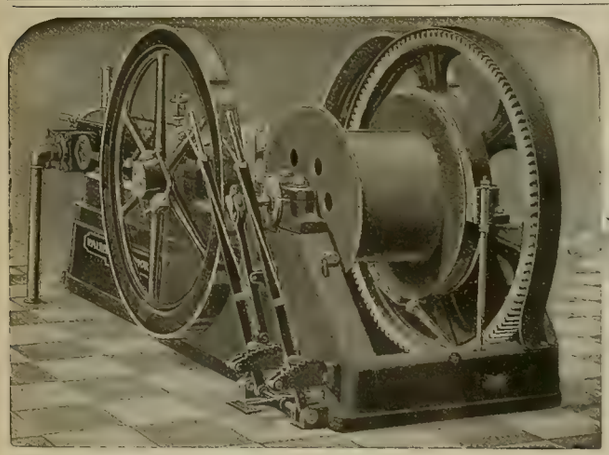

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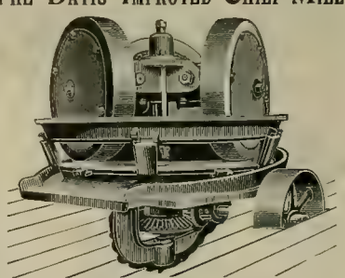

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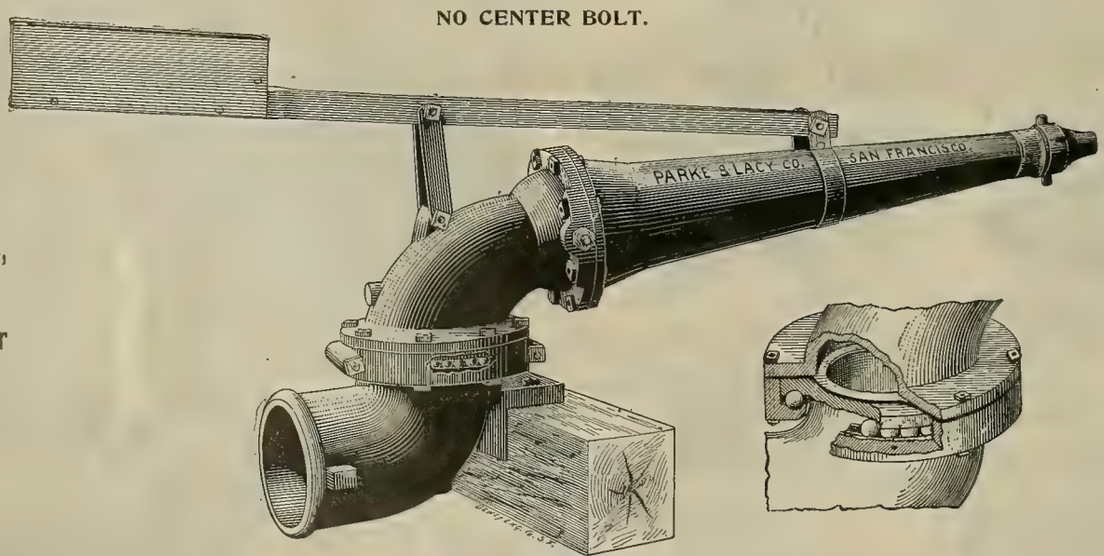

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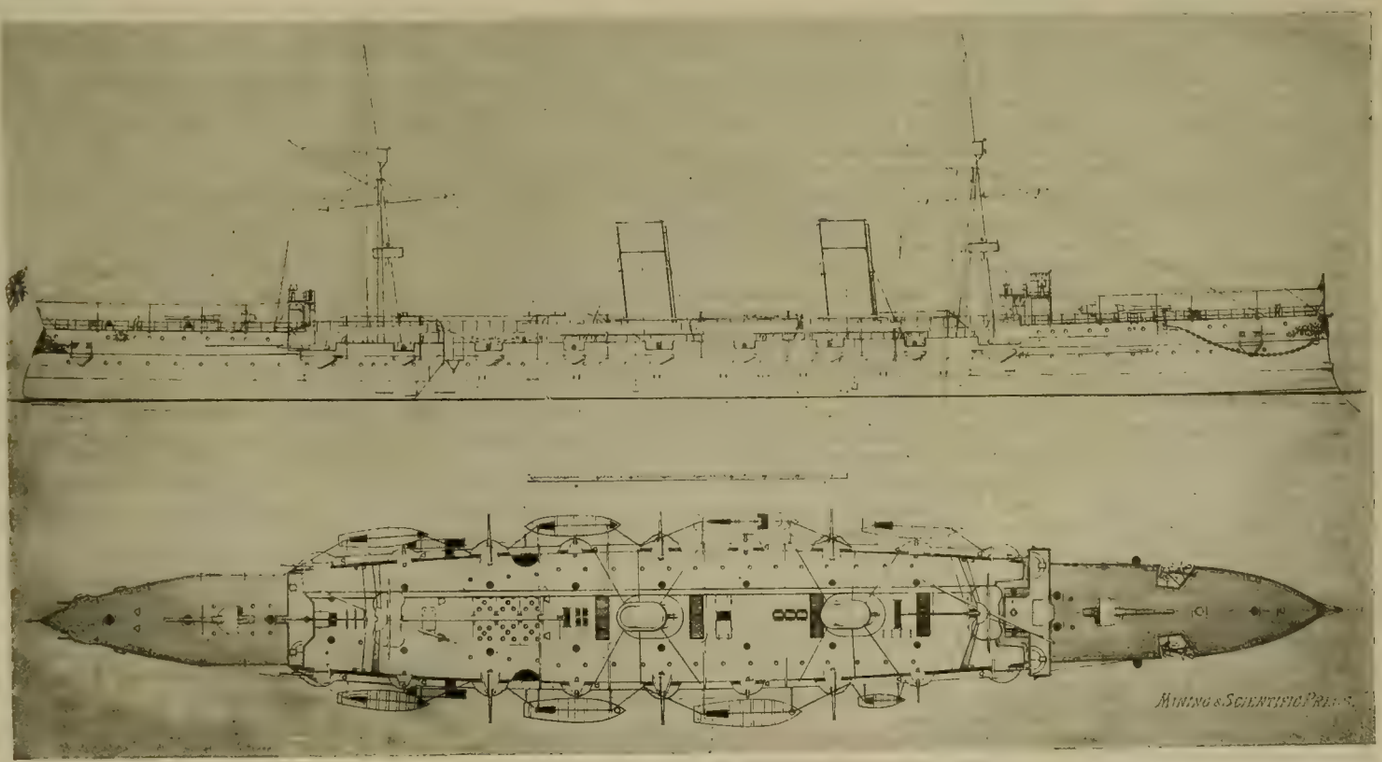
No. 2012.—VOLUME LXXVIII. Number 4. SAN FRANCISCO, SATURDAY, JANUARY 28, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

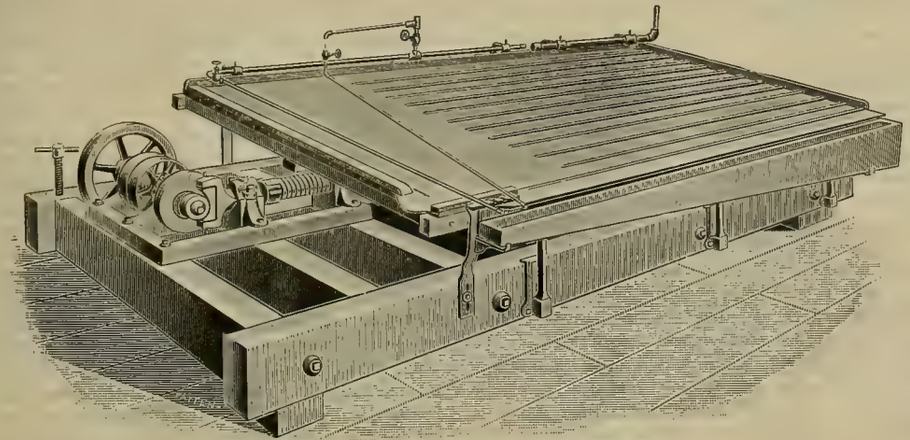
Railroad Construction in California.

Building the second transcontinental line to San Francisco involves some engineering problems that are being successfully solved. One of these occurs in the seventy miles between that city and Stockton, where nine miles of roadbed sufficiently solid to safely bear up heavy railroad traffic must be built across a wide expanse of "tule" lands. Four large dredgers are there employed, cutting canals 65 feet wide and 25 feet deep. The material removed is piled inward, thus building up a roadbed 100 feet wide and leaving a drainway on each side. The work is done at intervals, a layer of muck removed and dumped along the line of the roadway and allowed to thoroughly dry before another similar one is superimposed. The accompanying engraving shows the dredger Golden Gate at work.

DREDGER MAKING ROADBED FOR RAILWAY ACROSS TULE LANDS NEAR STOCKTON, CAL.



THE CALIFORNIA-BUILT JAPANESE CRUISER CHITOSE. (See page 89.)



NEW WOODBURY IMPERIAL CONCENTRATOR.

New Woodbury Imperial Concentrator.

The saving of fine sulphurets which contain a certain amount of values in ores, and reducing the losses while performing the work of concentrating to a minimum, with the most simple and inexpensive machinery, occasions constant effort to improve on what has already been accomplished. While the belt concentrators have and do produce good results, in concentration as in all other mining processes there is constant aim at improvement. Geo. E. Woodbury of 141 First street, San Francisco, who has been engaged in the manufacturing of belt concentrators for twenty years, considers that the field for such improvement in the line of concentrators and tables is not exhausted, and hopes to simplify the construction, lessen the cost of machinery, to give it a larger capacity with less care and attention, and at the same time do good work. He has invented the "Imperial table," herewith illustrated, and claims for it the essential merits as stated.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Oldest Mining Journal on the American Continent

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J. F. HALLORAN.....Publisher

San Francisco, January 28, 1899.

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IT is often noticeable that in the prospectus of a mining property great emphasis is laid on its contiguity to some famous producer; usually such a claim is accompanied by a map showing how, if the course of the vein of the "Baby Mine" or "Success" be continued, it surely cuts squarely through the "Copper Gong" or Golden Lyre," for sale. Yet, such contiguity is to some minds an argument against investment, as faults and breaks are so frequent that it by no means follows that, because a certain property is valuable, adjacent ground must prove equally rich. The reverse is too often the case to deceive miners into belief in the implication. In gold mining particularly the ore veins are likely to follow along the lines of least resistance, without special regard to continuous direction.

THE most noticeable feature in metals in '99, so far, is the appreciation in the price of lead, copper and tin. For the first time since October 15th, '97, lead has smelter quotations above the $4 mark; the general average price for '98 was $3.63. Though the United States lead production in '98 was 15,624 tons, yet its consumption has been proportionately greater, and the trade looks for a fine market in '99; to-day's New York quotations are $4 27½. The continued non-existence of tin in commercial quantities in the United States, coupled with the increasing demand for that metal, causes substantial appreciation in its price. In the case of the price of copper it seems amid combinations on the one hand, and enormous consumption on the other, that the only question is where it shall stop in its advance; to-day it is quoted by New York brokers at $16.25. Silver steadily stays below the 60 cent mark. Its place in the world's work is among the financial rather than the industrial column. During '98 this country brought in from abroad silver to the value of $29,029,724, and exported it to the amount of $53,797,104, just about the same as in '97. Gold ostensibly remains the same, though as its worth is determined by its purchasing power, it appreciates when prices drop, and depreciates as general values rise. The advance in real estate and other values all over the country during the past six months, the glut of gold in the United States treasury, and the balance of trade in favor of this country are among recent causes that make for gold's depreciation in value as a purchaser. During '98 this country sent abroad only $16,194,954 in gold, and imported $158,036,252, a wonderful contrast to other years. Even in the year previous, '97, the United States had sent out more gold than it received, yet in '98 we find that this country imported $141,841,298 more gold than it sent away.

Market Value of Ores.

A southeastern California miner writes regarding alleged discrimination and incorrect valuation of ores shipped to San Francisco, making some statements that, if susceptible of proof, deserve attention. He declares that in the vicinity of Big Pine, Inyo Co., are silver mines producing ore running from $100 to $500 per ton, and containing some gold, but that the shippers can only get from one-quarter to one-half their value from the smelter.

The market value of ore is a vital question to every ore producer who chooses to send away his product for treatment. Gold ore or any other kind of metal-bearing ore should be determinable in value, and, theoretically, it is, just the same as oil or wool or timber. Just how this value is to be determined is the question. The complaint of the Inyo Co. man is not an isolated case. Wherever ore is so produced, be it California, Colorado, Montana, Utah or Idaho, the same allegation is frequently made. In this regard it is worthy of note that the smaller the amount individually shipped the greater the amount of individual complaint. The men or companies who ship the most complain the least. Instances are not wanting where 4000 tons of ore are annually received by one California concern from one shipper without one complaint from the latter during the year. Doubtless did occasion arise, or seem to require, so large a shipper would institute an inquiry, look even more carefully than ever to the correctness of his samples and assays, and, if discrepancy continued, would have an umpire appointed whose decision would be final as between him and the smelter. Small shippers have not, ordinarily, the facilities or do not take the trouble to assure accuracy in the important matter of sampling, which, manifestly, is of even more importance than the assay, for upon the correctness of the sample as fairly representing the ore depends the proper rating of the value of the entire ore shipment. While we are not authorized to more than suggest, it is obvious that in the case of any reputable smelting concern in California or Colorado, or anywhere else, wherever any complaint is made, proper notice will be taken and an honest endeavor made to satisfy the producer regarding the correctness of the returns made him.

In considering the business of buying and selling ores it is best to assume entire fairness and honesty on both sides, eliminating guesswork, supposition and suspicion, and arriving at correct results by intelligent methods. Belief, however sincere, or opinion, however hopeful, has nothing to do with the facts. Because a man honestly believes that his ore shipment will go $100 to the ton does not insure so desirable a result, and its failure to come up to expectation only engenders suspicion regarding the methods of the smelter. Better every way for him to be sure of his samples; to be accurate in sampling and reasonably certain as to its value. It sometimes happens that after a man has put in, say two months' hard work getting out a little jag of ore, as the days go by his reiterated belief that it is "$100 rock" will result in a positive frame of mind by the time that he ships it, and if the facts do not agree with his estimate, so much the worse for the facts.

On the part of a responsible smelting establishment it is in every way to the interest of such a concern to be scrupulously honest in its dealings with miners. It cannot afford in the long run or the short run to be otherwise. Assays, approved, accurate and definite, determine the value of every shipment large or small, and deducting the fixed charges and expenses of treatment, the resultant remainder belongs to the shipper. There should be fair profit to both, and a thorough understanding on the part of the miner as to what he may reasonably expect. It is of course natural for a miner after months of toil to suspect unfairness if, upon paying freight and smelter charges, the result is little or nothing, and yet it does not follow that he was unjustly or unfairly treated. In smelting, cyaniding, chlorination, or anything else, there is always some unavoidable loss; a small lot of ore costs more, proportionately, than a larger quantity; freights and fixed charges fluctuate, and results exact, and impartial, rarely bear out previous assumptions or estimates. As to the shipper, it must be borne in mind that no one can continue to cheat him; but he must not cheat himself: he must be reasonably certain of the value of his ore. As to the smelter and ore buyer, no one in that business can afford to be otherwise than perfectly square; as a business proposition no ore buyer or proprietor of a reduction plant can continue to act otherwise than honestly, but he has to be honest with himself as well as his customer, and though the values may not be there, the freight and reduction charges count up just as much as though they were.

Upon accurate sampling of the ore depends largely the solution of this matter. Where a fair sample repeatedly gives a certain value, the returns ought to approximate such value, making due allowance for unavoidable loss, but no producer has just reason to expect that one or two assays from picked samples can determine the result in a manner mutually satisfactory to both buyer and seller.

Arrastra Structure and Operation.

"Why don't you illustrate and give in detail how to build and operate an arrastra?" has been the substance of an unusually large number of inquiries during the past five months. It is evident that despite the advance in methods of handling ore this ancient system is still in favor in many remote localities. Accordingly data, detailed description, sketches, etc., were secured, and in the issue of the 14th inst. appeared an article going into the thing from start to finish. In this issue is another article of equal practical interest. It is believed that these two articles will thoroughly cover the whole matter. Either one of them would probably be sufficient, but both should fill the field of arrastra literature for the next ten years. So far as observed the two articles in the issue of the 14th, and of this date, are the first of the kind, giving details of construction and operation, and written by men who, as usual, with our contributors, know what they are talking about.

Though in these modern days of scientific mining, with crushers, rolls, and hundred stamp mills, the arrastra seems a slow and poky affair; yet, rude though it be, and humble its place, it has an honest record and deserves notice. Though seemingly stupid and archaic as the burro that often furnishes the motive power, it is not without its good points. Unlike more pretentious devices, the car and battery assays agree; what goes in is accounted for; the outfit never strikes, and rarely blows up or burns down; if anything breaks, the accident is not costly, and repairs can be made on the spot; there is little science and less style; it is as sure as it is slow; its accounts are simple and easily kept; it usually makes money for its owner, and this is a good feature about mining machinery of any kind. All over California and the coast; up the gulch in Montana; over the other side of the hill in Idaho; up a little ways in Arizona; on the opposite side of the canyon in Colorado, are found those old-fashioned concerns, which, so far as free-milling gold is concerned, are fairly successful. Water, steam and burro power—the latter in greater evidence—are used; it is unlikely that direct electrical connection or an air compressor would be found anywhere supplying the force that makes the drag go round.

Everything is relative; doubtless when some of our remote Mexican readers see the issues of the 14th and 28th, they will want to discard the old, old arrastra in use there for the last hundred years and take up the newer designs therein portrayed, for, as in everything else, there are fashions and progress even in the building and operation of arrastras. Many a miner all over this west half of the continent will be busy comparing his arrastra with those illustrated and described in these columns, and will soon decide whether the old way is good enough for him, or whether he shall adopt some of the new pointers. He may conclude to go on as before till developments warrant his getting modern machinery; for the operation of an arrastra ofttimes precedes the purchase of modern, up-to-date mining machinery. Where the quantity of ore is limited, or the owner is short of money, or transportation facilities preclude the transit of machinery; where reduction works do not exist, and isolation tends to bar development, there is the home and there is the province of the arrastra, and in many an instance that humble appliance has ground out the bullion that paid for the fine mill that in the evolution of things finally superseded it.

Concentrates.

IN '98, West Australia produced in gold 1,050,183 ounces, in '97, 674,989 ounces.

NEVADA miners ask that State's Legislature to pass an eight-hour law, similar to Utah's.

WYOMING is about to establish at Cheyenne a State executive department of mining and mineralogy.

AT the Alaska-Treadwell mill, Douglas Island, Alaska, on March 1, 720 stamps will be in operation.

THE Arizona Legislature contemplates a bullion tax on the net proceeds of mines in that Territory.

PRIVATE London advices indicate as being very unlikely any severe attack of Klondicitis there this year.

ABOUT two and one-half tons is the daily duty of a 650 pound stamp with ninety 12-inch drops per minute.

CALIFORNIA miners, in and out of the State Legislature, should endorse and aid every effort to secure good roads. It's business.

STEPHANITE—black silver—is composed of silver, 70.4%; antimony, 14%; sulphur, 15.6%. Silver glance is made up of silver 87.04, sulphur 12.96.

OIL, maltha and natural gas are reported discovered on the borders of San Luis Obispo and Monterey counties, Cal., near Parkfield, occasioning a land "boom."

IF fifty ounces of slimes are worth $12, one ton would be worth $3499.99. One acre of ground 3 inches deep, allowing 20 cubic feet earth to the ton, contains 544 tons.

THE Southern California Railroad pays about $9 per ton for its coal; the Southern Pacific Co. about $5. Both roads are reported abandoning the effort to burn oil in their engines.

"THE best general way of treating metallic ore" is a big question that would require a voluminous treatise to attempt to answer. The best answer that occurs is "by smelting."

IN order of malleability aluminum ranks third, and sixth for ductility. It is usually alloyed with 6% of copper. This alloy has a tensile strength of fourteen tons per square inch.

IN Telegraph creek, on the Gila river, in New Mexico, is a formation said to be exactly similar to the "banket" reef of South Africa, geologically interesting, but of no industrial value.

THE newest process for "galvanizing" or coating iron or steel is immersion of cleaned sheets of iron or steel in a bath composed of (by weight), zinc, 84%; tin, 14%; lead, 1.5%; aluminum, 0.5%.

A "FAULT" in its widest sense signifies any displacement or interruption in the continuity of a vein. Veins, in general, are most productive near the junction of stratified and unstratified rock.

A DELINQUENT co-owner has ninety days from the date of last publication of notice of forfeiture to pay up his share of cost of labor and improvements necessary to hold an unpatented mining claim.

SODIUM AMALGAM can be used in coating copper plates with quicksilver. It should be used very sparingly. One part of sodium (by weight) to 2000 parts of quicksilver is about the right proportion.

IN a good ice plant of ordinary dimensions from five to eight tons of ice can be produced for each ton of coal. The Vulcan Iron Works, 505 Mission street, San Francisco, Cal., make such ice machines.

CHLORIDE OF SILVER ("horn silver") fuses at 500° Fahr. It cannot be decomposed by charcoal unless water be present; in that case hydrochloric acid and carbonic oxide are formed, and the silver is liberated.

WIRELESS telegraphy is interesting and a promising field for electrical research. Most of the daily newspaper articles and illustrations thereon are ridiculous. Its economic use is an improbable possibility.

WITH a 9-inch pipe, 6000 feet long, and a 600-foot head of water, the velocity of the water per minute would be 785.4 feet. In all streams the velocity is usually greatest at the surface and in the middle of the current.

ORDINARY interpretation of the 29th statutes at large, U. S., passed March 2nd, '97, would occasion an affirmative answer to the question, "Can a British or an English company legally hold mineral claims in Alaska."

THE Kern Co., Cal., man who writes for information about divining rods to locate gold is on a barren trail. It were as wise to essay the tangible effect of a chimera revolving in a vacuum as to consider any such divination.

IT is asserted that the Western Electric Co. is casting 300 to 500 pounds of copper daily, which have an electric conductivity of above 90% and as high as 99.52% as compared with below 50% conductivity in ordinary casting copper.

GRAPHITE, as it comes from the mine, contains from 50% to 60% silica, sulphur and other impurities, and the process of completely freeing the graphite from impurities requires expensive machinery and skillful manipulation.

STAMPS vary in weight as to custom and ore requirement of different districts, from 600 pounds in Gilpin Co., Colorado, to 1200 pounds in El Dorado Co., Cal. With an 850-pound stamp the stem weighs about 360 pounds, the head 225, the tappet 115, and the shoe 150.

"FREE AIR" means air at atmospheric pressure—15 pounds per square inch sea level. Calculating the efficiency of an air compressor at 100%, at that level, the barometer standing at 23.83 indicates an altitude of 6000 feet and a comparative efficiency of 82.8%.

REGARDING the alien act, mentioned in last week's issue as passed by the British Columbia Legislature, on the 18th inst., it is understood that the Canadian members of the American-Canadian commission have agreed on international mining terms which vitiate the act.

"A MINING property that isn't giving a net income is worthless." Not logical. If so, then no prospect not in pay ore is of any value. If that argument obtained, goodbye to all development. There is scarcely a mining property of any value anywhere that was a continuous paying success from the very start.

ONE who goes no further than to experiment with an invention and then gives it up, and attempts to attain the object by other means, and who afterwards purchases articles manufactured under it from another, who has obtained a patent for it, has abandoned it, and the patentee is entitled to hold it.

CONCENTRATED food for miners and prospectors is a very pretty theory, and doubtless the Chicago correspondent is in earnest and means business; but it is probable that for the remainder of the century at least, bacon, beans, biscuit and coffee will continue to hold the place of honor in the prospector's cuisine.

IN '97, in the Rand, South Africa, gold district, there were in operation 4675 stamps; in '98, 5042; the tonnage crushed in '97 was 5,325,355—about 4¼ tons per stamp per day. As in the United States the tendency is to increase the capacity per stamp. In the past ten years that district has yielded $320,000,000 in gold.

THE royalty charged leasers is largely a question of local custom and observance. Some owners demand 50% and will only give a twelve months' lease; others, elsewhere, are content with 25% and a contract that is not ironclad nor one-sided. A current blank form of Colorado lease was given on page 616 in the issue of June 11th, '98.

TO FIND the number of gallons delivered per minute by a single double-acting pump at 100 feet piston speed per minute, square the diameters of the plungers, then multiply by 4. For duplex double-acting pumps, multiply by 8 Example, a 10-inch duplex pump will deliver 10x10x8=800 gallons of water per minute at 100 feet piston speed.

THE last report of the Canadian Mining Annual puts the total value of the mineral output of Canada for 1897 at $28,000,000, an increase of $6,000,000 over that of 1896. The output is divided among the principal mining provinces as follows: British Columbia, $10,456,268; Nova Scotia, $6,000,000; Ontario, $5,000,000; Quebec, $2,063,266; Northwest Territories and Yukon, $3,000,000.

"THE Quicksilver Mines" of California is the title of a company whose prospectus states that the property is the Redington quicksilver mine and comprises 6160 acres in Napa Co., Cal. It has been reported on by Messrs. Newcomb and Symington. The nominal capital is $750,000; offered for subscription, $500,000; the purchase money is, cash, $75,000; optional, $550,000; working capital, $125,000.

THE efficiency of boilers, engines and dynamos is now so high that little improvement can be expected. On the other hand, the optical efficiency of nearly all known sources of light is extremely low, these being the latest determinations: Oil lamp, 0.073%; ordinary gas flame, 0.33%; electric incandescent lamp, 1%; arc lamp, 3.875%; magnesium light, 15%; sun, about 31%; Geissler tube, 32 7%.

ZINC LEAD ores are not specially difficult of treatment. The Eastern smelting firms mentioned can treat them, but probably no better than they could be handled within fifty miles of where our Colorado correspondent writes. For an ore going, lead 20%, zinc 25%, silver 20 ounces, there ought to be no difficulty in getting $10 per ton, and if the ore goes more than 20% lead or 25% zinc, an additional payment.

THERE are twenty-seven volumes of the Transactions of the American Institute of Mining Engineers. Vols. I to IV, inclusive, cost $3 each; V to VIII, inclusive, $4 each; Vols. IX and X, $10 each; XI to XXVII, inclusive, $5 each. The cost of a complete file of the MINING AND SCIENTIFIC PRESS is not exactly statable. There are not more than twenty such files in existence. Such a file would probably be cheap at $2500.

SECTION 5 of Arizona's present mining law says: Any open cut, crosscut, adit or tunnel which shall be made, as above provided for, as a part of the location of a mining claim, and which shall be equal in amount of work to a shaft 10 feet deep and 4 feet wide by 6 feet long, and which shall cut a lode or mineral in place at a depth of 10 feet from surface, shall be equivalent as a discovery work to a shaft sunk from the surface.

IN the U. S. Senate last Saturday, Senator Perkins having had made a canvass of the Senate, found that there were enough votes to pass the California mineral land bill and was ready to move that measure. He was informed, however, that "this would be considered an unfriendly act by the friends of the other bills," and so had to suspend operations. Late Washington advices say that the bill "will be brought up as soon as possible."

APPROXIMATELY the '98 output of the West in metals aggregated $150,000,000—not like wheat or barley consumed, but added to the permanent wealth of the world. This crop occasioned wide distribution of returns, placing transportation charges at $15,000,000, cost of reduction $20,000,000, operating expenses, wages, machinery, etc., $50,000,000, profit to owners $65,000,000. And yet learned Eastern essayists are writing profound theses on the text, "Does mining pay?"

RESERVATION in a mining lease of a lien on "all ore mined," for royalties, is not waived by a provision in the lease contemplating that the ore will be shipped to market before payment of royalty, which is made every three months, and based on the weights as determined by the railroad transporting the ore from the mine. A lessor who reserves such a lien may recover in an action for conversion against the lessee who not only fails to pay royalties, but sells the ore without preserving the lien.

METALLURGISTS and geologists will note with interest the occurrence of a rare mineral recently found near Florence, Ravalli county, Montana, by a prospector. It occurs in small six-sided prisms, and upon analysis proves to be parisite, a carbonate of cerium, with a general formula (CaF)(CeF)Ce(Co3)3, with in this case a part of the cerium replaced by didynium and lanthanium. This is believed to be its first occurrence in the United States. It was first discovered in Colombia, S. A., and has only been found since in Greenland.

WHEN a lode enters an end line of a regularly located mining claim and runs its course lengthwise, nearly parallel with the sides of the claim for the greater part of the length of the claim, the owners of the claim are not deprived of their extra-lateral rights, because the lode crosses a side line before reaching the other end line, but such rights will extend from the end at which the lode enters to a point at which it crosses the side line, whether a new end line is regarded as being drawn at that point or not.

CORUNDUM is composed of the oxide of aluminum (Al_2O^3), but traces of the oxides of other metals are generally present as coloring materials. As in the cases of other minerals of non-metallic luster, the color of corundum varies considerably. Sometimes the mineral is colorless or white, and at other times it is found possessing a blue, pink, red, brown, gray or other color. The relative weight of corundum compared with equal volumes of many other minerals is high. It has a specific gravity of about 4, while feldspar has a specific gravity of from 2.4 to 2 7 and quartz of 2 5 to 2 8.

IT is calculated that air of 99.96 pounds pressure, transported through pipes to such a distance that it loses 10 26 pounds pressure by friction, will still be capable of exerting 96.92% of the power that might have been had if it had been used at full pressure without friction loss; the head is 99 96 pounds, the loss of head is 10 36% and the loss of power 3.38%, the loss of head being more than three times the loss of power. The manifest reason for this is that compressed air as it loses in pressure gains in bulk, and thus, by its increased volume, approximately compensates for the diminished pressure.

FROM the vicinity of Nelson, B. C., a 40% lead ore shipped to the U. S. would pay $12 duty and, say, $8 freight; smelted in B. C. and bullion shipped into this country, the duty would be $16 and the freight, say, $3 20—virtually the same. A 65% lead ore there would cost in duty $19 50 per ton; with $8 freight, that would be $27 50 per ton, shipped to the United States. Were it smelted near the mine, on the resultant lead the same freight rate, sent to this country, would be $5.20; the duty, $26 The problem from the British Columbia standpoint is a difficult one to solve.

THE miners' lien bill now under consideration in the California Legislature is an important measure. Under the present California law (modified by Supreme Court rulings) liens can be filed on a mine for labor performed or material furnished, but only on mines on which mineral land patents have been issued by the Federal Government. Mines on lands patented as agricultural do not come within the scope of the existing law. The proposed amendment is designed to permit the filing of liens on any and all mines and with the further object of simplifying such procedure.

THE California State Mining Bureau and Museum has been moved from the Pioneer building, Fourth street, San Francisco, to the upper northwest half of the new Union Depot at the foot of Market street, where State Mineralogist Cooper and his corps of assistants are finely situated. The Museum room is about 250 feet in length, and, like the offices, laboratory, library, etc, is admirably lighted and arranged. The Bureau is now well housed, with the State for its landlord, the cost of rent, etc., being $130 per month as against $250 in its former quarters. It will be ready for the reception of mining men, and visitors generally, about Feb. 10th.

THE bill relating to "grub-stake contracts," introduced in the California Legislature by a Siskiyou member, sets forth that any contract between individuals whereby one party thereto agrees to furnish all provisions, materials and boats, and the other all labor and prospecting required in prospecting for and discovering mines, shall be known as a "grub-stake contract" The bill makes "grub-stake contracts" void unless a written agreement fully setting forth the contract be made and signed by the parties and recorded in the office of the County Recorder of the county wherein one of the parties resides or where the prospecting is to be done.

AT the Guggenheim Smelting Works at Perth Amboy, N. J., as a final process all the gold slimes are treated with nitric acid in porcelain bowls, steam heated, whence, after several days, the resultant chocolate colored mud is taken to the melting room and refined in a small furnace, borax being used for flux, and cast into bricks. From the residual nitric acid the silver in solution is precipitated by the addition of common salt. The main silver yield, from the tanks, is melted in large retort furnaces, made of graphite. The silver is cast into 1100-ounce bricks, on which a smooth surface is secured by burning sugar thereon, while molten, and briefly excluding the air. The silver output of those works is nearly three tons per day.

IN securing patent to a mineral claim, the first thing to be done is to send to the office of the surveyor general a certified copy of the location notice and $35, this sum being for office fees. That office then authorizes the survey. The applicant makes the financial arrangements with the surveyor. The surveyor makes return to the surveyor general's office of his notes, etc., where the clerks plat the claims and check up the surveys. They then send the applicant two copies of the plat and a copy of the field notes. One copy of the plat he posts up on the claim. The other he files at the land office and makes application to the register for a patent. The application is sent forward from the land office to the commissioner of the general land office, and from this latter office the patent finally issues.

IN the Rand, South Africa, the stamp mills are of the usual Californian pattern, with self-feeders. Their weight used to be 850 to 900 pounds and they used to have a 9-inch drop. The modern mills have 1200-pound stamps and are worked with an 8-inch drop, some of them dropping ninety-two to the minute. The best crush 4½ to 5 tons per twenty-four hours per head, through a 900 mesh screen. The average for the entire district for one month was 3 7 tons crushed per head per twenty-four hours. The batteries have amalgamated copper plates inside them, and the crushed ore is discharged on to copper tables 12 feet long and 6 feet wide, these tables being amalgamated so as to catch the gold. It is found that most of the gold is caught inside the battery, and on the first 3 feet of the outside copper plates. The amount of gold caught on the plates is 55 to 60%—an amount which compares unfavorably with many other plates where the percentage is 80. The amalgam is collected, cleaned in pans and then heated in retorts, mercury driven off and recondensed; the spongy gold so obtained is then melted. The loss of mercury in the entire treatment is about three-fourths ounce per ton of ore; at the Robinson mine it is 0.65 ounce. The melted gold is usually 800 to 825 fine and contains silver, lead, copper and other metals.

Platinum.*

By DAVID T. DAY

Production.—The product of platinum during 1897 in the United States came chiefly from Trinity and Shasta counties, California, and amounted to about 150 ounces, worth in the crude state $900. The production since 1880 has been as follows:

Year.	*Quanti'y, ozs.*	*Value.* (a)
1880	100	$ 400
1881	100	400
1882	200	600
1883	200	600
1884	150	450
1885	250	187
1886	50	100
1887	448	1,838
1888	500	2,000
1889	500	2,000
1890	600	2,500
1891	100	500
1892	80	550
1893	75	517
1894	100	600
1895	150	900
1896	163	944
1897	150	900

(a) The chief variations in price have been due to the quality of the crude grains.

Localities of Occurrence.—During the year '98 a demand has developed for osmium which has greatly stimulated the search for iridosmine, and hence for all the platinum metals, since osmium either in the form of iridosmine or as an impurity in platinum and in platiniridium is almost invariably found where any of the other platinum metals occur. The demand for osmium comes from the Welsbach Light Co. of Philadelphia, who need it for the incandescent lights. It is probable that very much more will be known in the next few months concerning the distribution of the platinum metals on the Pacific slope. In fact, a general search for the platinum metals will be made by this company throughout the United States, Canada, Alaska and South America. On the Pacific slope platinum was noticed by Siliman in the black sand obtained as the heaviest material with the gold in placer mining at Cherokee Flat, Butte county, California. Siliman speaks of it as being plentiful, and the iridosmine more plentiful than platinum, but that the miners have no way to save it. Since then platinum has been noticed on the coast of California as far south as San Bernardino county. All the work done in the search for platinum, including that of the writer during the present summer (1898), tends to strengthen the belief that it occurs only in more or less direct association with placer sands derived from serpentine rocks, and especially those rich in chromite. A glance at the recent geological map of California, in which the occurrence of serpentine rocks and deposits of chromite are noted in colors, will give a fair idea of the distribution of gold-bearing sand in which platinum metals have also been found. Thus, coming north from San Bernardino county, California, platinum has been obtained when washing for gold in the beach sands of the coast near Santa Barbara; again at Lompoc beach; on the beaches of San Luis Obispo county; farther north again in the neighborhood of Santa Cruz; and it has occasionally been found between Santa Cruz and the Golden Gate. But the coast sands which have yielded the platinum metals most prolifically in California are those of Humboldt and Del Norte counties. The beach mines of Gold Bluff, north of Arcata, and the mines at Big Lagoon, Stone Lagoon, Little River, and going north in the neighborhood of Crescent City, and coming inland from there the mines in the neighborhood of Gasquet and Smith River, have furnished considerable amounts of platinum, and would doubtless have furnished more but for the fact that the platinum is extremely fine, making it difficult to separate from iron pyrite, chromite, magnetite and ilmenite. Further, it has contained a discouragingly large amount of iridosmine that is practically valueless; it was too fine for pen points and had no other use.

Going farther north in Oregon, the same conditions concerning the occurrence of platinum along the coast are principally noticeable at Gold Beach and at Port Orford in the Coos bay region. Sharpless and Winchell have carefully examined the sands at Bandon, at the mouth of Rogue river, Oregon, and found platinum almost invariably, although the proportion was smaller than has usually been reported by less careful observers. Thus beach mining for gold, in which platinum has frequently been saved, continues as far north as Yaquina bay, Oregon, and more or less successful efforts have been made to save the platinum associated with fine gold in the black sands of the Pacific beach north of Astoria, Oregon, and still farther north on the beaches of Washington. The saving of platinum from beach sands, however, as indicated below, reached its maximum extent in the mines of Gold Bluff, Crescent City, Gold Beach and Port Orford.

Meanwhile the interior of the State has also furnished platinum from the black sand associated with gold in the placers of the American river, and in Plumas, Shasta and Trinity counties, California. In these counties both gold and platinum have usually been coarser, and thus the platinum has been more easily saved and separated from the finer grains of iridosmine. In fact, the main seat of the platinum industry of the Pacific slope has been in the Hay Fork district of Trinity county and along the Trinity river from Chapman's mine, six miles south of Junction City, northward to North Fork. Here both the large mines and the small Chinese workings have furnished the bulk of the platinum produced in the United States. Nuggets one-quarter of an inch in diameter have very frequently been found. In the Hay Fork district iridium, in the form of platinum iridium or iridosmine, has been a noticeable feature. The region of Grant's Pass, on the Rogue river, Oregon has also furnished small quantities of platinum, and will probably furnish much more in the future.

Much of the general information has been obtained from the records of the California State Mining Bureau, furnished by Prof. Durden and by Mr. Charles G. Yale, but was supplemented by a personal visit of the writer—in company with Col. W. E. Barrows, president of the Welsbach Light Co.—to most of the inland regions which have been described.

By continuing to Portland and examining all the black sands which could be found from various points in Oregon, Idaho and elsewhere, traces of platinum were found in sands at various points on the Snake river from Bakersville to Lewiston, and a specimen of platinum sand was also obtained from Miles City, Montana.

In regard to the conditions of occurrence of platinum in California and Oregon, the general statement that the black sands are richer as one preceeds farther north should be modified. This undoubtedly is true if one considers the coast from San Bernardino through to the northern limit of California, the richest deposit having been found in Del Norte county; and the same conditions continue in Oregon as far as Coos bay, but above this there is no information at hand to show that the black sands farther north are richer in platinum or gold than those farther south, or, indeed, that they are so rich.

For years the region known as the Similkameen district, in British Columbia, has been looked upon as the richest source of platinum in America, and a visit to this point, which is reached most easily by a wagon drive of 120 miles south from Kamloops, British Columbia, on the Canadian Pacific Railroad, was made by Col. Barrows and the writer. It was found that there are large bodies of serpentine containing chromite near the headwaters of Tulameen and Granite branches of the Similkameen river, and below this the sands of both creeks are remarkably rich in the platinum metals.

Platinum has also been found on Slate creek, which empties into the Tulameen river a short distance above Granite creek. This region is particularly interesting because of the characteristics of the platinum grains found there. It is practically easy to determine whether a given nugget of platinum was found on the Similkameen river proper, or whether it came from the region of the Tulameen or Granite creek district. In the latter case the nuggets are usually black and very magnetic, due probably to the fact that they are frequently coated with either magnetite or magnetite and chromite, or with some oxidation product of pyrrhotite. The platinum sand coming from the Similkameen river, on the contrary, is bright, as though the greater part of the coating had been rubbed away. There is every indication that the platinum of Granite creek is in close proximity to the original source. This fact is made particularly evident by the finding of a platinum nugget to which a considerable amount of the mother rock was still attached. This rock proves to be peridotite, mixed with chromite and magnetite. A careful search will be made of the various rocks in the vicinity, with the probability of finding platinum in place.

In regard to the proportion of platinum metals to gold, the only direct evidence was the fact that at the Pogue mine, operated by Mr. T. H. Murphy, about twenty ounces of coarse platinum, the principal nuggets ¼ inch in diameter, were found in mining 100 ounces of gold dust, and this proportion can be taken as perhaps fairly representative of the district, although the proportion must necessarily vary considerably, because not all either of gold or platinum is saved, the fine gold and fine platinum usually being put aside with the black sand to be worked up at some future day. The total output of platinum in the Similkameen district has declined very greatly. In fact, the large output for one or two years, about 1886, was due to a cleanup of various lots of black sand, rich in platinum, which had accumulated for several years. The output of 1897 did not vary considerably from 200 ounces.

Word was received that a considerable proportion of platinum was found with the gold of the Caribou district, 250 miles north of Ashcroft, British Columbia, and Mr. W. Pellew Harvey of Vancouver has found three one-hundredths of an ounce per ton in the unconcentrated sand of the Saskatchawan river, sixty miles up the river from Edmonton, British Columbia. It is said that the Edmonton black sand is regularly purchased for shipment abroad, in order to obtain platinum from it.

Platinum in Russia.†—Platinum is produced only in the Ural, in the mining districts of Perm and Verhotursk. In the following table is shown the production by works in 1896, the last year for which any official figures are available:

Name of mine.	*Production, Troy ounces.*
Goroblagodat	116,980
Nizhne-Tagilski	31,288
Krestovozdvizhenskie	23,635
Nikolaye-Pavdinski	1,573
Bogolovski Mining Co	362
Total	173,838

In 1896, as well as in preceding years, the largest quantity of the output was produced in the Goroblagodat region, viz., 116,980 ounces, or a little over two-thirds of the entire product. Next follow the mines of the Nizhne-Tagilski works with 31,288 ounces, or 18 per cent, and the Krestovozdvizhenskie with an output of 23,635 ounces, or 13½ per cent of the total. Compared with 1895, when the production was 155,646 ounces, the output increased by 18,192 ounces, or nearly 12 per cent, owing principally to the increased demand and good prices paid for the metal.

The production of platinum in Russia during the four latest years for which statistics are obtainable is given in the subjoined table, which also demonstrates that the rank of the producing mines has remained the same:

Mines.	*1893. Ounces.*	*1894. Ounces.*	*1895. Ounces.*	*1896. Ounces.*
Goroblagodat	107,267	108,242	94,045	116,980
Nizhne-Tagilski	44,702	45,625	36,558	31,288
Krestovozdvizhenskie	22,312	23,045	22,091	23,635
All other	5,490	6,752	2,952	1,935
Totals	179,801	183,664	155,646	173,838

The production and value of platinum for a series of years, and also the production of this metal for the twelve years from 1885 to 1896, are given in the two following tables:

Year.	*Production, ounces.*	*Value.*	*Average price per ounce.*
1893	179,801	$1,765,669	$9.83
1894	183,664	1,714,020	9.33
1895	155,646	1,701,623	10.93
1896	173,838	2,085,930	12.00

Year.	*Production, ounces.*
1885	91,944
1886	152,195
1887	155,415
1888	95,799
1889	92,946
1890	100,289
1891	149,365
1892	161,234
1893	179,801
1894	183,664
1895	155,646
1896	173,838
Total, twelve years	1,692,136
Average yearly output	141,011

The year 1894 represents the greatest quantity of platinum obtained in any one year. Of this amount (183,664 ounces) 181,029 ounces of platinum were washed out of 1,833,219 short tons of platinum-bearing sand, while the remaining 2635 ounces were washed out of gold-bearing sand. In 1895 there were washed 1,728,816 short tons of platinum-bearing sand, yielding 154.862 ounces of platinum, besides a small amount (794 ounces) obtained from gold-bearing sand.

Establishments for Refining Platinum.—The crude platinum obtained from the mines, before being put to use, is subjected to a refining process. This is done in various establishments, but mainly in foreign ones, and consequently a large part of the metal produced is exported in the crude state over the frontier. In Russia there exist only two establishments refining platinum, the Tentelevski Chemical Works and the laboratory of Kolbe & Lindfors. Both are located at St. Petersburg, and are under the supervision of the mining department. The former of these establishments in 1896 purchased 1343 ounces of the crude platinum, from which 1114 ounces of pure metal were produced. The Kolbe & Lindfors laboratory in 1896 neither bought nor refined any platinum.

Two new companies were formed in 1896 for the production of gold, platinum and associated metals.

Osmium-Iridium.—This metal is obtained from only one locality, the Miasski gold mine, in the government of Orenburg. The production for the last three years for which any information can be obtained is given in the following table:

Year.	*Production, ounces.*
1894	125
1895	159
1896	224

The production in 1896 shows an increase over that of 1895 of sixty-five ounces, or nearly 40 per cent.

*U. S. Geological Survey, 19th annual report, 1897-98.

†Authority: Sbornik Statisticheskyh Svyedyenii o Gornozavodskoi promyshlennosti, Rossii 1894 i 1895, Otchet Gornava Departmenta za 1896 goda, St. Petersburg, 1897.

Some Needed Aids to Development of Mines.

Written for the MINING AND SCIENTIFIC PRESS by JOHN W. GRAY.

Those who heighten the public weal are public benefactors. The men who increase the commonwealth and develop for others self-sustaining opportunities, benefit mankind much, and those who do this in a manner which does not impoverish their fellows and render it more difficult to earn one's bread, benefit the world most.

As this is true of individuals, so it is true of the industries which offer the field for such work. The mining industry stands pre-eminent in this regard, and so the industry itself, and those engaged in it, should be looked upon with special favor. Yet the present splendid development of the industry in our own country has been brought about by greater efforts and harder struggles than have even been needed in the industries of lesser possibilities, and with less of aid and encouragement from the individual, State and Government, notwithstanding the fact that from no other industry does the country at large receive more direct and substantial advantage, and the further fact that there is no other industry of more brilliant promise, or the complete development of which offers such general benefit.

In former times, the industry of mining was looked upon as the noblest of all, and those engaged in it were regarded with distinction, enjoyed the favor of high and low alike, and were the recipients of substantial governmental aid in the pursuit of their calling. In many other lands to-day, the industry of mining receives high attention and fostering care, and aids to its full development are being constantly conceded. Our own people and country have been backward in this regard, but when the good results sure to follow all aid and attention which may be bestowed upon the industry are better known, all classes of people and all manner of men will unite to see that mining receives its just due, and that the industry shall occupy that proud distinction among the pursuits of man which rightly is hers.

Probably the three things most needed to fully develop the industry of mining in our western country are cheap power, easy and economical transportation and low reduction charges. Money is always, of course, needed, but this would come with the others, since credit is usually obtained when sought in connection with business based upon the elements of success.

To-day, money is put into our mines in large sums chiefly, and few properties are considered of importance which do not afford opportunities for extended operations. Much of the money is foreign, and most of the profits from such enterprises are paid to foreign residents. All of this is well enough, perhaps, but the full and complete development of the mining industry will not be brought about by such means.

If capital were to be expended in constructing railroads and common economical transportation lines throughout the mining regions, in providing cheap power at all mines, however small, and in establishing central metallurgical plants to which all roads should converge, it would no doubt receive satisfactory profit, and would tend to vastly increase and sustain the public prosperity. There are thousands of mines producing ores easily concentrated or otherwise put into shape for the reduction works which, under the conditions mentioned, could and would be profitable worked in a small way, producing in the aggregate vast amounts of ore, and affording to the workers permanent, agreeable and independent occupation. Such mining as this means the true development of the industry. It is applicable alike to all kinds of mining. It means the creation of a mining class, owners and wage earners in their own claims, with as great independence and greater chances of regular profit, than the farming class. It means the establishment of permanent and prosperous mining communities. It means the creation of the most profitable markets possible for all classes of producers. It means a considerable increase in the general prosperity of the State, since it brings about increase of population and production of wealth. It means the raising of the miner to a higher level, and the creation of a class which, by personal force and intelligence, will ultimately develop nature's vast fields of riches along the lines intended by the Creator, and to the utmost benefit of all. It means too many good things to be included within the compass of a short article, but which will suggest themselves to the thoughtful man.

In a small way, in some parts of the world, the mining industry has been thus developed, and nowhere do more prosperous or generally beneficial communities exist.

That the final development of mining must come about in some such manner, would seem necessary, since the vast majority of mines can only be so worked, paying permanent and satisfactory wages to the owners, offering no field for capital save in the manner pointed out, but nevertheless affording the most satisfactory conditions for the employment of both capital and labor.

Great aid to the full development of mining will be given by raising the general intelligence and increasing the skill of all the workers in the various occupations included in the mining industry, and we now come to a most important and necessary factor in the final development of all industrial pursuits—that of the education and training of the worker.

At no time in the history of the world has so much attention been given to the subject of general education as is now being given thereto. Millions upon millions of dollars are being poured into the already overcharged coffers of our various universities for the extension and advancement of these institutions. Suppose, now, that some of these millions could be applied to undertakings more especially adapted to the education of what is termed the "workingman" and to increasing the skill and intelligence of that great army of men who are to-day making possible the brilliant achievements of the present time. Other nations are doing much in this direction, but our boasted American civilization has as yet done but little.

An area of country in one of our best and most attractive mining counties could be secured, containing all the natural elements necessary for splendid success along the lines outlined. Here a great practical school of mining, metallurgy, electricity and the various mechanical arts could be established, affording to the manly and ambitious youth of all countries opportunities greatly to be prized, and now entirely denied to them. A town could be established, power developed, the necessary metallurgical and mechanical plants constructed, and those attending the various departments of the great school could be employed in labor, as well as study. Such an institution, by working its own mines and other industrial departments, would be largely self-sustaining, without in any way interfering with private enterprise, and the students, by giving half their time to labor, might be able to cover for themselves the cost of such an education as is at present beyond the reach of all.

The possibilities of such a great school are manifest. It would attract the best youth of our land, and of many lands, and would in no long time become known throughout the world and be a source of pride and pleasure to all who love the goodness and greatness of modern Americanism.

There is no spot so suitable as California for such a school, and its successful establishment would be a monument to the goodness of its founders and the State whose aid and care will foster it. From such a school the youth of all lands would go forth, with hands trained to American skill, arms strung with American energy and spirits full of American pluck, to play a mighty part in the great industrial evolution of the future and in the development of many lands, whose resources now lie, in great measure, undisturbed and dormant.

From this great practical school it will be but a step to our famous universities, in which institutions it will be possible to pursue the studies already well begun, and to carry out experiment and research to the utmost point desired. Thus the field would be doubly open, first for those seeking industrial training and skill with the necessary learning, and, second, for those desiring to enter the field of higher education and devote themselves to the branches of research and investigation.

Here is an opportunity for philanthropists to do great good to a great many, an opportunity for the practical solution of some of the many questions now seemingly so to puzzle the good but theorizing political economists, and an opportunity for the business interests of the country to aid in an undertaking which would, after a time, do more to extend and increase the trade and commerce of the land than any equal expenditure in other channels.

California-Built Japanese Cruiser.

The first war vessel ever built in the United States for a foreign Government is the protected cruiser Chitose, built by the Union Iron Works of San Francisco for the Japanese Government, and which has successfully completed an official six hours' trial trip in Santa Barbara channel, averaging 21.48 knots per hour, when but 20.5 were required, and developing a speed of 21.38 knots under natural draught.

The upper part of the engraving on page 85 shows her lines and general appearance as completed; the lower part is a deck plan. She is technically known as a second-class, high-speed, unarmored, protected cruiser, is 405 feet 2 inches in length, 49 feet breadth, 17 feet 7¼ inches draft, 4760 tons burthen. Engines triple expansion, twin-screw propellers, four double-ended and four single-ended boilers 14 feet 3 inches diameter. The armament consists of two 8-inch 45-caliber quick-firing guns and twelve 12-centimeter guns, twelve 12-pound guns, and six 47-millimeter quick-firing guns; there will also be five torpedo launching tubes, one 14-inch fixed and four 14-inch training. She has a Japanese crew of 182 men, and, under Commander L. Mori, will next week start across the Pacific to Japan.

Some Modifications of the Cyanide Process.

Translated for the MINING AND SCIENTIFIC PRESS.

The following are brief abstracts of descriptions of modifications of the cyanide process, proposed by European workers and published in foreign journals. It is believed that no sufficiently full description of either of them has so far appeared in America.

1.—The Pape-Henneberg and Goepner-Diehl Combination Process.—This process was described in an Austrian paper by Dr. C. Blomeke. Pape and Henneberg devised a method of dry crushing and concentrating by the application of centrifugal force and air-currents, while in British patent No. 17,793 of 1896 and U. S. patent No. 580,683 Goepner and Diehl claim to precipitate gold and silver from dilute solutions by adding cyanide of silver or copper and then acidulating.

After suitable pulverization the ore is treated on a centrifugal separator with an air-current produced by an exhausting fan, yielding six grades of material, the four finer suitable for leaching, the other two for amalgamation: (1) heavy sand, (2) medium sand, (3) fine sand, (4) coarse dust, (5) fine dust, (6) floating dust, corresponding to slimes.

The advantages claimed for dry separation are: 1—The dust (slimes) is easily separated and collected, as is not the case with spitzkasten, etc. 2—The "percolation products" are looser, freer leaching, so causing less absorption and higher gold extraction. 3—Much less water is required. 4—Dry-separated products can be treated at once by chemical processes, those got in the wet way requiring twenty-four hours' drainage. 5—Apparatus for dry work takes up much less space than spitzkasten, etc., and necessitates a less outlay. 6—The cost of gold extraction is less by the dry way for refractory and low-grade ores.

Goepner and Diehl's extraction process consists essentially in (1) leaching the ore with a solution of pure potassium cyanide, such as is always employed, but with the addition of some secret ingredients; (2) in the removal of the auriferous solution from the residue by filter presses; (3) in the precipitation of the gold by sulphuric acid in place of the zinc commonly used. For the latter purpose an excess of copper cyanide is added to the solution and then sulphuric acid which precipitates the cyanides of copper and gold. After this has settled the solution is removed and made alkaline again by means of soda lye; upon adding a little more cyanide it is ready for further use.

The copper-gold-cyanide precipitate is redissolved in fresh gold-carrying solution and then thrown down again by more acid, and so on, whereby a continual enrichment of the precipitate takes place. When this enrichment has gone far enough the precipitate is dried in filter presses, and redissolved in fresh potassium cyanide solution, from which the gold is precipitated by electrolysis while the copper cyanide remains and can be used again.

As high as 95 per cent extractions have been made by this process, both by percolation and with slimes; in the latter case the filter press is used and removes the solution very completely from the residue.

Detailed accounts are given by Dr. Blomeke of experiments on 500 to 2000-pound lots of ore from West Australian and South African mines.

2.—Netto's Process.—In June, 1896, Don Cesar Rubio published in the *Revista Minera* of Cartagena, Spain, an account of an improved cyanide process for the extraction of gold and silver from ores, the invention of Max Netto, a foreign chemical engineer resident in Spain. (1) The solution of these metals is effected by the action of aqueous KCN in the manner common to the MacArthur-Forrest and Siemens-Halske processes, (sulphides and "dry" ores being preferably first roasted with the addition of a little salt), the solution containing from 0.5 to 0.8 per cent; this is run on at intervals so that air is carried down with it, and is followed by a water wash after four to eighteen hours' contact. (2) Precipitation of the silver is effected by acidulating with hydrochloric acid which throws down AgCl (mixed, though the author omits to mention it, with more or less AgCN) which is filtered or decanted off, the KCN being at the same time decomposed with formation of free hydrocyanic acid. (3) The gold is obtained by electrolyzing the acid solution, some Cl being set free at the same time; the cathode is a gold sheet and the anode of carbon. (4) Regeneration of the alkaline cyanide is effected by adding soda or potash to the solution in the proportion calculated to combine the free HCN and form KCN or NaCN.

The leaching is carried on in cement tanks, the rest of the process in wooden vats.

According to Senor Rubio this procedure has the advantage of forming no prejudicial compounds like the MacArthur-Forrest system, and losing no appreciable amount of cyanogen as with the Siemens method, only about 3 per cent of the total being lost.

In the *Berg und Huettenmaennische Zeitung* of October 15th, 1897, C. A. Hering discussed this method favorably, pointing out that the Cl set free at one stage will react at another stage to form cyanogen

chloride (CyCl) which makes the solvent more effective when subsequently used, another advantage being the production of gold and silver nearly free from one another. In one case quoted an ore, carrying about one ounce gold and twelve ounces silver (as sulphantimonide) per ton, yielded 92 per cent of its value at a cost of about $5.50 per ton, a preliminary roasting being necessary in this particular case.

In the same journal Messrs. Witter and Zuschlag criticized Netto's claims, stating that the process, though it appeared continuous and satisfactory on paper, went on differently in practice.

Their experiments were carried on for a year and a half, while they were engaged in testing the adaptability of some forty ores to the Pape–Henneberg process already described, the coarse gold having been removed from these ores before cyaniding.

The solutions from these experiments were precipitated by the method of Prof. Christy or Prof. De Wilde* (addition of copper sulphate, sulphurous and sulphuric acids), and the gold and silver thus precipitated were estimated by cupellation. Larger quantities, from tests on one-fourth to ten tons were treated by the precipitation process of Goepner–Diehl (copper or silver cyanide followed by acid).

It was thereby shown that gold potassium cyanide solution, if it carries silver, needs no addition of cuprous salts; the gold and silver fall out almost completely on acidulation with either sulphuric or hydrochloric acid. If solutions stronger in KCN are acidified with sulphuric acid, 2 to 4 grams of gold per cubic meter ($1 20 to $2 40 per ton) remain in solution, as against 1 to 1 5 grams (60 to 90 cents per ton) with hydrochloric acid, the original liquor carrying 20 to 100 grams per cubic meter ($12 to $60 per ton). The retention of these small amounts of gold results apparently from formation of aurocyanhydric acid ($HAuCy_2$) which breaks up at 50° C. (120° F), if heated to that temperature the gold falls out quantitatively.

They therefore prefer to add to such solutions as carry gold only, some previously obtained gold-silver precipitate, stir, and acidulate. In laboratory experiments copper chloride or silver nitrate was added to the auriferous solution and then acid, this removed the gold quantitatively. Silver-bearing solutions naturally needed no such addition before acidulating.

These writers cite the results of their hundreds of experiments in disproof of Netto's claim that his process yields the gold free from silver and silver free from gold.

In a still later number of the same journal (Dec. 24, 1897), Max Netto writes in defence of his claims, premising that no extraction process is universally applicable, and that the cyanide process especially is best adapted to low-grade ores and mill tailings. The solutions experimented on by Messrs. Witter and Zuschlag ($12 to $60 per ton) are much richer than those met in ordinary practice. As an instance he estimates that the average Transvaal ore should give a solution carrying about 11 grams per cubic meter ($6 60 per ton) and the tailings and low-grade ores still poorer solutions. He considers about $6 per ton about as high as is to be ordinarily expected in working solutions. If a solution of this value is acidified with HCl, at the ordinary temperature, Netto states that the precipitated AgCl (whether in large or small proportion) contains only traces of gold, the gold all remaining in solution; with solutions richer in gold and at higher temperatures the amount of gold removed increases irregularly, irrespective of the presence of silver. But, as any heating is avoided on account of the great cost, it is to be regarded as a favorable circumstance that the Netto continuous process goes on best at the ordinary temperature. The correctness of these claims was proven by Netto's extensive researches in 1893 94, since confirmed in other laboratories, including that of H. Roscher at Hoboken-les-Anvers.

*An account of these methods of precipitation may be found in Prof. Christy's paper on "Solution and Precipitation of the Cyanide of Gold," pages 20 to 22 and page 36, or in the MINING AND SCIENTIFIC PRESS of Jan. 9th and Feb. 6th, '97. De Wilde's method was recommended at a recent meeting of the South African Chemical and Metallurgical Society as giving an absolutely complete precipitation of gold for laboratory purposes, though it was condemned as a metallurgical process.

Reciprocity on This Side.

That native-born citizens of the Dominion of Canada shall be accorded in said district of Alaska the same mining rights and privileges accorded to citizens of the United States in British Columbia and the Northwest Territory by the laws of the Dominion of Canada or the local laws, rules and regulations; but no greater rights shall be thus accorded than citizens of the United States or persons who have declared their intention to become such may enjoy in said district of Alaska; and the Secretary of the Interior shall from time to time promulgate and enforce rules and regulations to carry this provision into effect.—U. S. Public Bill No. 39, Sec. 13; approved by Congress, May 14th, '98.

ELECTRICITY and electric machinery have 48 000 square feet in the United States exhibit at the Paris Exposition in 1900. None too much.

Existing Conditions in the Klondike.

Written for the MINING AND SCIENTIFIC PRESS.

This is no place for a poor man, but a good country for large capital properly directed. The country from the Hootalinqua to the Koyukuk—1000 miles—is almost blanketed with low-grade gravel, that is, low grade for present methods, but high grade for larger operations.

The rush here was based on the expectation of finding other El Dorado or Bonanza creeks. El Dorado, Bonanza and Hunker, which is also a good creek, were discovered and located at the same time in 1896. Since then, with 4000 prospectors coming in in 1897 and 40,000 coming in in 1898, and scouring the country, not only all about the Klondike, but all up and down the Yukon, not another rich creek has been discovered, so far as proved. Of course, Dominion promises well; so does Sulphur, and lately great reports come from Thistle creek, which come into the Yukon on the right bank 100 miles above Dawson. But none of these creeks have been proved up.

The most important development made has been in the bench claims along El Dorado, Bonanza, Hunker and Dominion. The richest bench claims, generally speaking, are above, or nearly above, the richest creek claims. These benches during the past summer produced $2,000,000 or $3,000,000, and will produce much more this winter and next summer. Only the rim of the benches has been prospected, but the indications are that they contain much more gold than do the creek beds. They are, however, contiguous only to the rich claims of the richer creeks, so that their development means only the proof that El Dorado, Bonanza and perhaps two or three other creeks will produce more than has been estimated.

All these rich claims are already coming into the hands of capital, and the late arrivals are working "lays" on creeks so far not proven. They always find gold enough to prove that the creeks will pay to work by cheaper methods, but hardly wages now. Out of 18,000 claims now located in this neighborhood not over 300 have been proved rich enough to return their owners more than good wages.

The whole country will in time be worked by cheaper methods—modifications of hydraulic mining—and the output will be immense, probably as great as from any country in the world.

This applies to the country all along the Yukon, down through Alaska as far as Rampart City and beyond. In Alaska the miner is not robbed by the Government, gets larger claims, pays less for supplies; generally speaking the mines are more easily worked and are as good as here, excepting, of course, El Dorado and Bonanza. I would advise the miner who knows his business to try Alaska. I do not think that this winter will show up another rich creek unless it be Thistle or some other new one. Since the Klondike excitement started you have heard of dozens of creeks proved as rich as El Dorado, according to reports, but that is all nonsense. Less than 40 claims on El Dorado, less than 100 on Bonanza and about 40 on Hunker will return their owners small or large fortunes. Nothing else has been proved rich, although thousands of shafts have been sunk. Dominion and Sulphur will, I have no doubt, show up well; but they have not been proved yet. So, you see, the whole rumpus is caused by these El Dorado claims. Bonanza does not compare with them. El Dorado is great. A dozen of the El Dorado claims will yield a million each, and probably more of them. Then, the benches on French hill and Skookum and Gold hill are marvels. They are not prospected yet, but are turning out very rich pay. But when you leave that little strip along El Dorado and Bonanza you find nothing great so far as proved. Certainly nothing as good or better than the Alaska mines at Birch creek or in the Forty Mile country has been found off El Dorado and Bonanza. Birch Creek and Forty Mile districts, and others along the Yukon in Alaska, are being exploited this winter by nearly 10,000 miners, and many of them are working diggings that have for years been known to be worth at least wages, and many new creeks are reported to prospect very well. Several thousand men are on the Koyukuk. Supplies in Alaska are comparatively plentiful and well distributed, and cheaper than at Dawson. So the outlook for good returns there is the best. Then it may be said that a larger proportion of the men in Alaska are real miners, and not rainbow chasers.

Dawson City, Nov. 11th, '98.

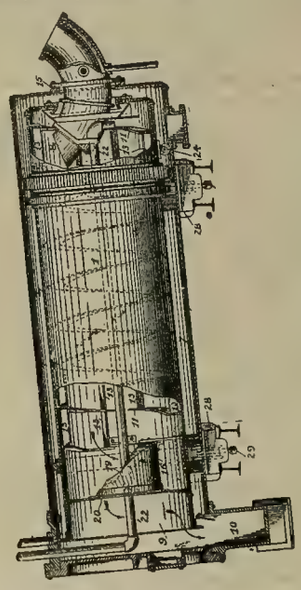
THE advertiser in a trade journal is mainly one who offers some commodity or service to persons engaged in a particular trade. The circulation of the paper represents a class of people, every one of whom can be considered and addressed as a possible patron. That they are intelligent above the human average is certain, or they would not take a paper devoted to one topic. And that they are worth addressing is equally sure, for each one must be an interested reader of the trade advertisement addressed to the trade. It is not an exaggeration to say that every 1000 of circulation in a trade paper is worth to any advertiser in the trade concerned any 10,000 or more of circulation in a paper addressing the general public.

Latest Mining and Metallurgical Patents.

Patents Issued January 17, 1899.

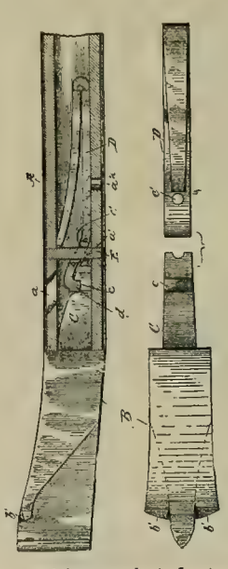
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

EXTRACTING AND REFINING ASPHALT.—No. 617,712; A. F. L. Bell, Carpenteria, Cal.



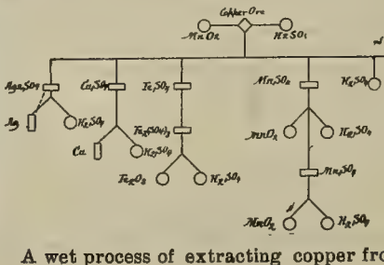
A revoluble mixing cylinder inclosed within and open to an inclosing vapor-tight casing, the ends of the cylinder having openings equal to about one-third of its diameter, through which the asphaltic material is received and discharged; at one end is a sealed inlet way for the asphaltic material, at the other end discharging scoops attached to and revolving with the mixing cylinder to raise and discharge the insoluble matter, the scoop being provided with perforations or a screen at its bottom so the free liquid solution or solvent can drain back and remain in the mixing vessel.

ROCK DRILL.—No. 617,795; O. G. Worsley, Newark, Ill.



A combination with a socketed stock having its end faced to receive the impact of the drill bit and a drill bit having a shoulder for bearing against the stock end, one of such bearing surfaces being oblique to the axis of the member of which it forms a part, with a shank for the bit adapted to enter the socket of the stock and to have a lateral movement at its inner end, and a spring bearing laterally against the shank, whereby the bit is caused to extend beyond the line of the periphery of the stock.

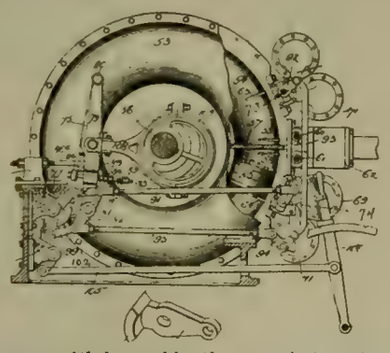
EXTRACTION OF METALLIC ORES.—No. 617,911; E. A. Smith & M H. Lyng, Anaconda, Mont.



A wet process of extracting copper from its ores

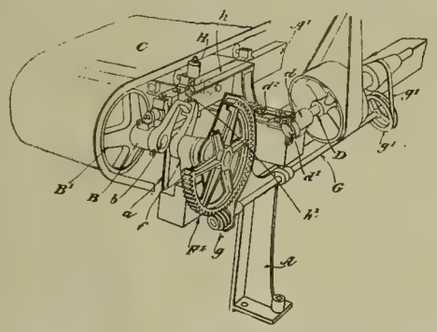
having precious metal therein, consisting in digesting the pulverized ore under action of heat and an oxidizing agent, in presence of sulphuric acid, exposing the dissolved sulphates to metallic copper for precipitation of the silver, treating the filtrate electrolytically to deposit the copper, evaporating the lean electrolyte to concentrate the free acid and crystallize the metallic sulphates, and finally calcining such crystallized sulphates to properly regenerate them as oxidizing agents for refuse.

ENGINE.—No. 617,807; W. S. Colwell, Chicago, Ill.



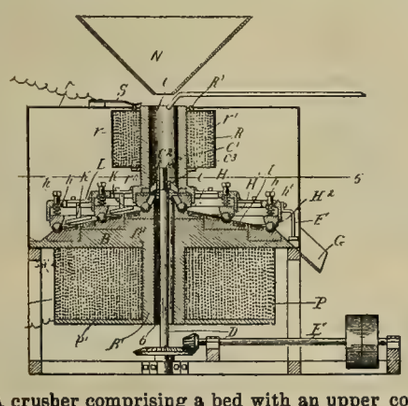
A motor with in combination an abutment, a piston, a continuous piston way having an exhaust port at each side of abutment, a vacuum chamber, a valve housing having communication therewith and with each exhaust port and provided with an exhaust-discharge passage, a valve in each housing adapted to place either exhaust port, in communication with vacuum chamber and exhaust-discharge passage alternately, a floating lever, a pivotal support or standard having limited oscillation, pivotally and elastically connected to lever; a second lever pivoted to first lever and having its ends provided with pivotal operative connection with the valves respectively, means for holding either end of second lever inactive while the other end oscillates, and means for admitting pressure to the piston way at either side of the abutment.

VANNER.—No. 617,953; C. L. Carman, Chicago, Ill.



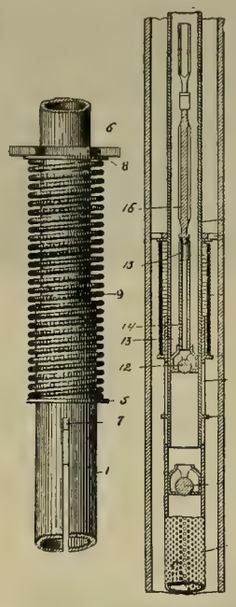
An ore vanner, a combination of a rotatable driving drum having an ore belt mounted thereon, means for vibrating the drum and ore belt transversely, a crank arm rigidly mounted on the projecting end of the driving drum spindle and having a right angular projecting lug thereon for rotating the driving drum, an independent intermediate driving shaft arranged in line with the axis of the driving drum and provided with a crank arm at its inner end having a radial face engaging with the projecting lug of the first-named crank, means for rotating the intermediate driving shaft, and an oil cup or reservoir provided with a flexible projection arranged to be contacted by one of the dogs during their rotations so as to lubricate the engaging faces of the crank arms.

ORE CRUSHER.—No. 617,781; C. Skinner, Chicago, Ill.



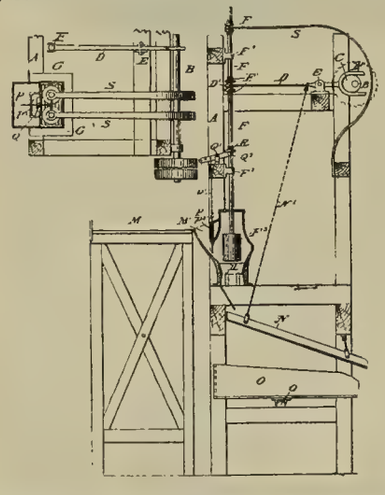
A crusher comprising a bed with an upper conical face provided with a series of concentric annular grooves which form ball racesgor tracks; a number of sets of balls of each set working in one of the races or tracks thus formed; a rotary head supported above the bed face and arranged for vertical shift or self-adjustment relatively thereto and provided with a central feed opening which leads to the central portion of the bed face; an annular groove arranged above the innermost groove and a series of concentrically disposed annular bearings having their lower faces grooved so as to provide an upper series of concentric annular ball races or tracks which lie respectively opposite to the races or tracks provided by the bed and upon the sets of balls working therein, and also having with the rotary head sliding connections adapted to permit their rise and fall relatively to the rotary head and independently of one another. The crusher has one or more sets of iron crushing balls susceptible to magnetic influence; a couple of relatively rotary crushing members providing one or more pairs of oppositely arranged races or tracks between which the set of balls can work, one constructed of iron and a magnet attracting both the iron balls and the races or tracks of the magnetically susceptible crushing member toward the races of the other member.

PUMPING OIL WELLS.—No. 617,770; G. H. Purdy, Wittens, O.



In combination with the tubing of an oil well and the like, an anchor provided with longitudinal slots, an external flange formed on anchor above the slots, a working barrel operating within anchor, lugs formed on the lower end of working barrel and engaging the slots in the anchor, an external flange formed on working barrel, a spring operating between said flanges and means engaging the tubing whereby the same is kept in alinement throughout its entire length.

DRY ORE STAMP.—No. 617,824; M. Weber, Adelaide, South Australia.



Composed of the stamp proper with stamper-box G having slots G', foundation blocks J, J', J^2, and rocking bars H, a hopper M', an automatically supply-regulating slide door P arranged within the hopper and provided with protecting cover plate P^2, chain P', T-ended lever Q with head Q^2 working upon fulcrum Q and alternately actuating collars R carried by the stamp stems, inclined sieve below the stamper-box; the combination of eccentrics C mounted upon the driving shaft B, a stamp rod-actuating spring lever D supported by fulcrum E and provided with forked end D' and engaging the stamp rod between collars F' and a stamp rod counterbalancing spring S secured with one end to the frame and engaging with the other the stamp rod near its top between collars F^4, F^4, and the stamp rod and stamp.

Valuable Flue Dust.

During the week the great flues leading to the sky-scraping smoke stacks at the smelters have been undergoing their quarterly clean-up. It has been the custom to scrape these flues out every three months, but in the future this work will not be done so frequently, or to be more correct it will be done more frequently, but not under the present method.

When flue cleaning time arrives it has been necessary to close down work and allow the furnaces to cool off. Recently the Anaconda Company constructed three tunnels leading to different points in the flues. These tunnels lead into large chambers which are supposed to and do catch the flue dust. To what extent this dust escapes will be determined by the present clean-up. Since the construction of the tunnels, flue dust has been taken out of the chambers about every other day. It is loaded into cars slid down a track running parallel with the flues.

There are two flues at the upper works and three at the lower works. That it pays to clean them out may be judged from the fact that each flue produces about 3000 tons of dust containing about 12% copper. This is an item of at least $48,000 in copper saved from each flue, not taking into account the gold and silver. After the fumes pass the long flues, but little dust goes up the perpendicular stack. Under the old system the saving of this dust has been quite an expensive task. The men who work in the flues have to be well paid and while the work was in progress the smelters had to be idle. It has been found that the negroes can work better in the flues than any other men. The number of negroes employed at the smelters has been gradually increasing because they can work in the hottest places better than white men. The great disadvantage with the colored man, however, is that he is very unreliable and when he goes off shift it is no sure thing that he will report for duty the next day.—Anaconda, Montana, Recorder.

Liquefied Hydrogen.

In London this week Professor Dewar at the Royal Institution described the most volatile of gases when reduced to the coldest substance ever known. When pure it is a colorless, transparent liquid, with considerable refracting power. It is not a conductor of electricity. Its density is very deceptive. At first he thought it might be half that of water, but by measuring a given volume and ascertaining how much gas it produced he found its density to be only one-fourteenth that of water, or six times less than that of the lightest liquid hitherto known. One litre weighed only seventy grammes. It instantly froze and solidified air and oxygen, and hence enabled the density of those two solids to be ascertained. A little ball cooled in it and exposed to the air was first covered with a coat of solid air, and then began to drip liquid air. A piece of cotton wool soaked in it appeared to be magnetic, but the liquid itself, Professor Dewar is satisfied, is not magnetic. This phenomena must, therefore, be due to the cotton being immediately filled with solid oxygen, which is highly magnetic. Professor Dewar explained how vacuums of high tenuity were easily obtained by immersing a closed tube in liquid hydrogen. The air in the tube was immediately solidified, and if the tube was so arranged that the portion containing an accumulation of solid air could be sealed up, the other part had, according to Sir William Cooke's calculation, a pressure amounting to only one ten-millionth of an atmosphere. With vacuum vessels for use with hydrogen it was therefore not necessary to pump out the air.

An Important Yukon Decision.

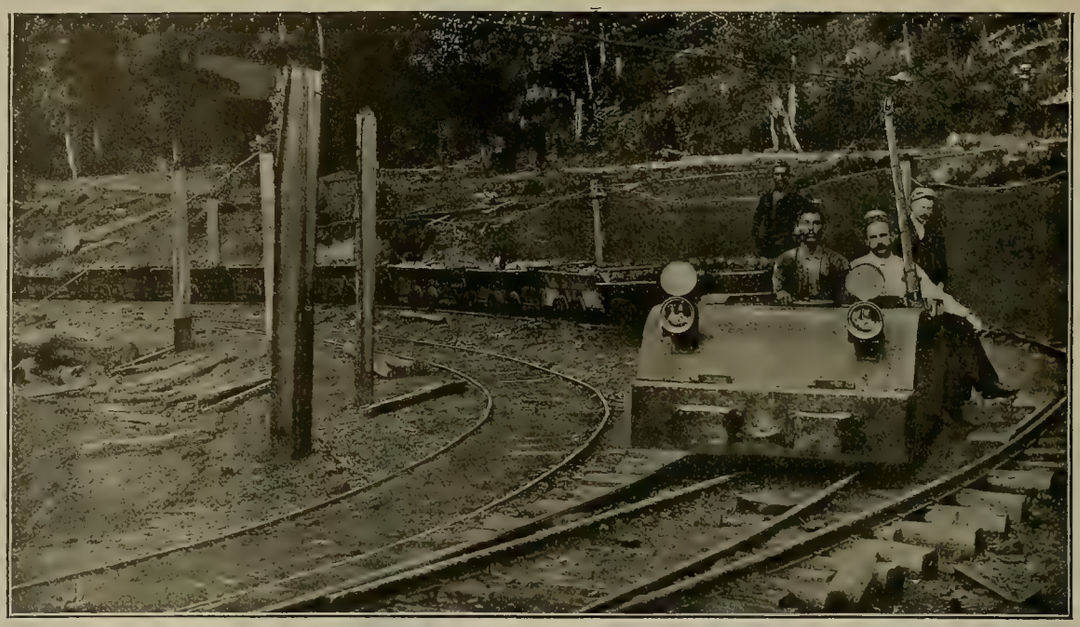
The Yukon appeal of Donelly vs. Nelson has attracted much attention and comment owing to the importance of the legal principles settled by the decision of the Canadian Minister of the Interior. He holds that the sworn application filed by the applicant for a mining claim upon which a mining certificate issues, raises a prima facie case in favor of the holder of the certificate in any proceedings which may be taken by any other person asserting title, and that it lies on the other person to disprove the truth of the statements contained in the application. He further holds that upon a staking according to the regulations, a possessory title to the claim at once vests in the staker, and that during the period within which the staker may obtain his certificate a staking of the claim by any other person is absolutely null and void and that such person is a trespasser ab initio. Owing to the importance of the case the Minister of the Interior requested two of his colleagues, the Minister of Justice and the Secretary of State, to assist him in hearing and determining the appeal. The claim in dispute is valued at over $100,000 and the respondent's title thereto is affirmed by the decision.

Electric Motors for Mine Haulage.

The upper illustration on this page is of the Jeffrey D. M. 60 electric locomotive, as built by the Jeffrey Mfg. Co., Columbus, O., with a train of loaded cars coming from the mines of the Corona Coke & Coal Co., Corona, Ala. The lower cut is one of a S. M. 10 electric locomotive built by the same concern, this type being designed for use especially around smelters and mills. The center cut represents a Jeffrey T. M. 110 electric locomotive.

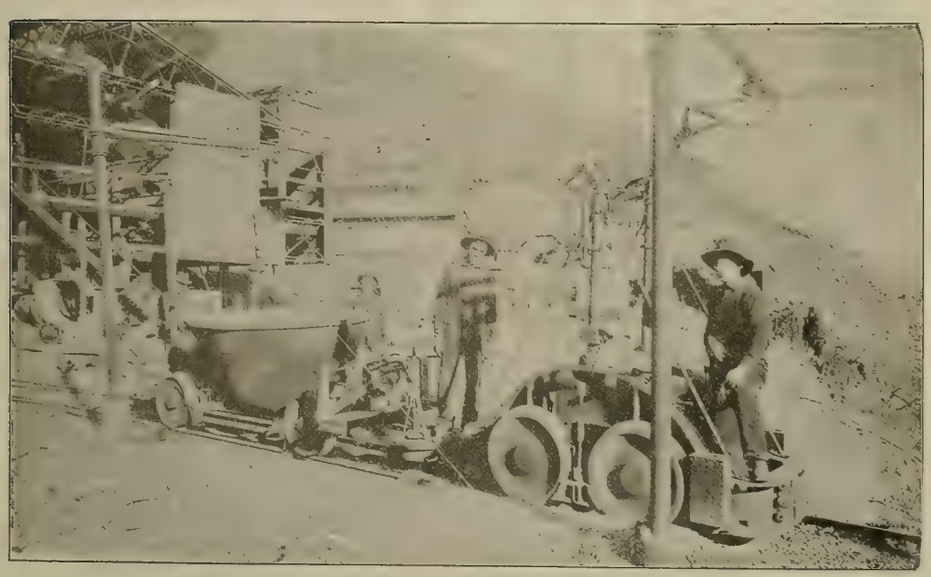
The first electric locomotives used in connection with mine work were very light, but the manufacturer has been building them heavier and heavier each year, as the work they were called upon to do was increased. Mines where these lighter locomotives were originally installed have advanced farther into the veins, and, with increased distance and output, something heavier was required. The locomotive shown in the central cut is a distinctively new type and is claimed by its makers to be the heaviest and most powerful electric locomotive for mine and surface haulage which has ever been built and put in successful operation. It weighs fifteen tons and is noticeably compact. The distribution of weight in the design of a locomotive largely determines the size of rail upon which it is necessary to operate it and affects the cost of track. Few mines are equipped with rails weighing more than thirty-five pounds to the yard. When the weight of the locomotive is distributed uniformly on its drivers and the number of drivers is sufficient to insure a comparatively small total weight upon each, the wear and tear upon the track is minimized. In all the heavier locomotives built heretofore it has been the custom to use four drivers, but in the T. M. 110 Jeffrey electric locomotive three sets of wheels and axles are used, making six drivers in all, upon which is distributed the weight of the locomotive, each driver being thus required to carry only one-sixth of the weight. The frame of the locomotive is mounted on equalizing springs arranged on the four-point suspension system. The method of spring suspension allows adjustment of the wheels to the irregularities in the track. By this arrangement a proportionate amount of the weight is at all times distributed upon each driver, with consequent obtainance of continuous maximum tractive force. By reason of the middle axle being fitted with smooth-faced drivers, instead of flanged wheels, it is possible to operate this form of locomotive on tracks where curves of small radius are frequently encountered. On each one of the three axles is mounted a motor of proper size and capacity, and by thus distributing the power among three motors, a locomotive of much narrower gauge can be supplied without sacrificing either efficiency or simplicity. It would be easy to build powerful motors for electric locomotives were such locomotives operated on standard gauges of track, but a mine track is narrower. The motors of the machine referred to are of the multipolar, iron-clad type, completely enclosed and fully protected by the motor casing. They are waterproof and adapted to this class of work. The controlling mechanism is a device which admits of the starting of a loaded train at a uniform acceleration without jerking. In connection with the controller is a series-parallel switch which admits of the motors being run either in series or parallel, according to the speed at which it is desired to move the load. All these parts, together with a reversing switch and sand-box levers, are so located that the operator can handle them without difficulty, he being seated in the center of the car between the axles, where he is fully protected from injury in case of accident. The trolley pole can be located on either side of the frame of the locomotive. The sand-boxes are cast in the frame, and the supply of sand can be regulated by a positive motion operated by levers. The brake is of the automatically-locking, equalizing-screw type, of such strength that the drivers can be slipped, if necessary. The top of the locomotive is covered over its entire surface, save the operator's seat, so that water dripping from the mine roof, or falls of other foreign substances, cannot drop into the working parts. This whole top is so hinged that it can be easily removed when it is necessary to gain access to any of the motors, gears or other parts of the machine. There are only three pinions and three split gears on the machine.

The Jeffrey Mfg. Co. have recently gotten out a handsome catalogue, in which they show cuts and descriptions of their locomotives, which will be mailed to any address upon application to the Jeffrey Mfg. Co., Columbus, Ohio, or Denver, Colo.



JEFFREY ELECTRIC MOTOR CAR FOR MINE HAULAGE.

JEFFREY T. M. 110 ELECTRIC LOCOMOTIVE.



SPECIAL MOTOR CAR FOR HANDLING SLAG CARS IN SMELTING WORKS.

Grade of Battery Plates, Water Supply, Etc.

To the Editor:—Referring to the inquiry of Mr. T. J. Bell, in your issue of Jan. 14th, the writer, if permitted, would suggest that the grade of the plates should be increased to not less than 1½ inches to 1 foot, if the ore is free from sulphurets or other heavy material, and to not less than 2 inches if carrying sulphurets.

The water supply should be just sufficient to keep the pulp from banking at any point on the plates, and no more.

In regard to the mercury draining off the plates, the writer knows by experience how difficult it is to learn to keep the plates dry, as is necessary when warm water is used.

One must resolve to throw aside experience previously gained and learn it anew, and will be surprised to find how much harder the plates may be safely run than with water at ordinary temperatures. Millman.

Baker City, Or., Jan. 18th, '99.

Few realize how far reaching and helpful is a single hint or suggestion supplied through type by one who works with his eyes open and thinks and observes while he works and sees others work. Everyone who supplies useful information is in turn benefited by the experiences related by others, and in the interchange all are advanced in the knowledge of their business.

Mining Summary.

ARIZONA.

The South Bisbee Co. has secured the O'Hare group of claims comprising five properties near Bisbee. Considerable work has been done on them and they show good indications.

In the Ajo mining district, in Yuma county, C. C. Bean is operating the old Ajo properties, and A. J. Shotwell of Denver has begun work on the new Ajo mines. There is a small mineral zone in the Ajo mountains at that point, where high-grade ore is found. The old Ajo mines were worked in the early days, and the ores shipped to Swansea, after being packed to the coast over the desert. Ore was shipped which ran as high as 60% in copper and $90 in gold values. The work was principally of a surface character, and the present development of the mines is to gain depth.

The Old Dominion smelters, near Globe, started up recently after their shut-down since the middle of December by reason of the heavy snow storm and the inability of the mine to secure fuel. The management has contracted for 2000 tons of coal at $15 per ton, delivery of which will extend over six months. With the operation of both smelters, it is estimated the Old Dominion should be able to produce 1,500,000 pounds of copper per month. Their cost per pound should not exceed 8c. The company about a month ago shipped 500,000 pounds of copper and has on hand at least 1,500,000 pounds. The switch connecting the Gila Valley, Globe & Northern railway with the smelters, about one-quarter of a mile in length, is completed. Coke will cost the company about $15 a ton, as compared with $25 formerly.

A rich strike is reported from the Prince George, at Stockton Hill, and in the Horn Silver mine, near White Hills.——W. H. Albritten, near Globe, encountered a deposit of copper ore that carries copper up to 35% and gold value $35 ——The Blue Jay mine, near Tucson, at the 359-foot level is producing gold and silver that yields $50.

The winzes and lower levels of the American Flag mine, in Wallapai mountain, will be immediately cleaned out and sinking resumed.

A Philadelphia company is investigating the Moor mine, at Pearce, with a probability of bonding it.——The machinery for the Jerome M. Co. is being placed in position and Supt. Dillon will push development work.——The Jerome *News* is informed that the Equator lawsuit will be settled and development work will begin at once.——D. E. Saunders will soon begin operations on the Reward copper mine, near Casa Grande. The Reward ore is said to carry good values in gold. There is a smelter on the mine, but it is not supposed to have been very profitable in the output. The new management contemplates 800 feet of work. The main shaft is down 180 feet, with a drift 300 feet, and at this point a winze is sunk 250 feet.

The *Mohave County Miner* reports Los Angeles men, under the name of Watson & Co., are working the Lady Bug mine at Mineral Park. They have put in 400 feet of track in the tunnel and have 180 feet of stoping ground opened up. The ore streak is a good width and shows ruby and native silver all through the rock.——A cyanide plant will be put in at the Mocking Bird mine, Weaver district, capable of working about ten tons daily. The Mocking Bird contains a larger amount of ore than can be cyanided, as well as several hundred tons of tailings.——The Duquesne mine is making arrangements to put a large force at work. A big lot of new machinery is being placed, and as soon as possible work will begin on a large scale.——Nelson & Rice bought four bars of bullion from Crown King last week, valued at $10,000.——A new strike is reported on the 200-foot level of the Lone Star mine, Mineral Park.

Yuma *Sun*: T. D. MacLeod, on his Seventy-Six mine near Yuma is continuing development with good results. He has a 140-foot shaft, two 50-foot shafts and two 30-foot shafts, all in ore, but the extent of ore bodies have not been determined.——A large part of the force has been laid off at the King of Arizona mine for lack of water.——The claim recently purchased by J. Singleton, of Randsburg, Cal., is being developed.

CALIFORNIA.

Amador.

Jackson *Dispatch*: Harding & Southard will soon resume work on the Wallace Harding placer claim at Pine Grove.——Whitehead Bros. are working their gravel claim at Aqueduct City with good results. Owing to the scarcity of water they were able to work but twenty-one days the past year, but indications point to a long run during 1899.——The China Hill mine near Pine Grove has been started up by Stirneman & Co. It is a gravel property.

Jackson *Ledger*: The Amelia mine has encountered the ledge at the 800-foot level.——The engine at the east shaft of the Kennedy was operated Monday for the first time. Sinking will be pushed.——The reopening and enlarging of the Lincoln shaft at Sutter Creek has progressed to the 800-foot level, and a contract is to be let immediately to sink the shaft 400 feet deeper.——The Porteous Bros.' claim is yielding fair returns.

Butte.

Oroville *Mercury*: At Yankee Hill Clark Bros. have their ditch finished and will soon begin operations.——Malone & Wing are taking out fair grade ore.——M. Edon has cut into pay gravel.

Oroville *Register*: Mining at Cherokee, which has been suspended for several weeks, while the flumes were undergoing repairs, has resumed. The Costa Co. are running seven powder drifts in their mine and the Enos Co. is also running powder drifts in their claim.

Calaveras.

San Andreas *Citizen*: The Cuneo mine of Esmeralda started work last week and is running day and night. The mill is run by water power. Eight men are employed, and the prospects are good. The success of the Cuneo mine has been an incentive to activity in prospecting about Esmeralda.——Near West Point work on the Blizzard mine will begin soon.——On the Yellow Aster work is being pushed.——The Paragon mill has begun operations. Supt. Haley has opened a large body of ore on the Paragon mines.——J. Bardsley is taking out ore that averages 1 foot in width and yields $80 per ton.——The Lloyd Bros.' mine gives fair returns by working the ore in an arrastra ——The Paice Bros. are working the Oakland mine.——Supt. Stephenson is successfully operating the Wickham mine.

Mokelumne Hill *Chronicle*: Near Copperopolis, the Empire mine has finished the upraise. As soon as the weather will permit machinery will be placed. A hoist and compressor and more stamps are to be added.——The Lightner mine, owned by D. S. Lightner, has three shafts, 60, 80 and 100 feet in depth, and twelve men are employed. It is the intention to erect a 10-stamp mill in the spring. There will also be a new hoist and a cyanide plant. The ore is rebellious and is at present being shipped to Selby's. The ledge is from 8 to 16 feet wide and the ore is high grade.——M. Clark is operating near the Salt Spring Valley reservoir and has ten men employed. The shaft has reached a depth of 100 feet.——At the Pine Log and Royal mine the additional stamps will be ready to start in about fifty days.

El Dorado.

In the Ohio mine near Greenwood operations ceased last week.

Placerville *Democrat*: At the Gopher-Boulder mine, Kelsey district, the mill is running steadily. The force has been increased.——It is locally reported that C. D. Lane of Angels Camp is negotiating for the Shaw mine, near Diamond Springs.——At the German mine, near El Dorado, they are operating with a full force.——Ore is being taken out at the Starlight mine, and the mill will soon be started up.——It is locally reported that a new ore chute, fully as rich as the one that is now paying $1000 a day, was struck last week in the Union mine, near El Dorado. The Union's cleanup last month amounted to $28,000, the mill running day shift only.

Fresno.

H. B. Vercoe, who is interested in the Gavilan mines and other properties in Riverside county, is said to be arranging for the construction of a 100-ton smelter on the Copper King copper mines in Fresno county. The ore runs an average of 11 per cent in copper with $11 in gold and $3 to $5 in silver per ton. It is estimated that there are at the present time about 30,000 tons on the dump. Work on the property is being done on the third level.

Kern.

Los Angeles *Review*: Last week A. W. Collins, who some weeks ago bought the O. K. properties for himself and New York associates, also bought the Black Hawk mine, near Randsburg, for $12,000. Much high-grade ore has been taken from this mine and milled, but a vast quantity running from $9 to $12 has been left on the walls. When the Willard & Harrison mill, which is being removed from Cuddeback lake to the Black Hawk ground, is in operation—probably within four or five weeks—this ore will be stoped out and milled.——In the Stringer country much work is going on. On the G. B. lessees are taking out a good grade of ore.——On the Gold Coin, Nixon, Keller & Mann are taking out, at a depth of 150 feet, ore from a 2-foot ledge which will run from $100 to $200 per ton. A recent milling on a few tons of this ore notted them nearly $2000.——On the Orphan Boy, Kuffel & Nixon are sinking on the ledge; it shows good values.——On the Napoleon lessees are taking out ore, some of which is high grade.——At the Sunshine, T. W. & D. M. Atkinson are taking out some high-grade ore. They are down 125 feet. The ledge is small, averaging not less than 6 inches; but from 30 feet down, when well sorted, has run up into the hundreds per ton.——The Buckboard mine, owned by Mathison, Donovan & Adams, has two shafts sunk, the deepest being 125 feet. At this depth the ledge has been crosscut for 20 feet, but no footwall has been found and the ore runs from $5 to $48.——The Butte made a cleanup last week at the Johannesburg mill, netting a gold brick worth several thousand dollars. Since work was resumed on this property $75,000 has been taken out.——A gold nugget worth $445 was found by Martin & Clifford, working some placer diggings in the Garlock district, near Koehn's mill.——The average value of all the Wedge ore milled during '98 was $75.51 per ton. This was the average mill cleanup value of the ore, and does not take into consideration the tailings, which were afterward cyanided.

Randsburg *Miner*: The Ruby mine, near Randsburg, owned by Vanbrieson & Co., which has been under bond to Koehn & Wilson, has had the bond extended to February 10th. From this property 600 tons of ore has recently been shipped to Barstow and milled.——At the mines in Tuber canyon, in the Panamint country, the Montgomerys have milled the dump, all that came out of two deep shafts, one of them nearly 400 feet in depth, and it all averaged $26 a ton. They are now milling the croppings and it all pays.

Los Angeles.

The late rains have enabled resumption of mining in the San Gabriel canyon. The finding of several good-sized nuggets have been reported, some running from $30 to over $60. Some of these were found considerable above bedrock.

Mariposa.

The Doss mine has been unwatered for inspection and awaits the decision of an expert.

Mono.

M. P. Snow will soon start work on his mine near Topaz.——Work on the Cortez mine at Antelope is going along slowly on account of the snow.——The Sawmill miners will start work early in the spring.

Napa.

During December the following number of flasks of quicksilver were shipped from the various mines: Napa, 599; Ætna, 271; Great Western, 50; Vallejo, 40; H W. Herrick, 1; total, 961. This is a decrease of 133 flasks from the previous month's shipment.

Nevada.

At the Eagle Bird mine at Maybert the 20-stamp mill is running steadily on high-grade ore. The same company has charge of the St. Patrick mine at Washington and have begun work there. The new 5-stamp mill will be erected when spring opens.

Nevada City *Transcript*: A plant is being put on the Champion mine to work the tailings from the company's seventy stamp mills.

Grass Valley *Union*: M. D. Cooley made a strike of ore in his Ocean Star mine near Washington in a ledge 3 feet thick that will average $14 per ton.——A good ledge has been struck in Willow Valley by Coughlan, Hecker & Co. They are pushing the tunnel.——When the ditch which supplies the Reddik mine with water will be reopened from the snow blockade the miners will be put back to work.——At the Live Oak mine near Columbia Hill the new 10-stamp mill will be soon completed, and it is thought that by March 1st the stamps will be dropping on ore.

Placer.

Colfax *Sentinel*: The new power plant of the Pioneer G. M. Co. is running satisfactorily. There is plenty of water to generate power for all the motors. All the machinery is running by electricity and giving satisfaction. The motors are also driving the air compressors.——At the Bellevue quartz mine, near Ophir, some high-grade quartz is taken from the 150-foot level. The ledge is 2 feet wide at the point where the rich ore is taken out.——At the Eureka Consolidated drift mine, near Forest Hill, Supt. Chappellet has cut the channel but has not yet reached gravel. In the first raise the company cut the east rim and the new raise is on the west rim. Supt. Chappellet will follow the bedrock to get the pitch, when he will go down the raise and drift into the channel. The cement carries wash boulders.

Plumas.

(Special Correspondence).—It has snowed here almost continuously since Jan. 1st; altitude, 4750 feet; lat. 39 deg. 54 min.; Jan. precipitation, 13 inches; depth of snow fallen in that time, 81 inches; depth of snow now on the ground, 47 inches. The snow fell on dry, frozen ground, and at this altitude the water has not yet started in the ditches. Nearly all the mines are idle now, but the prospects are good.

Edmanton, Jan. 18th, '99.

Quincy *Bulletin*: On the White Lily quartz mine, near Quincy, owned by S. P. & R. H. Dunn, development work is in progress. Owing to the cold weather the mill has not been operating for the past six weeks. The lower tunnel cuts into a quartz vein 20 feet wide. A mill test of the ore produced an average of $4 per ton. They have another body of quartz 30 feet wide. The milling during the past season was from this ore body, and the average product was $12 a ton. The mill crushes eight tons per day.

Riverside.

A $1600 gold bar was the result of a cyanide run on some tailings of the Santa Rosa mine, near Riverside. Another one, a little smaller, was cleaned up from some Good Hope tailings in the same district. The Perris mines are shipping about $5000 a month in gold bullion.

Sacramento.

Near Folsom, on Mississippi Bar, work has begun on the big dredger. Engineer Griffin of the Risdon Iron Works is superintending the construction. The dredger will be rushed to completion. It will take three months before the machine will be ready for service. The boat will be built and launched before any of the machinery will be put in. It will be a flat-bottom and 75x100 feet in size. The contract for excavating the pit to launch the dredger has been let and work has commenced. The pit will be 100x200 feet in size and 6 feet deep. Dredging will be a new era in gold mining in this vicinity.

San Diego.

At Banner the Ready Relief M. & M. Co. started their mill last week on their own rock.——The Eureka mine has resumed.——L. & O. Bailey are working the Hidden Treasure mine.—Rock is being hauled to the Ready Relief mill from the San Felipe mine.

From the Bay Horse mine a large shipment of ore was made for a mill test. The results are said to have proved satisfactory.

Romona *Sentinel*: J. W. Thorman, one of purchasers of the Pacific Bank's interest of the Helvetia mine near Ramona, is looking over his newly purchased property. He will do considerable improvement work on the mine.

San Diego *Union*: The High Peak and Roosevelt mines, and a one-third interest in the Rossland mine, in the Julian district, have been sold to L. M. Smith by W. W. Roswell for $6000.

Shasta.

The steam quartz mill on the Spanish mine, near Shasta, is running steadily with abundant supply of water, fuel and ore. The success of the mill on the Spanish mine will give great impetus to mining enterprise in Shasta.——The Mountain Copper Co. are rapidly completing their new foundry. It will be capable of casting a 10-ton piece.——The Mt. Shasta M. Co. have awarded a contract for hauling ore from their mine on Clear creek to the Keswick smelter, at $3 per ton.

The Uncle Sam mine, near Kennet, which was recently sold to Deakin and others, has been incorporated under the name of the the Uncle Sam G. M. Co. M. Deakin is the manager of the property. The 10-stamp mill has been put in operation. Five more stamps are soon to be added. Work has also resumed in the mine.

Redding *Democrat*: The sale of the Golinsky group of copper mines near Kennet has been made public. The purchase was made by an Eastern corporation, through their agent, J. Park Channing. On or before January 4, 1900, the company contracts to pay B. Golinsky, F. Weischman and M. Clendenning $130,000 for the property, consisting of nine locations. In the meantime the bonders are permitted to patent the several claims and deduct, for that expense, $2000 from the purchase price. The purchasers will take immediate possession and are required to keep six men at work during the life of the bond. In addition to this group the company has contracted to purchase a quarter section adjoining for $30,000. The company is required to begin development work Feb. 4th.

Redding *Searchlight*: The first ore shipment from the Bully Hill group since December arrived at Redding this week. There will be some heavy shipments from there as soon as hauling can be made profitable. —— Near Shasta, Huntington & McPhail are developing a property with success.——On the Herron & Leach mine much development work has been done, and discloses a good chute of free-milling ore. The product is being handled by an arrastra with good results.——Another well developed property in the same district is the Pugh & Menzel mine, on which a mill is in operation.——Small & Dawe are developing a property under bond. The Oro Fino is also being worked under bond by Frick & Chase.——Mier & Russell are doing development work on a property from which a shipment of ore to the smelters produced satisfactory results.

Sierra.

Downieville *Messenger*: Ten more stamps will be started soon at the Mountain mine at Sierra City.——The Butte mine's force has got the water in preparatory to starting the mill again.

Siskiyou.

The Minetta B mine near Yreka is producing good results. It is a well equipped hydraulic property. The company has two ditches, one with a pressure of 230 feet, the other 335 feet, the 2-foot pipe line across the Klamath on a suspension bridge supplying three No. 5 giants for nine months in the year. The only difficulty is flat bedrock.

Fry, Macaulay & Oberholtzer have four quartz claims on the extension of the Sheba mine at Patterson creek in which the ledge is from 7 to 10 feet wide. The amalgam from this mine in a crushing of seventy-five tons at the Chester mill in Quartz valley, yielded from $50 to $70 per ton.——J. Wise will soon begin work again on the Best Chance gravel mine near Yreka which was worked a few years ago, but was abandoned on account of too much water. New hoisting and pumping machinery is to be placed.——River mining on the Klamath has been closed for the season. The late storms raised the stream over 2 feet and washed out a Chinese company near Honolulu, all the other companies having pulled out their apparatus before hand. The miners are making preparations for resumption of work early next spring.

Yreka *Journal*: McCaw & Nowell Bros. of San Francisco, interested in the Sheba quartz mine on Patterson creek have started the new steam mill and ho'st. The ledge is about 22 feet wide and is said to yield from $50 to $70 per ton. Some rich pocket gold quartz, not put in the mill, paid as high as $10 a pound. The Sheba Co. secured this ledge from Fry & Macaulay, and in addition, purchased the claim adjoining, from a Portuguese company, making their holding comprise an area of 200 acres.

Yreka *Journal*: The placer miners on Greenhorn have all begun to mine, now that water is furnished. The hydraulic miners at Humbug have 3000 inches of water, the streams in Scott valley are full of water, as also the ditches from the Salmon range to Oro Fino and vicinity. On Cherry creek, Deadwood and McAdams creek the miners are working successfully.——The Golden Star Quartz M. Co.'s tunnel is 600 feet into the mountain.

Yreka *News*: Foster Bros. started their new arrastra last week at the Lucky mine near Yreka. They have been busy all summer at this claim, taking out ore and building the arrastra. Quantities of the rock previously taken out went from $25 to $40 per ton.——It is reported that the Chicago company that bonded extensive holdings near Hawkinsville last summer has bought the Foster ranch. They have been making extensive tests. This is a dredging property.——D. Ream is running a tunnel on the Tom McGuire mine on Greenhorn. It will crosscut the ledge 30 feet below the old works, from which some rich pockets were takea.——Work on the Katie May mine, owned by A. Wetzel, will start as soon as the snow gets off. This claim has produced ore running $112 per ton. The tunnel will be extended to crosscut the ledge at a depth of 170 feet below the old works. It is in 150 feet. The ledge varies from 6 to 8 inches in width.——Ward & Co., the Seattle company that bought the Cape mine last September, will start developing operations next month. The old tunnel, running on the ledge, will be extended. They will confine themselves to development work, only taking out such ore as it is necessary to remove.——All the small placer claims among the foothills are starting up and everything promises a good season.——Last week were transferred the Knownothing, Independent and Novelty mines at the forks of Salmon from W. P. Bennett to Bennett & Smith.——J. E. Jones has bought J. Brazzi's placer claim on Lime gulch and has begun to

work the property.——The Portuguese placer miners on the north fork of Greenhorn and on Cherry creek are all taking advantage of the water supply and getting in full time.——The Blue Gravel mine near Yreka is no longer compelled to rely upon pumping water from bedrock for sluicing purposes.

Trinity.

The Brown Bear Co., at Deadwood, are pushing the new tunnel at the rate of 10 and 12 feet a day. There are fifteen men at work in the tunnel—three shifts. They have but two power drills, and the men get $3 per foot for every foot they run over 300 feet per month, besides their wages.

The Weaverville *Journal* says that the break in the West Weaver pipe line of the La Grange hydraulic mine near Junction City has been repaired and work at the mine has resumed.——All the mines around Weaverville are at work with plenty of water, and miners feel assured of a fair season.

Tuolumne.

Sonora *Democrat*: At the Jumper mine at Stent forty stamps are dropping.——The Golden Gate has forty miners on the payroll and the force will be doubled within ten days. ——The Densmore mill started up last Monday. There is plenty of ore on hand.——The Lost Fox mine is placing a new steam hoist, and will soon start up with a full force.——J. Meighan, on the Bullion mine near Groveland, will renew development.——At the Kanaka mine, near Groveland, sinking will be continued 200 feet deeper than the old works. The vein holds its average width, with occasional rich spots. Recently a section of quartz not over 18 inches square yielded $1000.—— Jones & Co. are opening up the old Garner claim, in the Buchanan district. The tunnel is being cleaned out and retimbered, after which drifting will be resumed. The tunnel is driven on the vein, which averages 3 feet in width.——J. Screech is developing a ledge 15 feet wide.——The extension of the Garner is again being developed. It was abandoned years ago at water level. During its brief operation the discoverers cleaned up a fortune through an arrastra.——The Bonanza mill started up last week, and unwatering the shaft has also begun. The shaft is but 200 feet deep, but acts as a receptacle for water in over 1000 feet of workings.

Jamestown *Magnet*: The App mill at Quartz is running and work has resumed in all departments.——The stations at the ninth and tenth levels in the Dutch mine were completed last week. Ore bins of 100 tons capacity are being erected at both stations.—— At the Tuolumne Mother Lode D. Co.'s mines, Big Oak Flat, a day and night force is developing the several properties. The company is erecting a 10-stamp mill.——At the Mazeppa mine at Stent they are hoisting high-grade ore.——The Santa Ysabel is short of water, though a supply is expected shortly. The company expects to start up full capacity soon.

Sonora *Independent*: At the Columbia mine, near Kid gulch, owned by Harris & Batte, high-grade ore is being taken out; the vein is 8 feet in width.——The power drills at the Star mine were started up last week. Forty men are at work.——At the Columbia E. & T. Co.'s mine, near Columbia, boring continues. A depth of 130 feet has been attained. A bed of gravel 40 feet in thickness had been encountered, which shows prospects.——In the Shamrock mine the vein is 40 feet wide.—— L. Page has begun operations on the Magruder mine, which has been abandoned a long time. The tunnel being run will strike below the old workings.——At the Bown mine at Tuttletown a 20-stamp mill is being built.

COLORADO.

The Cripple Creek tunnel controversy has been won by the plaintiff, the Matoa G. M. Co. A jury in the U. S. Circuit Court last week awarded the company $29,880 70, for ore extracted by the Chicago, Cripple Creek G. M. Co. while driving the bore of the tunnel through the Gold Pass No. 1 and Jubilee claims. The Matoa Co. brought suit for $110,000, assessing the ore as being worth that much, and a perpetual injunction. The court's instructions embraced three points of more than usual interest in tunnel litigation. Judge Hallett held that ground having senior rights and afterward deeded to a claim having junior standing, was still the possessor of seniority, the deed being not a waiver of the priority of its original location as a senior claim. The second decision was to the effect that a tunnel owner can acquire no rights within the boundaries of a previous claim upon either blind or other lodes. Another ruling made in the case was that it is proper and necessary to file a rejoinder to a replication if new matter is set up in the replication. Counsel claimed that all new matter in the replication should be considered as denied. Attorneys for the defense moved a new trial and asked the court for fifteen days in which to make the motion. The points of law developed during the progress of the case were intricate. The tunnel was projected through the ground of the plaintiff and ore extracted therefrom on the standpoint that the vein from which the ore was taken was opened up by the tunnel, as it nowhere appeared that it was the discovery vein of the Jubilee claim; that Section 2323 of the Revised Statutes of the U. S. gives the owners of a tunnel run for the development of a vein, the right of possession of all veins or lodes within 3000 feet from the face of the tunnel on the line thereof, not previously known to exist and discovered in such tunnel, and that the ground in dispute was originally embraced in the Gold Pass claim, and afterward included in the Jubilee patent, but excluded from the Gold Pass patent, which was prior to the tunnel site. The defendant claimed this made the Jubilee a junior claim.

BOULDER COUNTY.

At Ward a strike in the B. & M. mine was made in the 500-foot level and ore is stripped along the vein for 65 feet. The width of the pay streak is from 16 to 24 inches.——The Newmarket leasers shipped two carloads of ore to the smelter last week.——The Ward Rose mine is producing high-grade ore and the leasers are doing well.——The Smelter Co. is unwatering the Miner's Dream mine.

CHAFFEE COUNTY.

A strike was made in the Turret district that assays $184 in gold.

At Salida in the Sedalia mine three new copper ore bodies have been discovered. It is being worked by L. C. Farree of Denver.

CLEAR CREEK COUNTY.

Idaho Springs *Gazette*: The West Santa Fe mine, near Idaho Springs, is sold to W. E. Renshaw for $50,000. It has a record as a gold producer.——The Lincoln mine has five sets of leasers who do fairly well.——The development on the Elliott and Barber consists of three adits on the vein. The first is in 400 feet, the second 450 feet, and the third 650 feet. Eight men are leasing on the different levels and doing well. The ore streaks are small but rich, running as high sometimes as eighteen ounces in gold per ton.——The Silver Mountain mine is producing large quantities of good ore and keeping the mill going full capacity.——The Hecla mine, near Georgetown, is producing good ore.——Holbrook & Tipple opened up a good streak of ore on the New Boston. They have been running on a 5-foot streak of concentrating ore that carries from 10 to 15% of lead.——The Aliunde mine shipped seven tons of ore last week from the new strike in the 850 level. The ore is of good grade, milling 408 ounces of silver per ton, and 12½% lead.——The vein of ore in the Maxwell & Hood portion of the Griffith mine is stripped for some distance to the height of 12 feet, of nearly solid galena, from 2 to 3 feet in thickness. A mill run of 24¼ tons of ore from this strike returned 47.75% lead, 34.75 ounces silver per ton, and 0.11 ounce gold. The ore netted $38 11 per ton.

DOLORES COUNTY.

At Rico the Enterprise M. Co. bought one claim and a half interest in another, near its own group, for $6000 cash last week.

EAGLE COUNTY.

Red Cliff *Blade*: The St. Joe mine, near Red Cliff, is shipping from a 5-foot body of good grade ore.——The Garbut mine has been leased to a Leadville company who will soon start operations on a large scale. It is understood that machinery will be placed on the property at once and work pushed.—— The Black Iron is producing high grade carbonate ore.——The shipments of ore from the Battle Mountain district were twenty-four loads since January 1.

EL PASO COUNTY.

At Cripple Creek eighty men are employed in the Los Angeles. Several sets of subleases are shipping ore from the various levels of the mine. The ore shipped during the last ten days was eight cars, running from two to three and a half ounces a ton.

The Gold Coin Co at Victor reports show the past year's production to be 31,833 tons with a gross value of $1,051,149.20; freight and treatment charges, $313,000; dividends, $130,000; cash on hand, $336,000.——The Cresson Leasing Co., on the Jack Pot, has sunk its new shaft into ore 309 feet. The management has increased the force to 140 men, and in another week machine drills will take the place of the hand apparatus. These changes will insure an increase of 50 per cent in the production of the lease.——Recent returns on twenty-seven tons of ore from the Cal Wagner lease, on the Minnie Bell, yielded $69.40 a ton.——The lessees on the Whisper shaft of the Gold Sovereign are shipping ten tons of 2-ounce ore daily. Eighteen inches of pay ore has been opened at the 175 foot level, and a high grade streak has been cut by the drift at 125 feet.——At the annual meeting of the Specimen it was given out that the royalties from the different leases on the property are averaging between $1000 and $1500 per month. The Canyon City & Cripple Creek Leasing Co. has opened a pay streak 24 inches wide that returns $800 a ton. In December these lessees took out $6000 worth of ore.—— Machinery is to be erected at once on the Dexter on Bull Hill by Edwards and associates, the lessees. At 70 feet a good body of ore has been opened.——A shipment of thirty-eight tons of high grade mineral was made from the Saunders lease on the Silver Tip last week. About twelve tons of this amount was screenings, yielding $500 a ton, and the remainder ore of $75 grade.——The electric power company last week started the electric pump in the 540-foot level of the Moon-Anchor on Gold Hill. The pump has a capacity of 500 gallons a minute, and works with smoothness. Another pump of similar capacity will soon be installed. Electric hoists were installed last week at the Fayette and Pharmacist mines. ——The Moon-Anchor at Cripple Creek is reported sold to an English company. The old company receives 50,000 shares of £1 each in the new company (one-seventh of its capitalization), and a minimum of $900,000 in cash, which will be paid as the stock is sold in London. The old company also retains other valuable properties at Cripple Creek.

The Victor *Record* announces the sale of the Hemenway and Jenkins interests in the Longfellows Nos. 1 and 2 to W. S. Stratton for $125,000.——A $50,000 bond and an eighteen-months lease on block 18 of the Arequa townsite were granted yesterday by Bennett and Meyers to R. H. Simmons of Cripple Creek.

Victor *Record*: The Johnstone lease on the Republic mine at Victor has eighty men employed, all that can be working on ore. The production will be maintained at about twenty-five to thirty tons daily.——Returns were received last week from a shipment of nearly twenty tons of ore from the Favorite, which gave gold values of 2.47 ounces to the ton. There are 5 feet of ore exposed in the stope.——Less than three weeks ago Welch and Long started work on a lease in the 150-foot level of the Dante, and they have in that period marketed four shipments of ore, about forty-eight tons, and it has returned a general average of $55 a ton. The vein is 3 feet in width.——From Cripple Creek were shipped recently fifteen cars containing about 332 tons of ore, by special train, to a Denver smelter. It contained 5100 ounces of gold, whose bullion value was $102,000. It was bought, it is believed, from the Isabella company.——The lease on the Little Pearl, held by Ashby & Blickerstaff, was sold last week for $18,000 to an eastern company. The Little Pearl is a small fraction of Bull Hill, and has produced considerable pay ore of late.——An 18-inch vein of $60 ore has been opened in the War Eagle, on Bull Hill. The property is under lease to Johnson & Peterson, who struck a vein of phonolite, carrying average values of three ounces in gold, of which sixteen tons were shipped last week.

GILPIN COUNTY.

The Lotus mine near Central City shipped a 300-ton lot of milling ore to Idaho Springs for treatment. The mine is also shipping a good grade of smelting ore.——In December the Carr mine on Bob Tail Hill produced ore to the amount of $3057 from six tons of first-class at $269.50, $1617; four tons of first-class at $105, $420; 120 tons of concentrating ore, $1020.

Central City *Observer*: Last week Cundy & Co. of the East Nottaway mine, near Central City, sold to the State Ore Sampling Works, in Black Hawk, a lot of ore which gave the following values: Gold, 37.40 ounces; silver 13.50 ounces, and 7.20% copper per ton —a total value of $742 per ton.

GUNNISON COUNTY.

Gunnison *News*: The Union and Constitution lodes, near Gunnison, have been bonded to Webb & Knox, who represent Aspen capital. The leasers will resume sinking in the shaft which now shows $11 ore.

HINSDALE COUNTY.

At Lake City the Superior group resumed work this week by unwatering the property. A large output of ore is expected to be ready for shipment in the early spring. Pennsylvania people have the lease.

LAKE COUNTY.

The Leadville Pumping Association have forty-five men on the payroll and are pumping 3300 gallons of water per minute from the five association shafts. Two new station pumps were installed last week at the 400-foot point in the Penrose shaft. At the Weldon mine when the pumping commenced there was 355 feet of water in the shaft, being within 210 feet of the collar. The Weldon is the richest and best mine in the city group, having given a profit of $65,000 in six weeks when it was worked under the $3 schedule. The Northern pumps are throwing between 500 and 600 gallons per minute.——The success of the leasing system is exemplified in the success various lessees are making with the Maid of Erin silver mines at Leadville. Between '87 and '93 these mines were the most extensive and best paying in the district. Very little work was done for two years previous to last year. Mr. Moffat last year decided to turn the property over to the small operator. There are ninety men working blocks of ground through eight shafts on the property. The output will be 4000 tons per month of various kinds of ore.——The Augusta lease on the Niles and Augusta claims is producing fifty tons daily of high-grade iron besides twenty tons per month of rich chloride ore which runs high in silver.——The No. 2 deep shaft of the Mikado M. Co., which previous to October 20, kept up an output of 120 tons daily of clean iron sulphides, but which has been closed down for a short time has resumed operations.

The Resurrection G. M. Co. at Leadville is shipping from 150 to 175 tons per day, while about 150 men are employed. The principal owners of this company are Denver people, including D. H. Moffat and Eben Smith, and C. T. Carnahan of Leadville. They have a large territory.

Leadville *Miner*: The northern shaft of the Clipper claim at Leadville is 165 feet deep. The main working level is located at the 550-foot point. The sinkers have beaten the water to a point 450 feet in this shaft and the pumps are throwing close to 700 gallons per minute.——The decision rendered last week in favor of Mrs. C. H. Brown, at Leadville, affecting the ownership of the Gordon gold mines, near Twin Lakes, will cause the immediate resumption of work on these noted gold mines, which have been closed down for four years owing to litigation. The group consists of the Gordon, Old Pounder and Bengal Tiger claims, embracing 19¼ acres of patented ground. One hundred thousand dollars has already been expended in developing the property and making improvements. There is about 5000 feet of development work on the claims. There are 35,000 tons of ore blocked out that runs from $10 to $25 per ton.

LA PLATA COUNTY.

A 4-foot body of good ore was uncovered on the 200 level in the Columbus mine, La Plata district, last week.

MINERAL COUNTY.

Creede *Candle*: Last week the ore shipments from Creede were 102 cars, or 1980 tons. ——The Nelson tunnel has been driven 6000 feet, and if it continues its present course the vein will be crossed a second time. The breast of the tunnel is dry, owing to the solid formation of the ground, and the water is fast sinking in all the big mines on the vein. In the Last Chance it is sinking at the rate of 3 to 4 inches a day.

PARK COUNTY.

Near Alma the Hill Top mine is shipping at the rate of twenty-two cars of ore per week from the Fulton lode to the smelter.

SAN JUAN COUNTY.

The tunnel being driven on the Summit vein to cut the Veta Madre at Galena mountain is in 1180 feet at a depth of 475 feet.

SAN MIGUEL COUNTY.

At Ophir the owners of the Gertrude property, Brink & Merrill, contemplate putting in a plant of large capacity for the treatment of low-grade ore.—— The Meldrum tunnel near Telluride, which is piercing the mountain between Ouray and San Miguel counties, crossing the Sheridan, Japan, Revenue, Columbia, Menona, Tomboy and a score of other well-known veins, will have an aggregate length of 22,315 feet, and it will pass under the comb of the mountain at a vertical depth of 3426 feet. One of its terminals is near Pandora, on the Telluride side, and the other is at Ironton. Eventually both terminals will be connected with the narrow gauge railway system now in operation near the two points. Its dimensions are 12x12 feet. At the Telluride end a power plant has been installed and air drills are penetrating the mountain at the rate of 38 to 40 feet a week. They have passed through a tough conglomerate and are now in the solid trachyte, where they make headway. The breast of the tunnel is in 1650 feet, 500 feet vertically beneath the surface, and several encouraging ore measures have been crossed. On the Ironton end the work is being pushed by hand and they are in 500 feet. When the solid formation is reached power drills will be put in and the work pushed. Mr. Meldrum expects to bore into the mountain from its two levels at the rate of 300 per month. In the meantime he will probably be shipping ore, drifting on veins and building a mill near each terminal. Capitalists of Glasgow, Scotland, are giving the enterprise financial support.

IDAHO.

At Wallace the drift on the vein in the Black Bear is 580 feet long, with ore all the way. The quality of the ore varies. That in the east face of the drift assays 60% lead and seventy ounces silver, while that from the face at the west end yields 65% lead and thirty-two ounces in silver. No arrangements have yet been made for milling the ore at home, and it is uncertain what will be done with it except that the property will be worked.——The Standard mill is running both shifts, ore from both the Standard and Hecla being milled there.

J. Warton, who has charge of the South Peacock mine in the Seven Devils for a Boston company, has bonded the Great Vale copper claim near Cuprum for $10,000.——The Checkmate mine, in Boise, the past two years has been productive of many shipments of high-grade ore, and will make another soon. The company has been prospecting new ground and has found a vein 5 feet wide In this a streak appears that is said to yield an average of $100 in gold per ton.——Lucky Boy ores at Custer City are saving about 67% of the values. Tailings have accumulated to the amount of about 10,000 tons, and the company will put in a cyanide plant to work them.—— At DeLamar next summer there will be three plants working on tailings. ——The company that bought the Crœsus group of mines and mill near Hailey recently has begun work. They are putting in an air compressor to operate power drills. The price of the property is $100,000, of which $5000 was paid last week.

F. Ibach received his first payment of $2500 on his half interest in the Ulysses group, near Salmon City, the other half interest having also been secured by the company, who are New Yorkers, and have already ordered a mill and expect to have the machinery on the ground within sixty days. The full purchase price of the property is understood to be $40,000. The property comprises a large group of claims, a 5 foot vein of very free-milling ore, worth $10 per ton, and several thousand tons of ore ready to stope.

J. E. Branscombe has sold to a Wisconsin company, represented by W. E. Smith, a quarter interest in the Cumberland mine at Silver City for $50,000 cash. The Cumberland was bonded in September, '97, by Sonneman & Branscombe for two years for $20,000. The property has been under steady development since then.

The Silver City *Avalanche* says that Sonnemann & Clinedinst have started work at the Cumberland mine, and that it is locally reported that a quarter interest in the mine was recently sold for $50,000.——T. Kennelly in the Red Cloud mine is working on a lease and is 200 feet below the seventh level.

Wallace *Press*: At Burke it is reported that a strike was made last week in the 1500-foot level of the Tiger mine.——The new chute in the Frisco, which was discovered last summer, is still being drifted on and holds out well. The shaft is 430 feet below the 1600-foot level, and in April the 1800-foot level will be opened up.——The Mammoth's new air compressor is at work and three shifts are pushing the tunnel.

MICHIGAN.

Conditions change in the Michigan copper mines, as in the gold mines of this west half of America. If the Calumet & Hecla, Quincy and other large lake mines were compelled to produce copper by the methods in vogue in the '50s in Ontonagon county, they would have to stop dividends to-morrow. At that time hand drills were used in place of air drills and black powder in place of giant powder. One could only work six months of the year, for you could not get to the properties except by means of snowshoes. The freight cost was 1c per pound to the nearest point. One dollar will do more work now than $3 would then. The mining companies were then organized with but $20,000 to $30,000 capital; $250,000 to $300,000 in the treasury of a company now will go as far as $750,000 would then.

MONTANA.

Phillipsburg *Call*: Work at the Bimetallic and Granite mines has resumed and the mammoth engines are hoisting ore as when the output of silver bullion was fifty bars a week. Coal is used for fuel. The Bimetallic con-

centrator is running on ore from the Granite dump. Miners are at work in the levels which are being driven to connect the Granite and Bimetallic mines. The first tunnel, which is now nearly complete, starts from the 1000-foot level of the Bimetallic mine and will connect with the 1400-foot level of the Granite, 400 feet being the difference in elevation in the two mines. A second connection is being made with the lower levels of the Granite mine at a depth of about 1800 feet which, when finished, will completely drain the Granite. The water is to be pumped at the Bimetallic mine to the 1000-foot level, whence it will find its exit through the drain tunnel, which was completed several years ago. This arrangement will prove a great saving to the company and a good profit can be made even at the present low price of silver. As soon as the Granite mine can be drained of water, miners will be put to work, the bulkheads will be removed from the face of the drifts and mining resumed after a suspension of six years. The ore is to be hoisted through the Granite shaft, and a tramway is now being constructed from the Granite hoist to the ore bins at the Bimetallic mine. The car will take on a load of coal for the Granite hoist, and in that manner operations will be most economically carried on. Teams are engaged in hauling lumber, and the construction is progressing steadily under the favorable condition of the weather.

From Saltese the car of ore shipped recently from the Last Chance weighed 39,500 pounds and the returns received from the smelter gave a net value of $2933 58 above freight and treatment charges. The value was almost all in the silver, it yielding a little over 288 ounces per ton. There was a little gold and some copper. The property is being worked under lease.

NEVADA.

STOREY COUNTY.

Virginia *Chronicle*: The lower section or bottom part of the hydraulic water lifting plant, to be installed on the Sutro tunnel level of the Con. Cal. & Va. mine, has been coupled. At the point where the discharge pipe is coupled to the arched or horseshoe shaped gun-metal casting the diameter is decreased several inches, the first joint of the discharge pipe above the point where it is coupled in the arched casting being in the shape of an elongated funnel 10 feet in length, the hollow arched tube into which the pressure pipe discharges having an inside diameter of only about 6 inches at the arch while the diameter of the discharge pipe above the funnel shaped joint is 14 inches. On the opposite side of the arched or horseshoe shaped casting, a foot or more below where the discharge pipe will be coupled on, is a nozzle cast inside of one of the legs or arms of the arch. This nozzle, or the point where it discharges, is an inch or more below the opening where the suction hose that draws in the mine water is coupled to the arm of the arched casting. This nozzle has a diameter of only 1⅛ inch and the velocity of the water at the end of the nozzle is 360 feet a second.

The water descending through the pressure pipe with a volume of 100 inches and a fall of 2000 feet, compressed to a diameter of 1⅛ inches at the point of discharge from the nozzle below the opening to which the hose is coupled, creates a vacuum and the vacuum so formed creates a current having a velocity of 40 feet a second, flowing into the discharge pipe, where it is forced upward to the Sutro tunnel level by pressure from the small nozzle just below the point where the mine water enters the discharge pipe.

The part of the plant described above is always submerged, and after the water is drained to a certain depth other lengths of pipe are ready for coupling and the plant is lowered to a further depth, the coupling of extra lengths of pipe only requiring a short time. To convey some idea of the work involved in the installation of the plant it is relevant to mention that it is necessary to install a column 1500 feet long, resting upon a base 24 feet wide that must be strong enough to sustain seventy-five tons in a shaft open 1000 feet below the base of operations. In this same compartment will be installed two lines of pipe with 20-inch flanges, leaving room to move a small cage, leave working room for the removal of 1000 feet of pump rod, the projecting portions of the pump bobs and 2000 feet of 12-inch columns with flanges of 17½ inches—and all of this in a space of 5 feet 4 inches by 5 feet 10 inches. Also to provide means for duplicating the pumping system so that one of the elevators can operate in one of the hoisting compartments, while the regular pumping will finally be done through the pump compartment. On account of the limited space all the fitting is done on the surface. It is expected that the plant will be in operation within the next twenty days.

The copper mines sold for $20,000 in Santa Fe district, Esmeralda county, last week by J. Fagan and W. Callahan, were bought for an English company. It is locally reported that the company will begin the development of the newly acquired property on an extensive scale early in the spring and will install a smelting plant either at Soda Springs or Hawthorne.——The Robust mill, at White Pine, is completed as far as the crusher. The shaft on the mine is down 120 feet, and drifting on the ledge will begin soon.

White Pine *News*: J. P. McOmie resumed work last week on the Chainman mine near Ely and has begun to sink a winze on the ledge from the No. 1 to the No. 2 level, 157 feet. The stope which the Lane Co. allowed to cave has been opened up again for 60 feet, and shows a ledge 4 feet wide for the entire distance that averages $30 to the ton in gold. The same ledge has been tapped on the No. 2 level.

Austin *Reveille*: J. A. Blossom shipped several carloads of high grade ore to Salt Lake City from his Kennedy group of gold mines.——J. B. Fitzgerald will start in full capacity his cyanide plant on the tailings at Pittsburg.——J. Mellander of Galena is taking out a car of valuable ore, which he will ship to Salt Lake.——J. Johnston has leased from B. F. Wilson a mine in Galena canyon and put a force at work extracting ore.——The Glasgow & Western Exploration Co., which operates the Mammoth Adelaide copper mines, near Golconda, are also interested at Copper canyon, near Battle Mountain. The placing of a hoisting engine is completed and the number of miners increased.

NEW MEXICO.

The Supt. of the Bonanza Development Co. says that the Hearst estate will have a concentrating outfit under way before the end of the month, by which the lower grades of copper ore will be treated. Over $60,000 worth of high-grade ore has been gleaned from the Santa Rita Copper property since the Hearst estate commenced work a few months ago. All the ore marketed by the Hearst estate has averaged or mined over 20% copper.

A receiver has been appointed for the Legal Tender mine at Elizabethtown.——The Senate and Bobtail properties have developed ore of high grade. The mill is running steadily.——The Mills Co. have their shaft down 106 feet, and it is locally reported that a body of $50 ore is exposed.——High-grade ore has been encountered in the Blue Bandana shaft, 50 feet lower than the tunnel workings. A pumping plant is contemplated. The Blue Bandana claim is owned by the Montezuma G. M. & M. Co. and is managed by C. J. Dold of Kansas City.

El Cielo mine, near Hermosillo, is being worked with good results by Grant & Co. There is a 5-foot ledge which runs about $25 in gold per ton, $140 in silver, and a large percentage of lead. A shipment of ore made recently yielded $16 in gold, about $300 silver, and considerable lead. A tunnel has been run on the vein 250 feet in ore all the way.——In La Indiana mine drainage work is being continued. The vein is wide and runs pay ore, although the mine has been worked for over fifty years.——Many of the mining companies of Pachuca are availing themselves of electricity for motive power. The Dificultad and San Rafael mines are using pumps run by electricity.

In Sonora, near La Dura, the La Dura M. & M. Co., a close corporation with only three stockholders, employs over 1000 men. They operate their own concentrating plant, and also ship an average of 300 tons per month, which carry from 300 to 400 ounces of silver to the ton, beside small quantities of gold, lead and copper.

Near Carbo L. Lindsay is developing a group of copper properties. The ore bodies are large. He has one shaft 75 feet deep, and three other shats 60 feet each, and a tunnel 50 feet in length.

At the Mesa Quemada mine development work is being pushed. The ledges are large and low grade, but will be worked on an extensive scale.

Last week the Santa Rosalia M. Co. made the first shipment of bullion from the new mill started in December of gold bullion to the value of $7000. The high-grade rock is not run through the mill, but will be shipped, and only second grade rock run through the mill. Recent work has developed a large body of second grade ore in the old Spanish workings of the property which, with what was developed by the present owners in the new workings, demands more stamps in the mill, which Supt. E. L. Murray hopes to get the company to place immediately.

It is estimated that when the new Chihuahua & Pacific Railway is completed from Guerrero, this road alone will bring to Chihuahua from the Sierras 2000 tons of smelting ore daily. A large smelting plant for Chihuahua is contemplated.

OREGON.

Press dispatches state that Finch & Campbell bought the Cornucopia group in Union county for $600,000 from J. Searles of New York. There are forty claims in the group.

Near Baker City the English mine is employing fourteen men, doing development work, and the results are satisfactory.——The bromine-chlorine plant will be ready for operation March 1st.——The Carrie B. mine is taking out good grade ore.——The Virtue Con. M. Co. last week in Collateral property broke through the upraise to the surface. The ledge exposed is 2 feet wide for a distance of over 150 feet and of high grade. The management will at once put on an increased force and soon the Virtue 20-stamp mill will be in operation.

Grant's Pass *Journal*: The A B C M. Co., near Glendale, has ten men at work.——The Oro Fino mine, near Grant's Pass, is working four men.——B. J. Allison of Roseburg is developing a good ledge of gold-bearing ore near Glendale.——The Miller mine, in Farmers Flat district, has been leased to Kitchen & Muggins.——The Sterling hydraulic started up again last week with a good supply of water.

Jacksonville *Times*: The placer miners about Jacksonville are at work and making the most of the opportunity.——Miners are developing the Free Silver and Gold Standard mines in Sampson creek district near Ashland.——A. Watts is operating his placer claim on Horsehead on full time, with good results. He recently brought $500 in gold dust to Grant's Pass.——Next spring Washington parties will prospect the big Yank ledge in Galice creek district and deep shafts will be sunk.

SOUTH DAKOTA.

The American M. Co. at Ragged Top are rushing work on their new plant, and will have their machinery on the ground next week and be ready to resume operations soon.

The Homestake Co., Black Hills, is dropping 540 stamps, and this number will be increased when the present scarcity of water is overcome. This will be done during the coming summer. Surveyors have run new water lines from Cold Springs and Spearfish creek. The latter will probably be brought into the Homestake plant at an estimated cost of $1,000,000. This will necessitate about twenty-one miles of ditching. The company is operating 400 stamps of their own and is running the Highland mill of 140 stamps under lease. The Highland Co. in turn are operating the Deadwood and Terry mine and a 160-stamp mill.

UTAH.

Near Vernal on the Colorado line the past two years the Bromide mine has been worked on a small scale and over 4000 tons of 15% copper ore have been treated at the primitive smelter. Occasional shipments of copper bullion, 96% fine, have gone to market. The great distance from the railroad retards satisfactory operations.

At Park City sinking the Silver King shaft 200 feet deeper was begun last week, by three shifts of seven men each. It is estimated that with ordinary working ground the task will have been completed in about three months. The size of the excavation is 7½x15 feet.——Shipments of ore the past week were 1,702,610 pounds.——The Copper King mine, near Park, is developing a ledge that contains, aside from several feet of second-class ore, a streak 2 feet wide which is said to pay a net profit of $20.91 a ton. This streak carries over 30% copper, $3 in gold, and silver of between $2 to $3 to the ton.——Work at the Massachusetts has been suspended, pending the arrangements for sinking the new shaft.

At Bingham, the Miner's Dream mine, under bond and lease to the Dalton & Lark people, will soon cut its big vein at 1000 to 1200 feet depth. A crosscut that will be 360 feet in length and has been run 320 feet is approaching the Dream from Dalton & Lark ground. From upper workings the Dream has to date shipped 10,000 tons of good ore, carrying lead, silver and gold.——Shaughnessy & Berryman, leasing the Yosemite, are producing three to four tons per day. The ore carries a good average of lead and silver.——Mgr. Hill has air connections completed at the Fortune and will now increase production from the large ore body recently encountered.——The Red Wing will this spring be a weekly shipper of crude ore and concentrates.——The Showall placer shaft is going down steadily at the rate of 2 to 3 feet per day.——Eleven cars of ore left Bingham depot last week, mostly the product of Old Telegraph leasers, but including three carloads from the Julia Dean. Average shipments are five to six cars per day.——The Rand tunnel, through which the Grow Co.'s group on Golconda mountain is being opened up, recently found an ore body reported to be good.

At Sunshine the Reindeer mine is bought by the Gold Reserve people for $12,500. The company has started an incline on the vein.——At the Annie a new 40 H. P. boiler and hoist are being installed, and sinking the shaft will be continued. It is down 350 feet.——From Golden Gate mine at Mercur last week there passed through the sampling rooms of the Refining Co. 5000 pounds of gold dust, the value of which is estimated ranging from $30,000 to $100,000, representing the gross earnings of twelve days.——The shipments out of the camps of Tintic the past week were sixty-five cars of ore, seven cars of concentrates and forty-four bars of bullion.

The Mercur *Mercury* says an average of 150 tons of ore is being treated in the Sacramento mill. A larger plant will be put on the property in the spring. New bodies of ore are being opened up and but little stoping is done.——At the Little Pittsburg the tunnel is in 130 feet. Work is being crowded.——At the La Cigale mill 100 tons per day is being put through the crushers. The ore leaches good. The cost of roasting ore is between 30 and 40 cents, and while most of the ore leaches well without roasting, it is in much better condition for leaching after being baked.——The Old Jordan & Galena, at Fish Springs, made new strikes in the lower workings of lead, silver and gold ore and also a body of copper and gold. Recent samples from the copper body show an average of 9% copper and $5 in gold.

The Swansea mine at Silver City shipped a small trainload of ore.——Three cars of high-grade silver and gold ore were sent out from the Centennial-Eureka last week.——The Lower Mammoth of Tintic has resumed shipments and reported at the sampler last week with two carloads of high-grade ore.——The Eureka-Swansea Extension at Tintic struck a streak of quartz 28 inches in width yielding two ounces in gold, with twenty-three ounces silver per ton.

In the Lower Mammoth mine at Mammoth 5 feet of solid ore is exposed and continuous shipments are promised. This ore is on the 300-foot level and assays show 20% copper and 45 ounces silver, with 18% lead and $2.80 in gold.——The proceeds of two lots of ore from the Northern Light mine yielded 449 ounces silver, 18% lead and $10 80 in gold, and on the second class 204 ounces silver, 7% lead and $4 in gold; for the two a check for $7000.——The Centennial-Emma M. Co., whose properties at Alta have been practically idle for a long time, have decided to soon resume operations.

The Mercur mills at Manning have begun work. The property will turn into the plant 400 tons of ore daily. The 200 miners who have been experiencing a holiday while the new plant was being started up, have returned to work.

WASHINGTON.

At Colville, work is progressing on the Great Northern mine. They have a vein of gold-bearing ore developed at 180 feet depth, with a tunnel on the ledge, having a pay-streak 2 feet thick which runs $60 to the ton in gold and copper.——At Northport a strike was made last week in the Covote mine, owned by the Scottish American M. & D. Co The ore body is 6 feet across, containing copper with iron and galena. Assays average $70 to the ton.——At Chewelah, J. C. Hooker has begun work on the Juno claim, which is showing copper pyrites.——Tinsley Bros. are extending the tunnel on the Bromide Mountain claim.——At Republic, the Mephisto G. M. Co. have discovered quartz of good value.——Work upon the Eldorado claim began last week.

W. M. Ridpath recently bought a sixteenth interest in the Iron Mask claim in Republic camp on a basis of $40,000 for the property.

The Maud S. group has a crew working on the property. They have uncovered a ledge from 4 to 10 feet wide and are running a 250-foot tunnel. The ore assays from $3 to $6 per ton.——The Morning Glory tunnel has encountered the vein and there are 5 feet of quartz; average samples yield $60 per ton in gold.

In the Mary Ann mine the ore in streaks is high grade; average assays show that 18 inches of ore runs $20.

The Blue Bird claim is said to be producing ore that runs $33 a ton.——Assays of ore from the Palo Alto gave from $22 37 to $153 75.

The Deer Trail mine No. 2 near Davenport, is owned and operated principally by Davenport capital. The ore is freighted to Davenport by teams and from Davenport it goes to the smelter. It is a high-grade silver property and yields 370 ounces of silver and 12% of lead to the ton.

Everett *News*: At Index there are about 150 men at work on the different claims in that district doing development work. M. Haber, who represents a German syndicate, has thirty men at work, has spent in the neighborhood of $50,000, and will spend as much more this summer.

Spokane *Review*: The Flora claim, in Republic camp, will be developed by the Flora G. M. Co. The property has a vein 2 feet wide that is said to yield $32 in gold per ton.——The Nevada claim, in Republic, operated by a company, has opened, it is said, a 3-foot ledge, showing ore of good grade.——The Dora property, in Republic, last week struck 3 feet of quartz.

WYOMING.

At the First National Bank, Rock Springs, there is a 100-pound bar of copper bullion, said to assay 96%. This is a sample of a six-ton lot from the Bromide smelter, near Vernal, and which was shipped to the Chicago copper refinery at Blue island. The Bromide mine is 100 miles south of Rock Springs. The owners lately put in a 36-inch water jacket furnace, and this shipment was of the first product of the smelter. The bullion carries a little gold. The mine and furnace have limestone and iron near to supply good fluxing material.

The Alma mine, near Grand Encampment, is shipping gold and silver ore, carrying some lead.——The discovery of copper ore was made on the Morning Star claim, in a vein 3½ feet wide, which averages 20 per cent copper.

FOREIGN.

BRITISH COLUMBIA.

The Ruby Silver mine, near Sandon, was bonded last week to Merrin & Armstrong for $20,000. A 300-foot tunnel is to be driven on the property. The Ruby Silver is one of the oldest claims in the Slocan country and over $30,000 of high-grade ore has already been shipped from the mine.

At Victoria the bill to exclude aliens from the placer mines of the province received its third reading last week and was immediately assented to by the Lieut.-Governor, so that it is now in effect.——The Minnesota Silver Co., Slocan, has spent $40,000 on its Slocan properties the past year. It intends putting in $60,000 more, most of which will be expended for a tramway and concentrator.——McNichol & Rackliff of Slocan City and Spencer & Duffy of Sandon, owners of the Noonday, near Silverton, have bonded it for $35,000. The ledge is 20 feet in width.——The Northwest Mining Syndicate of London, operating the Bosun mine, near Nelson, states that the company is spending about $3000 per month and is taking out 120 tons of high-grade ore, yielding about $8000. The company bought the property last June for $25,000, and up to date has shipped 480 tons of ore, which netted about $68 per ton, or $32,640 in all.

Rossland *Miner*: Shipments from the Rossland mines were resumed last week and will be continued for awhile at the rate of 200 tons per day.——The Iron Mask, in view of its coming lawsuit with the Center Star, is doing dead work almost entirely for the purpose of proving the continuity of the vein in dispute.——After two months' overhauling the Le Roi mine Supt. Tregear has the retimbering completed and the property is believed to be perfectly safe throughout. The plans of W. A. Carlyle, who has laid out the work, call for the operation of the property on a liberal scale, and as many men will be employed as can be put to work. On the 700-foot level drifting is in progress along both the hanging and the foot wall. A crosscut is being driven about 100 feet west of the stope, and it shows the ore body to be 40 feet wide.——Since the B. A. Corporation started work on the Nickel Plate Supt. Haskins has done 3000 feet of work, mostly on the 200-foot level.——From the War Eagle the shipments for the past week, owing to the delays in the railway service, were merely 340 tons. The War Eagle Co. received a refund of $16,000 from the Trail smelter on account of having furnished the stipulated 175 tons of ore daily for the past six months. During that time the shipments amounted in round numbers to 32,000 tons, and the refund was on the basis of 50 cents per ton.——It is conservatively estimated that the mining machinery bought for Rossland camp during '98 cost as follows:

War Eagle	$80,000
Deer Park	10,000
No. 1	5,000
Great Western	5,000
Nickel Plate	12,000
Virginia	6,500

LOWER CALIFORNIA.

San Diego *Union*: The Piramide M. Co., in the Juarez district, has secured a permit from

the Mexican Government to develop placer mines in that section and work is expected to begin soon. The permit covers 570 acres of and, and negotiations are in progress to have the land patented. It is said that the dirt and gravel is rich and that only the lack of water has prevented the placers from being worked on an extensive scale. The Mexicans have been working the mines on a small scale, paying $2 a load for hauling the dirt several miles to a creek. The Piramide Co. has been working since last August in making improvements on the property. About $20,000 has been expended in putting in a hydraulic plant. Two 50 H. P. pumps have been put in which will bring water from a creek three miles away. One of the pumps will force the water through a 9-inch pipe over a hill for a mile, and from there the water will run for some distance by gravitation in a ditch, to be diverted into a pipe line again and given force by the other pump to do the required work.

Three lumps of gold, each weighing about fifty ounces, were brought to San Diego recently from the Sorocco district.

MEXICO.

The new tramway of the Grand Central M. Co. at Las Amarillas has been set in operation and works successfully.——Near Aldame there is said to have been discovered a vein of ore running high in gold and 50 per cent lead to the ton.——A vein bearing gold, silver, lead and copper is being operated in the Cerso Prieto mine near Mapimi.——At Minas Prietas the Colorada-Creston Co. is doing considerable work in the old Prietas mine, and extracting ore at the surface which was overlooked by those who worked the property a generation ago.

The Seven Stars property, which was recently sold to the Monclova M. Co., composed of H. C. Lowther of Pittsburg and associates, is undergoing extensive development work. The property is near Chuichupa, in the State of Chihuahua. The company will soon erect a smelter.

ONTARIO.

From Wabigoon 500 tons of ore were shipped from the Munro property to the reduction works. It is probable that ore from 419 will also be shipped, and proving satisfactory the installation of a mill plant will follow.

Industrial Notes.

—During '98 Mexico mines distributed dividends amounting to $5,224,010; in '97, $5,079,107.

—The power of Cedar river is to be harnessed to furnish electric light and power for Seattle, Wash.

—Present coast passenger rates to Skaguay and Dyea are $15 and $25 respectively; freight rates, $8, $9 and $10 per ton; live stock, per head: horses, $22.50; dogs, $5.

—President McKinley will send a commission to examine thoroughly into conditions in the Philippine Islands. He fears that the treaty cannot be ratified by the present Congress.

—A golden spike will be driven on the last section of the Gila Valley, Globe & Northern Railway, at Globe, A. T., February 1st, to signalize the completion of that road and its advent into that great copper camp.

—The canners of British Columbia are alarmed at the proposed action of the Ottawa Government respecting the canning industry. They say that if the proposed suggestion is carried into effect, their $3,000,000 industries will be driven bodily to the United States.

—In San Francisco on the 21st met a convention to discuss conservation of the waters of California, participated in by representatives of the mining, agricultural and manufacturing interests. Permanent organization was effected. J. M. Gleaves is president, E. H. Benjamin secretary. The executive committee will memorialize the Legislature.

—The committee on permanent organization of the Pacific Ocean Exposition has a plan of organization for the exposition proposed to be held in San Francisco in 1901. A director-general will be made manager, with assistants to be appointed by himself, not exceeding three. His salary will be $10,000 a year, the salaries of the assistants to be fixed by the executive committee. There will be twenty-six committees.

—Consul-General Goodman's report from China shows that labor-saving devices are not wanted there. He says: "The cheapest thing here is a man. There is more labor than can find employment. A coolie carrying dirt will receive from 7 to 10 cents in gold per day. He must work from sunrise to sunset, not very steadily nor intensely, but putting in a great many hours and accomplishing a large amount of work for the amount of wages paid. There are more coolies willing to work for this pittance than there is work for them to do."

—Development of electric power for industrial uses is phenomenal in California, notably illustrated in the case of the two big plants in the vicinity of Redlands. It is stated that it requires 34,560 pounds of coal to operate 1 H. P. for one year by means of steam. The Redlands plant produces 1000 H. P. in electricity, in addition to the one producing 2000 H. P. Further, the plant of the Southern California Power Co., producing 4000 H. P., makes 7000 H. P. in electricity by the two companies in Mill Creek and Santa Ana canyons—equivalent, that is, to the consumption of nearly 121,000 tons of coal per year in the making of power by steam. With coal, therefore, at $8 per ton, this means $967,680; dividing this by 300, as the number of working days, gives an average of 806, the equivalent of this number of tons of coal mined per day, and, as the water flow is continuous, these plants are, as it were, inexhaustible mines producing this enormous output. A telegram yesterday from Los Angeles says: "To-day witnessed the completion in every detail of the longest power transmission system in the world, that which supplies the city of Los Angeles with electricity from force developed at the head of the Santa Ana river, eighty miles away. A telegram was sent from this city to-day by Senator G. H. Baker of the Edison Electric Co. and Southern California Power Co. to C. A. Coffin, president of the General Electric Co. in New York, informing him of the completion of the work and its successful operation for forty-eight hours. The system has occupied several years in building and has caused the expenditure of large sums of money. The wires enter the city in underground conduits." Electricity is as cheap a force as the world holds, even if made in the most expensive way, out of the most expensive material, at the most expensive locations, and transmitted with little regard to economy. It can be made where the location costs almost nothing, where the material from which it is made costs not more than one-tenth of the material now used. The doctrine of "varying levels," the easily-collectible force of water running to and from the "varying levels," is not generally understood. There are 1000 instances of it to one of the expensive waterfall. Wherever water runs, wherever bodies of water lie so that they would run into each other if connected (a mere scratching of the soil will connect them so that they will dig their own canals by the running of the water), you can collect the force and transmit it by this process from the lowest valley to the highest mountain, down into the deepest mine, or off to the most inaccessible places. The force of water running to and from the "varying levels," a force which can never be exhausted because it is continually being renewed.

—The Nicaragua Canal bill passed the U. S. Senate this week by an almost unanimous vote. The following is a brief description of the work proposed: San Juan del Norte, on the Atlantic, and Brito, on the Pacific, are the termini of the canal. Its length from port to port is 169¼ miles, of which 26¼ will be excavated channel and 142⅔ miles is lakes, rivers and basins. The summit level is necessarily that of Lake Nicaragua, 110 feet above the sea. There will be three locks near either end. The summit level commences 12¾ miles from the Atlantic and extends to within 3⅓ miles of the Pacific. The summit reach, will, therefore, be 153¼ miles long. For 9¼ miles from the inner harbor at San Juan del Norte the canal extends southwesterly across the low lands of the coast to the foothills of the Cordillera, known as the Eastern Divide, where is located the first of the three eastern locks. Up to this point the formation through which the canal is to be cut is entirely alluvial and will be excavated by machinery. The locks follow in close succession, No. 1 at 9¼ miles, as above stated, with a lift of 31 feet; No. 2, 1¼ miles farther on, with a lift of 30 feet, and No. 3, about 2¼ miles farther on, with a lift of 45 feet. Here commences the summit level of the canal at an elevation of 106 feet above the sea, which allows 4 feet of fall from the lake for flowage. Beyond the locks a cutting is to be made through the eastern divide to the River San Juan, at a place called Ochoa, near to its junction with the San Carlos, where a large dam of the same elevation as lock No. 3 will be built, which, with such other embankments as are ascertained to be requisite, will impound the waters of the river and small tributary streams in their valleys, forming a series of large basins at the elevation determined by Ochoa dam and by the locks. The cutting through the divide will be about 3 miles long, with an average depth of 141 feet. The dam at Ochoa is to hold the waters of the river permanently at the height of 106 feet above the sea. Locks Nos. 4 and 5 terminate the summit level of the canal. These are close together, and will have a lift of 42½ feet each. Lock No. 6, about 1¼ miles beyond, is the last of the western series, and will lower the canal to the level of the Pacific, with a lift of 21 to 29 feet, varying according to tidal conditions. The Senate voted that the amount to be spent on the Nicaragua canal shall not be more than $20,000,000 in any one year.

Commercial Paragraphs.

THE Hercules Gas Engine Co., 305 Market street, San Francisco, has a contract with P. K. Wood of Los Angeles, Cal., to manufacture his pump.

AT Leadville, Colo., the Little Jonny mine is to have electrical appliances for light and power. The contract has been given to the Denver Engineering Works, and Eugene Y. Sayer, the electrical engineer, will superintend the work.

A. MIDDLEBROOK, the Denver manager of the Jeanesville Iron Works Co., reports the sale to the Ibex M. Co. at Leadville, Colo., of a large compound condensing mine pump 36-inch stroke. It will be the first 36-inch stroke mine pump at Leadville.

THE Risdon Iron & Locomotive Works of San Francisco this week received an order for two more dredges from Breckenridge, Summit Co., Colo., the two they put in there having done such satisfactory work that two more were deemed desirable.

J. C. WINANS, manufacturer of Winans Anti-Incrustation Powder for removing and preventing scale formation in boilers, has moved from his old quarters, 220 Fremont St., to the new modern brick structure No. 151 Fremont, where he will carry a full line of steam users' supplies.

In the United States Circuit Court at San Francisco, on the 23rd, Judge Morrow gave judgment in favor of the complainant in the case of the Risdon Iron & Locomotive Works against L. C. Trent for a permanent injunction and an accounting. The matter in dispute was the infringement by the defendant of a patent on a roller ore crusher. Judge Morrow decided that the Bradley crusher of the respondent and the Bryan crusher of the complainant were practically the same invention. A perpetual injunction was granted and an accounting ordered.

Our Southern California Representative.

Herewith is fairly presented the general appearance of our genial southern California representative, Mr. W. D. Curtis, of 223 W.

2nd St., Los Angeles, Cal., who is deservedly winning name and fame as an enterprising business man in the southern California metropolis.

Personal.

ROSS E. BROWNE expects to return from London about March 1st.

G. W. HALL, Supt. Eaglebird mine, Maybert, Cal., is in San Francisco.

P. KERVIN is slated for the superintendency of the Utah mine, Virginia, Nev.

MYER JACOBS has been appointed receiver at the Rawhide mine, Tuolumne Co., Cal.

C. ROTH succeeds C. W. Ayres as Supt. Turner's Flat Drift M. Co., Sonora, Cal.

D. SEARLES, Supt. Eureka and Excelsior mines, Sumpter, Or., is in San Francisco.

D. J. MCFAUL, Supt. Home mine, Nevada City, Cal., has returned from San Francisco.

W. J. ADAMS is examining copper properties and will be absent from San Francisco for some time.

W. J. SUTHERLAND, Pres. Holmes M. Co., Candelaria, Nevada, has gone to his gravel properties at Grizzly Flat, Cal.

F. W. PAGE, Mgr. North Fork mine, Forest, Cal., is examining properties in Siskiyou Co., Cal., for an Eastern company.

J. D. HEARD, Alameda, Cal., managing owner Greenhorn Blue Gravel property, Yreka, Cal., has returned from the mine.

C. A. HAMILTON of San Francisco, with A. Scowden of London, England, is examining copper properties in the Pitt river country of Shasta Co., Cal.

WM. M. STEWART was re-elected U. S. Senator from the State of Nevada on the 24th inst. The regular army always gets away with the militia.

E. H. GARTHWAITE of California has been appointed by Cecil Rhodes superintending engineer of the South African Chartered Co.'s mines at Bulawayo, Rhodesia, South Africa.

GEO. H. EVANS, late Mgr. Con. Gold Mines of California, at Oroville, Cal., purposes a visit to the U. S. of Colombia, S. A., to examine a mining property there for a Boston syndicate, as soon as the Comstock pumping operations have been successfully inaugurated.

H. HUESER of Cologne, Germany, who with Geo. Bayha was examining copper properties at Copper City, in Shasta Co., Cal., for Colonge and Dusseldorf bankers, returned home this week because of the death of his father. Either he or another expert will return to complete the work.

IRVING M. SCOTT'S name is mentioned in connection with the election of U. S. Senator from California, now under discussion by the Legislature at Sacramento. If Mr. Scott were to accept the position California would be ably, honorably and honestly represented by a representative business man, who would be in touch with the State's industrial interests. The Union Iron Works, of which he is general manager, in '98 carried a payroll amounting to $1,826,000. This sum was paid in wages to the workingmen in his employ last year.

DR. ALEXANDER GRAHAM BELL, the inventor of the Bell telephone, at a recent meeting of the Starr King Fraternity of Oakland, Cal., talking of the invention of the telephone, said: "The telephone grew from my experiments to teach the deaf how to understand and to talk so that they could be understood. My father invented a symbol by which deaf mutes could converse, and finally I invented an apparatus by which the vibrations of speech could be seen, and it turned out to be a telephone. It occurred to me to make a machine that would enable one to hear vibrations. I went to an artist in Boston and he advised me take the human ear as a model. I told him that I would if he would kindly furnish the ear, which he did by supplying me with the ear of a dead man. With this I experimented, and upon applying the apparatus I noticed that the dead man's ear wrote down the vibrations. I arrived at the conclusion that if I could make iron vibrate on a dead man's ear I could make an instrument more delicate which would cause these vibrations to be heard and understood. I thought if I placed a delicate piece of steel over an electric magnet I could get a vibration, and thus the telephone was completed. The telephone arose from my attempts to teach the deaf to speak. I was not an inventor. It arose not from my knowledge of electricity, but as a teacher of the deaf. Had I been an electrician I would not have attempted it."

T. H. BROWNELL of the Everett, Wash., smelter, is in Washington, D. C., contending against a Treasury Department decision relating to sampling of lead ores. The Treasury insists on the wet method of sampling, and the smelter company demands the dry. The wet method shows exactly how much lead is in the ore, but the dry method shows what proportion the smelting company gets, as in dry sampling about 3% of lead escapes as fumes, the same as in smelting. Owing to this contention money due the company in rebates has been held up. The Everett works has become a bonded smelter and Mr. Brownell seeks to have the greater portion of this money released. It seems probable the Treasury will do this, retaining only enough to cover the 3% in controversy.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JANUARY 17, 1899.

617,712.—REFINING ASPHALT—A. F. L. Bell, Carpenteria, Cal.
617,825.—GATE—W. Blair, Vallejo, Cal.
617,919.—VESSEL CLOSURE—A. Braverman, Fresno, Cal.
617,731.—CORSET, ETC.—Emma A. Ford, S. F.
617,929.—FINGER SHIELD—O. E. Fowble, Los Angeles, Cal.
617,857.—TANK—J. H. Franklin, S. F.
617,829.—GAS CONCENTRATOR—R. P. Greer, S. F.
617,808.—WAGON TONGUE—S. M. Harris, Cheney, Wash.
617,785.—COWL—L. H. Honigbaum, S. F.
617,899.—SUCTION DREDGING—F. W. Krogh, S. F.
617,9?9.—SASH LOCK—W. Madison, Los Gatos, Cal.
617,991.—MOVABLE FLUME—J. B. McDill, South Pasadena, Cal.
617,834.—RIVETING MACHINE—R. S. Moore. Oakland, Cal.
617,835.—RAZOR—F. Patak, S. F.
617 905.—TRACTION SLED—J. C. & N. B. Peterson, Seattle, Wash.
617.884.—BRUSH—J. M. Poe, Santa Monica, Cal.
617 910—WATER ELEVATOR—H. Room, Olema, Wash.
61?,783.—HONE—T. R. Smith, Los Angeles, Cal.
617,823.—FRUIT DRIER—Thomas & Thompson, Jefferson, Cal.
618,019.—METAL SIGN—G. H. Tietjen, S. F.
617,914.—WHEELED SCRAPER—A. Titus, National City, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

RAZOR.—F. Patak, San Francisco, Cal. Assignor of one-half to J. Frowenfeld of same place. No. 617,835. Dated Jan. 17, 1899. This invention is especially designed to provide means for conveniently separating and locking an independent and removable blade into the permanent back of the razor to which it is fitted so that it can be removed and replaced. It consists essentially of a channeled back, having a permanent latching device at the outer end, a transversely fulcrumed latching lever at the inner end, in combination with a blade having corresponding engaging devices formed upon it, and by means of these connections the blade can be easily inserted or removed without the use of supplemental tools.

TANK.—J. H. Franklin, San Francisco, Cal. No. 617,857. Dated Jan. 17, 1899. This invention relates to improvements in tanks which are designed to contain liquids. In the use of large containing tanks which are built of staves hooped together, it is found very difficult to prevent their becoming leaky. This invention is designed to prevent this shrinkage and leakage, and it consists in the formation of grooves or channels in the meeting edges of the vertical staves with transverse passages connecting the grooves or channels, and a water supply by which water may be constantly kept in the channels and passages so that the staves will not shrink and separate when the tank is not full. The water supply tube has connections at the bottom and a means for discharging any sediment which may accumulate therein so that it will not be introduced into the passages of the tank and eventually clog them.

RIVETING MACHINE ATTACHMENT.—R. S. Moore, Oakland, Cal. No. 617,834. Dated Jan. 17, 1899. This invention relates to an attachment for riveting machines. The object is to overcome a difficulty which arises when metal plates are to be riveted together, in which holes are bored or punched through the overlapping edges, and the rivets having a head on one end are placed in these holes and the opposite end is headed or upset upon the opposite side of the sheets. This difficulty of making a perfect joint in this manner arises from the tendency of the plates to become slightly separated while the upsetting of the rivet is taking place, and the result will often be that a portion of the rivet and the open space between the plates will be upset before the head is formed upon the end of the rivet, and the open space will thus be maintained and a leak occur at that point. In this invention the post is cut away upon each side to form bearing surfaces, and an upsetting die is carried by the posts between the said supports. A disk or plate adapted to support the parts to be riveted is mounted on the said supports and has a central opening for the die, and a plunger is adapted to force the disk backwardly by the act of lifting until the rivet is upset by contact with the die. The springs which press against the rear of the disk serve to close the plates tightly together by the first impact of the riveting apparatus, and they are thus held while the rivet is headed upon the opposite side.

How to Build and Operate an Arrastra.

Written for the MINING AND SCIENTIFIC PRESS by WM. H. WASHBURN.

Although the arrastra is generally considered to be out of date, we occasionally meet with a claim-owning prospector who still prefers this ancient crushing machine for testing the ore taken out in development work. When this is the case, the claim is generally remotely situated and transportation expensive, limited means being usually one of the conditions.

Where water power is to be had reasonably cheap, the arrastra may still find a useful place in developing a prospect into a mine, preparatory to the erection of more efficient modern machinery. When it has been decided to build one, a site should be selected to which the water power may be cheaply brought and high enough to afford ample dump for tailings and be out of reach of floods as well. It will be found convenient to have the camp or cabin near by when making a run.

The accompanying drawings are made with a few slight variations from a typical arrastra in Union county, Oregon.

The site being leveled off, the mudsills *b*, *b*, Fig. 1, are laid, the two center ones being gained into the "stump" or center post *A*, the upper end of which is about 28 in. above the mudsills.

There is an iron band around its top and lagging around it to protect it from being worn by the drags. The segments of the rim *B* are pinned to the mudsills. The first 12 in. above the sills are 2 in. thicker on the inside than those above them, which are 6 in. thick. This allows the "bed" or stone pavement *D* to wear down without leaving a ridge around the outside, not reached by the drags *C*.

A gateway for discharge, shown at *G*, Fig. 2, is 6 in. wide, having 1-in. grooves in its sides for a vertically sliding gate. It extends down to about 4 in. below the level of the bed. The issue, or lowest point of discharge, is temporarily raised to about 1 in. above the level of the bed by 1-in. strips under the gate, which are removed as the bed wears down, thus allowing the issue to be always the same height above it.

A silver-plated copper plate should be placed outside the gate, as a safeguard against loss when discharging. The sills are well tamped and covered to a depth of about 3 inches with fine sand. The bed is laid down on the sand with blocks of any hard, granular rock, granite being generally preferred. They may be about 1 foot thick and have from 1 to 2 sq. ft. of upper surface. Larger than this will not leave crevices enough to afford a lodgment for the amalgam and gold. They need not be accurately fitted, as the crevices should average from 1 to 2 in. wide and be nearly filled with sand. The bed should have a slight grade of about 1 in. in 10 ft. toward the gate.

Sometimes a narrow row of softer rock is laid next the rim and stump to equalize the wear. The vertical shaft *E* is 16 in. in diameter, its length being determined by the diameter of the water wheel and level of the tail race. It is hooped on each end.

The drag arms *F*, *F* are 4 x 6 in., gained together in the center and secured by the wooden key *f*, Fig.

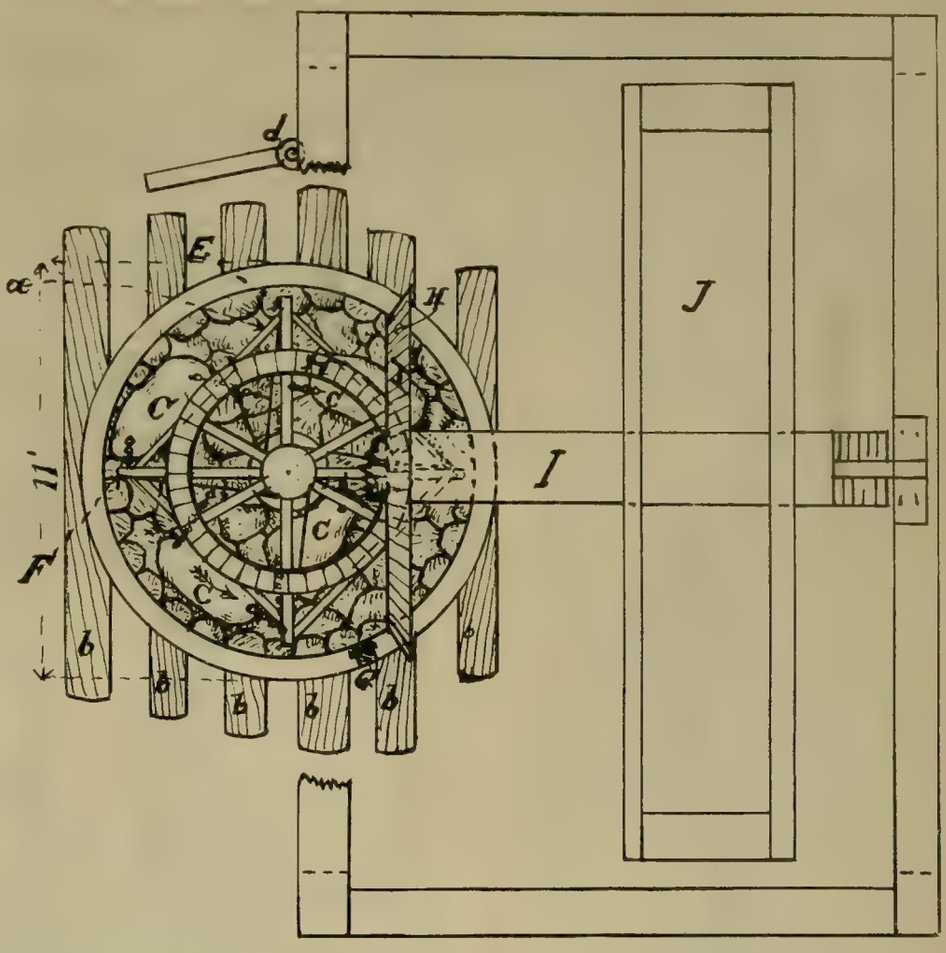


Fig. 2.

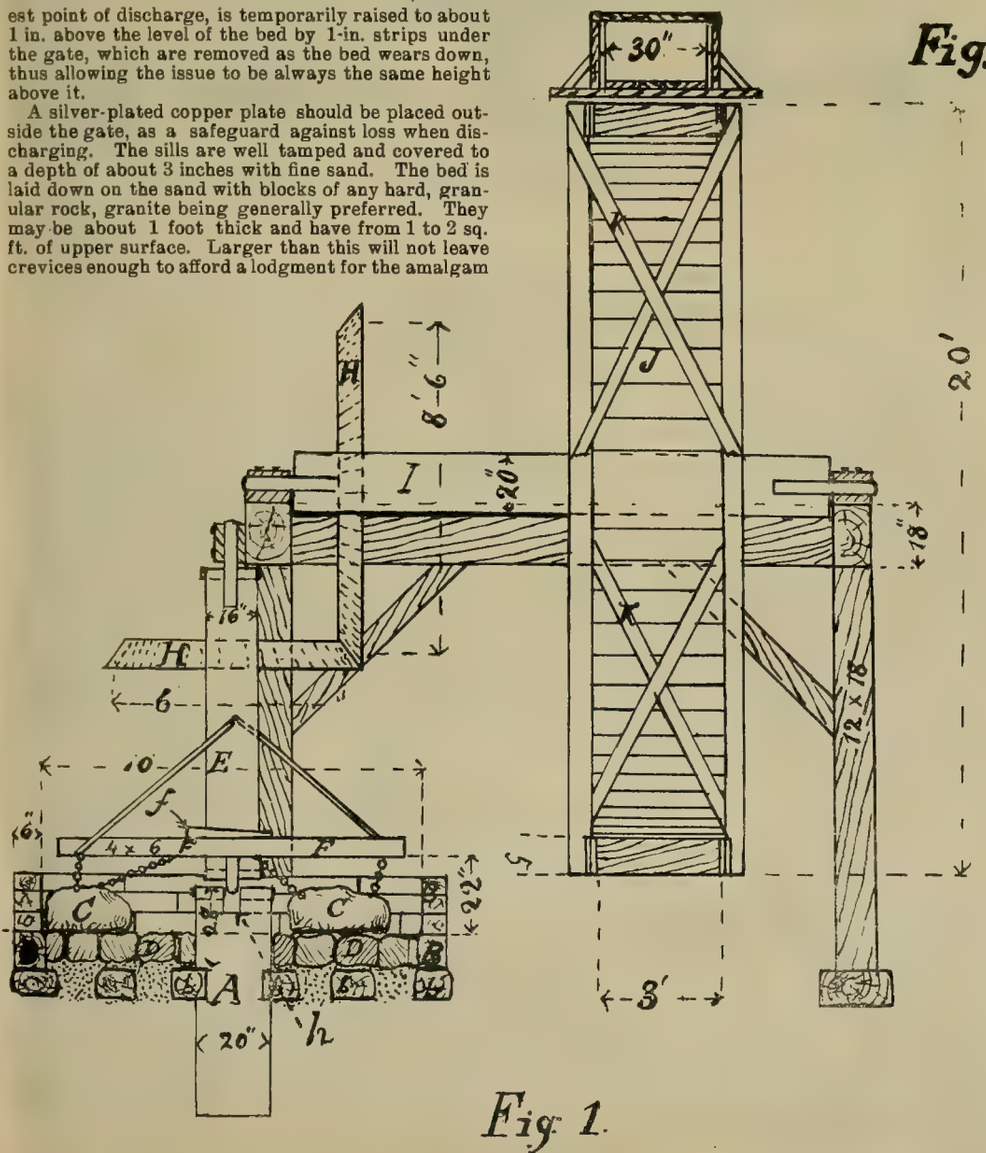


Fig. 1.

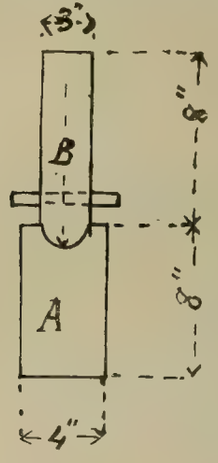


Fig. 3.

1. Besides the 4 x 4-in. braces *a*, *a*, Fig. 2, between the outer ends of the arms, rods of ⅝-in. iron run from thence upward to the leading side of the shaft.

The drags are usually hard granite boulders weighing about 1000 lbs. each. Smaller ones will do when power is scant, but their crushing capacity is determined by their weight.

A ⅞-inch hole nearly vertical is drilled in the upper side of each end of the drags, and about 5 in. deep, in which is inserted a ⅝-in. eyebolt enlarged toward the lower end. These are tightly wedged with dry wooden wedges. The use of lead or babbitt is not

recommended, as in case it should work loose the amalgam would be in danger of being fouled.

The drags are fastened to the drag arms by suitable chains, with due regard to thoroughly mixing the pulp when in motion. A small derrick at *d*, Fig. 2, will be found very convenient for hoisting the drags into and out of the bed.

The step *h*, Fig. 1, sometimes gives trouble by heating and cutting, owing to the weight upon it, unless carefully made and attended to.

Capt. E. E. Clough of Sparta, Union Co., Oregon, who has had many years experience with arrastras, and to whom I am indebted for valuable information in regard to them, recommends the step shown in detail in Fig. 3. A piece of steel *A*, 4x4x8 in. long, has in its upper end a semi-spherical recess 3 in. in diameter and 1½ in. deep. This is tempered to a

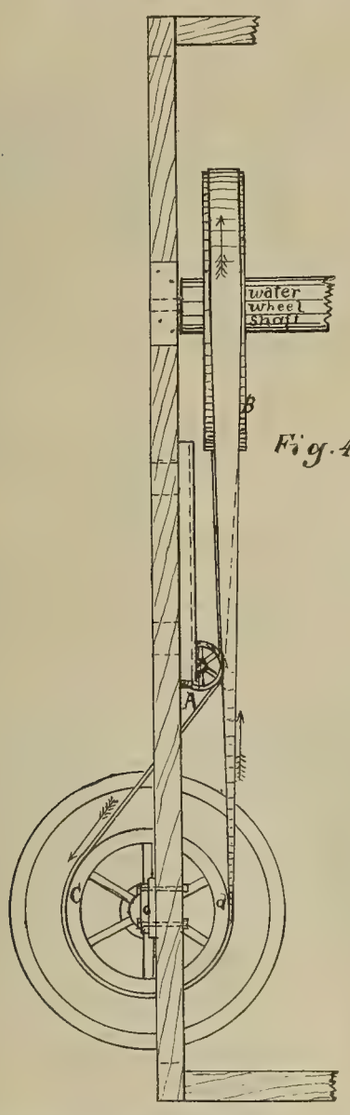


Fig. 4.

hardness that will barely turn the edge of a file, then fitted into the stump and tightly wedged. *B* is also steel, 3x3x9½ in. long, rounded on the lower end, to fit the recess in *A*. A collar should be welded around it 3½ in. from its lower end to afford more supporting surface. It is also tempered, firmly wedged in the shaft, the drag arms resting upon its upper end, with a piece of thin iron interposed. A little water once in two hours on this step is said to be all the lubrication acquired. The danger of grease getting into the pulp from this step is thus removed. The solution used for tempering the step was made up of 5 gal. of rainwater, 1 qt. of salt, 4 oz. saltpeter and 2 oz. of ash bark.

The cogwheels *H*, *H*, have six arms and the rims are made up of two ply of hardwood segments, well-seasoned and painted, to prevent shrinkage. The cogs are 2x4x3 in. long and about 5 in. and a small fraction circular pitch, or mean distance between centers. The mortises for them are 2 in. round holes. The driving-wheel is 8 ft. 6 in. and the driven wheel 6 ft. in diameter on pitch lines. They should be made by a good mechanic. The gudgeon in upper end of shaft *E* should be 3 in. in diameter and 18 in. total length, tightly wedged. The bearing may be of hardwood. The water-wheel shaft *I* should have wing gudgeons, running on either hardwood or cast-iron bearings, as the weight of the wheel may require. The water-wheel *J* has twenty-four arms 2x6 in. with braces *K*, *K*, and is 20 ft. in diameter with buckets 3 ft. wide, the rim being 9 in. deep. It requires about 80 miners' in. of water to drive it.

The overshot wheel is so well known that further description than is furnished by the drawings is not necessary. Some arrastra men believe its greater weight is an advantage in arrastra work over the more modern impact or turbine wheels. Whether or not this be correct, I am unable to prove from actual experience.

This will prove a strong and durable machine, capable of crushing about three tons in twelve hours. Should a lighter one be desired, it may be cheapened somewhat by omitting the mudsills, using plank or board staves for the rim and making the step by having the gudgeon in the shaft extend downward about 6 in., the end being cut off square and smooth instead of being rounded. Next tightly fasten a piece of gas pipe into the stump of suitable size to receive the gudgeon. Drop a number of loosely fitting discs of steel inside the gas pipe, leaving the hole of such depth that the shaft will be about 2 in. above the stump. The shaft may be driven by a quarter twist belt instead of cogwheels. A tightening pulley should be arranged on the slack side of the belt to bring it in line with the driving pulley. As shown at *A*, Fig. 4, the frame carrying the tightener pulley is set in grooves that it may be moved toward the arrastra when the belt requires tightening. A 10-ft. arrastra will require a 10-in. four-ply belt, though a 12-in. one would be better. Care must be taken to have the lower side of the driving pulley *B*, Fig. 4, about 1 in. above the level of the center of the driven pulley *C* and that the side of the latter pulley where the belt leaves it at *d* is in line with the center of the driving pulley *B*, otherwise the belt will run off the pulleys. The cogwheels are to be preferred, however, as a belt will sometimes slip—a most troublesome thing in arrastra work. Three arms may be used instead of four on smaller arrastras.

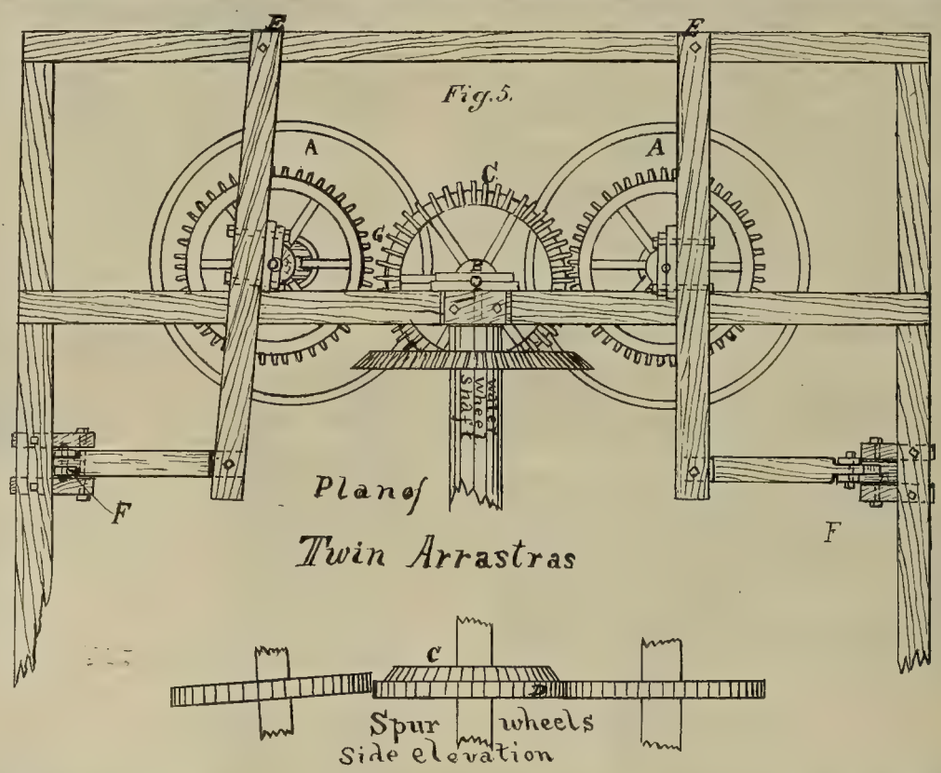


Fig. 5.

Where horses or mules are used as the motive power, but two are sometimes used. In this case, one of the arms are extended outward beyond the rim to be used as a sweep to which the animals are hitched as a span, where more than one is used. Where timber is scarce, the frame supporting the upper end of the shaft is sometimes dispensed with, the sweep revolving on a bolt in the stump and balanced by a weight on the end opposite the team. The vertical shaft, however, is to be much preferred. Where but two arms are used, two drags may be attached to one arm, one close to the stump and the other near the rim, while on the opposite side one larger drag travels between their tracks.

I know of an arrastra, designed by a Portland machinery firm, which was driven by a ⅝-in. cable-link chain. The bed was 36 ft. outside and 16 ft. inside diameter, leaving an annular track 10 ft. wide. The rims were of sheet iron, their upper edges reinforced by wood. There were twenty-four drag arms, having three drags each. These weighed from 1500 to 1800 pounds, aggregating over fifty tons of drags. It crushed from twenty-two to twenty-six tons of ore per twenty-four hours. Instead of being worked in charges, it was run with a continuous discharge through screens, the discharge pulp passing over amalgamated plates. Nearly all the gold, however, was saved inside. Between each of the twenty-four drag arms an extra arm was framed, making forty-eight all told at the periphery. The ends of each of these were banded, and had a strong iron fork inserted in them to receive the chain, which was guided by idle pulleys, and a tightener. It was necessary to remove a few links occasionally to take up the wear. The upper end of the shaft was held in place by guys, instead of framework.

Sometimes two arrastras, *A*, *A*, Fig. 5, are arranged to be driven by one water-wheel. These are termed twin arrastras. *B* is a vertical shaft on which the bevel wheel *C* has an additional spur wheel *D* (side elevation) built on beneath it, which drives the arrastra on either side by corresponding spur wheels. The upper ends of their respective shafts are attached to beams, which may be swung on a stout bolt at *E*, *E* by means of a lever at *F*, *F*. This is for the purpose of throwing either arrastra out of gear, as shown at *G*, without stopping the other. Instead of this arrangement, the opposite end of the water-wheel shaft may be elongated sufficiently to allow the arrastra shown in Figs. 1 and 2, to be duplicated, except that both should be built so either can be thrown out of gear when required. The plan shown in Fig. 5 has the advantage that the working of both may be more conveniently watched by the operator than when on opposite sides of the water-wheel.

The main advantages of twin arrastras are that the most convenient size for working is retained, and that one may be stopped when water is scarce. Where the water supply is ample for the season one desires to run, construction may be cheapened by building one of 15 ft.; which would have about the same capacity as two of 10 ft., provided the total weight of the drags were doubled, as it should be. It occurs to the writer that twin arrastras might be advantageously arranged to run with a continuous discharge and save labor and time by having one set about 2 ft. above the other. From the first, after grinding without mercury, the pulp would issue through screen about No. 1 size, and thence conveyed to the second, where it could be amalgamated and the crushing continued to the desired fineness, using probably a No. 9 or 10 screen. A silver-plated copper plate should be placed outside at a grade of not less than 2 in. to 1 ft. This plan would call for a continuous supply of water and ore, the latter being fed in quantities so small as to keep the pulp much thinner than when worked in charges, especially in the second arrastra. It should be stated, however, that we have never known of arrastras being so arranged.

When the water-wheel flume and ditches are finished, our arrastra is ready to run. Fasten one of the drags to the outer end of one of the arms by the chain, short enough that it may tend to lift the forward end a trifle and so it will travel as near the rim as possible, without touching it, the chain on the rear end, or "tail chain," being used to pull that end toward the center to throw the pulp in that direction.

The next drag, being fastened to the following arm, may travel near the center of bed track. The third is fastened to its arm, so as to travel as close to the stump as possible, its rear end being pulled toward the rim by the tail chain, to throw the pulp outward. The fourth is made to travel nearer the center of the track. However placed, they should be so arranged that their tracks will overlap, and result in an even wear of the bed, at the same time keeping the pulp as thoroughly mixed as possible. They may be changed end for end when necessary to equalize the wear.

Turn on enough water to run the arrastra about

fourteen revolutions per minute and begin throwing in the charge, adding a little water at intervals, to bring the pulp to about the consistency of thin mortar, the aim being to have it only thick enough to hold the uncrushed rock in suspension, as well as the mercury when added later. If too thin, the rock will settle to the bottom and grinding be greatly retarded. If too thick, power is wasted. By careful watching, one will soon be able to judge it correctly.

The charge for an arrastra of this size should weigh about 1500 pounds and be all in as quickly as it can be done, and, at the same time, keep the pulp of the right consistency.

This usually requires about thirty minutes. The time required to grind a charge will vary with the hardness of the rock; unless the drags are light or the rock harder than usual, from five to six hours will suffice.

Generally in three or four hours the charge will be found to be ground to a fineness of grain not exceeding one-eighth of an inch. A sample is horned, or panned out, and the amount of mercury required determined from the prospect so obtained.

This will require some practice. About 2 ozs. of mercury to each ounce of gold in the charge will be about the average required. Samples should be taken at short intervals afterward, to see that the mercury is being thoroughly distributed through the pulp.

The amalgam should also be examined, and if too hard, more mercury should be added until brought to about the consistency of fresh butter. Watch the pulp carefully that it does not become too thin, for by strict attention to these seemingly trifling details is success only to be attained. Usually in about two hours the free gold will all be taken up by the mercury; but this must be judged by careful testing, and when it has taken place the operator may begin to "wet down" the charge, first slowing the arrastra down to about ten revolutions per minute, and gradually adding water enough to allow the coarser grains of ore to be ground as fast as they settle. By placing one's ear against the rim, the grinding sound will assist in judging the amount of water required. Usually in from thirty to forty-five minutes the amalgam will all have settled into the crevices of the bed. If not, then continue adding water carefully until it has so settled and a careful testing fails to reveal any amalgam or mercury in the pulp.

The charge is now ready to be drawn off. The amalgam plate outside the discharge gate having been dressed, the gate is carefully raised a very little at first, testing the tailings and watching the plate for indications of escaping amalgam, until the charge is all run off, when the arrastra is recharged, and the same operation repeated until a cleanup is made, which is usually after from twelve to twenty charges have been ground. There seems to be a difference of opinion in regard to the best method of running off the charge, some preferring a series of 2 or 3-inch holes instead of the gate, and drawing off from the top first, and so on down to nearly the level of the bed.

It would seem the latter way, though slower, would be the safest, but Capt. Clough, whose experience lends his opinion much weight, favors drawing off from the bottom, on account of being so much quicker, and entailing no appreciable loss if the amalgam has been properly settled.

Should drawing off from the top be preferred, it may be done by using, instead of the gate, strips of 1-in. board 2 in. wide, and long enough to extend into the grooves in the sides of the gateway, removing them from the top, one by one, as the level of the pulp is lowered. Study to avoid grinding the amalgam by keeping the crevices open to receive it. Careful attention to the amount of water used will greatly assist in gaining this result.

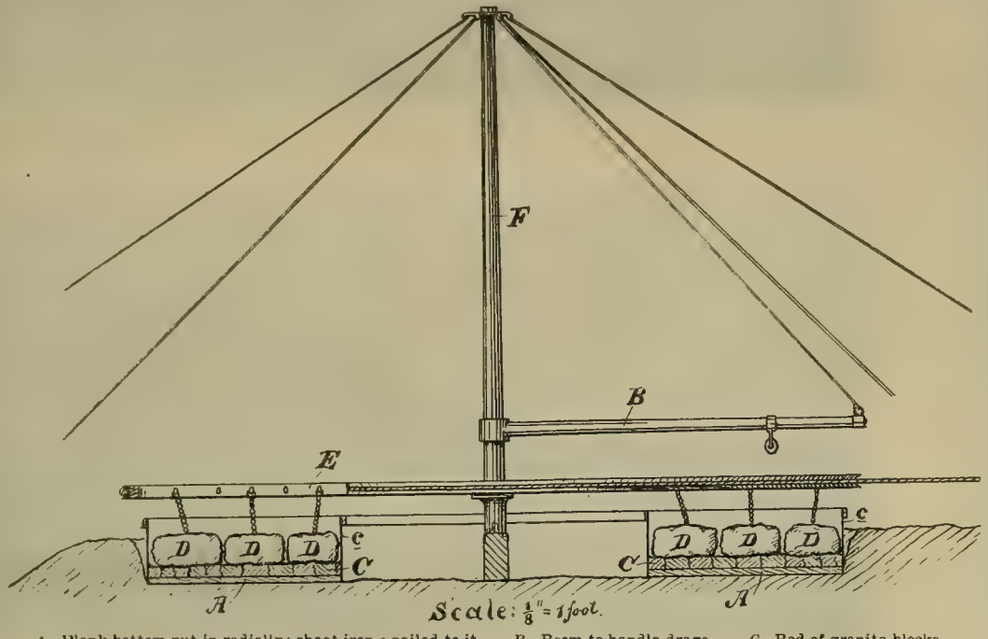
Chemicals are not often used, except occasionally a little salt or ashes, or both. We recommend, however, a few handfuls of quicklime when settling, to assist in coagulating the mercury and counteract any tendency to flour.

When the work has been carefully managed and the gold is reasonably free the saving should be not less than 95%, better results than these being quite common among experienced arrastra men. Capt. Clough states that he has dissolved a $20 gold piece in aqua regia and recovered 95% of it in a thoroughly clean arrastra, grinding rock totally barren.

Great care should be taken to prevent any particle of grease from finding its way into the pulp, where it would cause much loss. The number of revolutions of smaller arrastras should be increased that the drags may run at the same speed as those above described. From 10 to 12 ft., however, seems to be the size generally preferred. At best it will be found a tedious process, however, and the owner of one of these machines will probably soon find himself longing for some cheaper and more rapid means of crushing his ore.

When closing down for the season support the water-wheel shaft by a post to keep it straight.

Finally, it should always be remembered that good judgment and the most vigilant attention to every detail is as essential to successful work with an arrastra as with a stamp mill.



A—Plank bottom put in radially; sheet iron *c* nailed to it. *B*—Boom to handle drags. *C*—Bed of granite blocks. *D*—Drags. *E*—Drag arms and forks in their ends to receive driving chain. *F*—Center post, upper end supported by guys. Charged by driving a wagon onto a platform over the bed and dumping it.

Electricity in Mining.

It is not a difficult matter to convey to managers of mining properties an understanding of the chief terms of electrical parlance, by comparing these terms with the various conditions of water—that agency with the action of which none are more familiar than miners themselves. As one miner's inch, the unit of volume of water, delivered under a pressure of 480 feet head, will produce one mechanical horse power, so will one ampere, the unit of volume of electricity, if delivered under a pressure of 746 volts, produce one mechanical horse power. The analogy is practically perfect and the busy man of mining affairs who has to do somewhat with electricity need not necessarily delve into electro-techniques beyond that depth which returns the understanding that almost every electrical term in every day use finds an analogue in a familiar utilization of water.

It has been shown that the ampere is comparable to the miner's inch, and that the volt is comparable to the head-in-feet, or the pressure of a stream of water. The power obtainable from a stream of water may be found in the product of its weight and velocity—this product being expressed in "foot-pounds"—and there are 33,000 foot-pounds to a horse power. Similarly the power obtained from a current of electricity is found in the product of its amperes (weight or volume) and its volts (pressure or velocity) — this product being expressed in "watts"—and there are 746 watts to a horse power. Where any power of considerable magnitude is under consideration, its equivalent in watts would be so great numerically as to be inconvenient of expression, hence the Greek prefix "kilo," signifying 1000, is used exactly as in the metric system, and thus the energy of 175,000 watts is expressed as 175 kilowatts. Since in the watt is represented the product of volts and amperes, it obvious that 175 kilowatts, for instance, may represent an energy of 10,000 volts and 17.5 amperes, or that the two factors may have any value which will give 175,000 as their product. Here the cited analogue still holds, for the same is true of the energy of a stream of water when expressed in foot-pounds.

But water in flowing through a pipe line encounters resistance from friction with the sides of the pipe and from bends or other changes in the direction of flow. Hydraulics characterize this resistance as the "co-efficient of resistance," which is a variable quantity, and which is not expressed in terms of standardized unity. It is practically in the same manner that a current of electricity, in traversing a wire, encounters resistance, the amount of which varies greatly with the metal of which the wire is made. Silver offers the least resistance of any metal to the flow of electricity; copper has about 98 per cent of the conductivity of silver, while iron has less than one-sixth of the conductivity of copper. In electricity the unit of resistance is the "ohm" and its value is such that when a pressure of one volt is applied to such a length or cross-section of wire that the current which flows through the wire will be one ampere, then the resistance of the wire will be one ohm. A parallel to this would be found in hydraulics where the length and diameter of a pipe is such that under a head of 1 foot, exactly 1 miner's inch of water would flow through the pipe. The co-efficient of resistance of this pipe is analogous to the term of "ohm"—the unit of electrical resistance.

Electricity, if of the direct current form, traverses the conducting wire in one direction, as does water in a pipe line. Sometimes pulsating currents are used and these, like water in the supply pipe of a hydraulic ram, flow in a single direction, but are interrupted periodically. Then there are alternating currents of electricity which are of a vibrating character and oscillate in one direction and then in the other, alternately, as water would do in a pipe, each end of which is connected to a respective side of a piston chamber having no valves, in which event the direction of flow of water through the pipe would alternate with the direction of the piston stroke.

An oscillating current of the form described, in which electricity flows back and forth as water in a pipe connected to a piston chamber without valves, forms the simplest type of alternating currents, and such a current is termed a "single phase" current. This may be fixed in mind by conceiving the water device to be driven by a single piston, actuated from a single crank disc, throwing the water in the pipe into a state of single oscillation or single alternation —technically "single phase." The rate of this oscillation, when applied electrically, is termed the "periodicity," or the "rate of alternation" of the circuit.

Suppose, however, that there are two such single pipes, entirely independent from but paralleling each other, and containing water alternated in flow as in the previous instance, by valveless piston chambers. If the pistons of the respective chambers are always in unison as to speed and position as they would be were they driven from the same crank pin of a shaft, then the volumes of water in the two pipes would pulsate in perfect harmony as to rate, speed and direction, or to use an electrical term, the currents would be in "synchronism." But should the two pistons be actuated from independent crank pins placed diametrically opposite on the driving shaft, then the flow of water in one pipe would be exactly opposite to that of the water in the second pipe, which may be described as a "two current" or "two flow" system. It is precisely such a condition as this which exists in the two electrical circuits of the "two phase" alternating current electric transmission system.

Again, instead of the two valveless chambers and pipe system just described, assume that there are three such systems, each identical in construction to the others, with the solitary exception that the pump pistons are respectively driven from crank pins placed 120 degrees apart on a shaft, in which event the direction of flow in pipe No. 2 will be one-third of a stroke or revolution behind that in pipe No. 1. Similarly, system No. 3 will "lag" one-third of a stroke behind No. 2; system No. 1 will lag one-third of a stroke behind No. 3, and so on, all this being analogous to a "three-phase" alternating current system. Thus are illustrated the different types of polyphase systems—as all varieties of alternating currents in excess of the single phase system are termed.

But what is the advantage of different phases? Simply this: As hot water in flowing through a pipe influences the temperature of the air surrounding it, so does electricity in flowing through a wire influence the ether surrounding the wire—in fact, magnetizes it, the direction of magnetic pull (so to speak) varying with the direction of electric current flow. A north magnetic polarity and a south magnetic polarity will attract each other as all know, and owing to the fact that in two-phase systems the direction of electric current flow in the two circuits is always exactly opposite, the ether surrounding

one wire is always of exactly opposite magnetic polarity to the ether surrounding the other wire, hence in two-phase electric motors there is always a state of mutual magnetic attraction between that part of the motor containing the "leading" phase and that part of the motor containing the "lagging" phase.

Single phase circuits are by nature restricted to but a single magnetic polarity of the surrounding ether at a given interval, and as it takes opposite magnetic polarities to exert attraction toward each other, it is evident that the production of power from single phase current is seriously handicapped by its own inherent characteristic. This idea roughly explains why the development of single phase motors is so tardy.

In three phase systems, the phase impulses follow each other consecutively with absolute regularity, and inasmuch as "fields" or atmospheres of magnetism attend the appearance or disappearance of each impulse, it is evident that the revolving motion of these consecutive impulses impart a similar rotation to the attending magnetic field, which explains the term "rotating field." If a strong magnetic field revolves, obviously any magnetic body placed within that field will tend to revolve with it and to this principle is due the three-phase motor.

Finally, the transformer or converter is just what its name indicates, or rather, what its name would indicate were the word electricity prefixed. It is merely a device for automatically transforming electrical energy or "wattage" from one value to another. The transformer is to electricity what an appliance would be to hydraulics that would take the energy of a small stream of water at high head and transform it with but small loss to the energy of a large stream of water at low head, or vice versa. Were there an equivalent appliance in hydraulics, this "hydraulic transformer" could automatically convert the irresistable tidal flow, or any portion of it, to a much smaller volume of water at a tremendously high head, thereby enabling an easy solution of the long hoped for utilization of the tides for power purposes.

It must be borne in mind that the foregoing has been written with the idea of imparting most elementary ideas to those who have neither time nor inclination to become possessed of any but a superficial knowledge of the chief terms and principles which are fundamental in electrical practices. The wisdom of experience has well taught that "a little knowledge is a dangerous thing," and the above is a little, indeed a very, very little, of the knowledge of which science is possessed concerning electricity, and to accept every statement given as an indisputable exposition of most recent practices would be an error, for, as intimated, an elementary and brief explanation of a profound subject cannot be swerved from its purpose by considerations other than the barest generalities.—Electricity.

Some High Mines of Telluride, Colorado.

Written for the MINING AND SCIENTIFIC PRESS.

Herewith are given three views of a typical Colorado mining town, its general appearance and surface topography of a few of its mines. The upper illustration is of the town, the center one portrays Savage Basin, the lower, Silver Pick Basin. The higher peaks shown surrounding the latter are over 14,000 feet above the level of the sea—almost the same altitude as Mt. Shasta, Cal.—yet mining and milling are carried on the year round. The altitude of the mill in the foreground is 11,500 feet. The photograph from which that picture is engraved was taken last October, just after a light fall of snow. The Silver Pick mine is not appropriately named, as the ore is much richer in gold than in silver. The vein centers a basic dike of diorite, and is worked through nine levels, the lowest of which is at an altitude of over 13,000 feet: the ground remains frozen the year round. Through the nine levels the pay ore shoot extends from 400 to 800 feet, with an average value of $25 per ton. About 130 men find employment there part of the year, reduced to one-half that number in extreme winters. The sorted first-class ore is shipped to the smelters. A ⅞-inch wire rope tramway 5900 feet long connects the mine and mill, the latter showing low down in the foreground of the picture. Well up in the left-hand corner a darkly shaded spot on the right-hand slope of the gulch is the dump of the present lowest workings, level No. 7. There are probably few higher mines on this continent.

On the right of the central picture are depicted the Tomboy mill and mine, another famous property, which, although only four years old, has a record as a gold producer. The mine is operated through a tunnel from the mill, one-half mile long, though by the time this is in type the sinking of a three-compartment vertical shaft will have been begun. Three machine drills are used. The compressors which drive the drills and supply the mine with air are driven by steam power. The machinery of the mill is driven by 200 H. P. electric motors, the power being derived from the plant of the Telluride Power Transmission Co., thirteen miles distant. A full account of that enterprising concern recently appeared in the MINING AND SCIENTIFIC PRESS. This

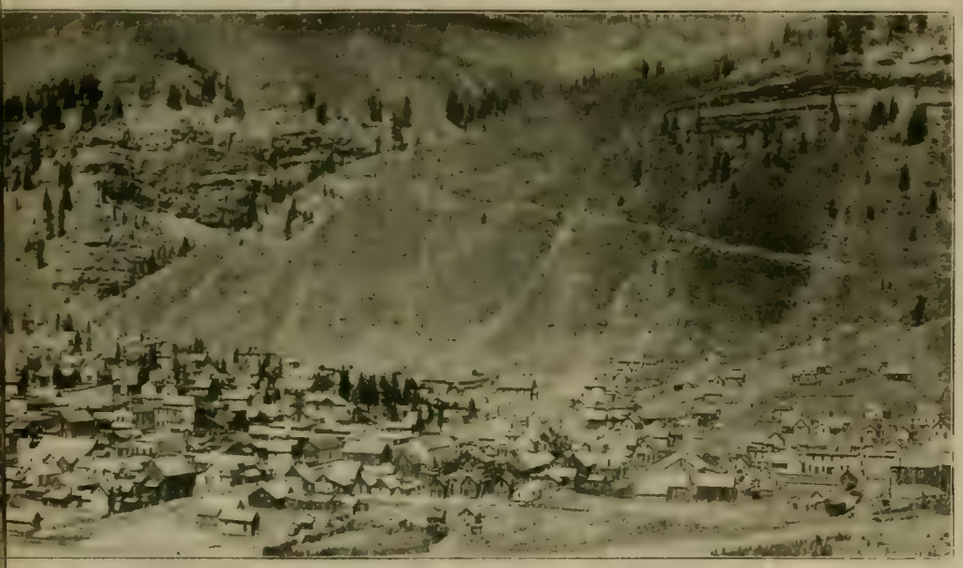
TELLURIDE, COLORAD

Marshall Basin. Japan Mine and Mill. Cli

SAVAGE BASIN, SIX MIL

Gorham peak in the distance, Silver Pick mine below.

SILVER PICK BASIN, TWENTY



D SURROUNDINGS.

e.

Tomboy Mine—Mill in the Distance.

OM TELLURIDE, COLO.

Silver Pick Mill.

S FROM TELLURIDE, COLO.

company, which supplies electric power to a number of mines in this section, has recently extended its line over Mount Sneffels to a large mine in Ouray county, a distance from the generating station of over twenty miles. Where the line passes over the mountain the altitude is 13,500 feet above sea level. The generating station at Ames commands the water power of both the Lake and Howard forks of the Rio San Miguel, the former 1200 H. P. and the latter 750. There are eight transformers. Water is conveyed from Great Lake to the plant, a distance of over three miles, by flume and pipe line, with a fall of 901 feet, pressure 436 pounds to the square inch, in a nozzle 15 inches at its discharge. The velocity of the water is 14,520 feet per minute. The Howard fork line is one mile in length, fall 550 feet, pressure 250 pounds, and nozzle 15 inches. There are two dynamos, each 9 feet in height, two-phase alternating current, 1200 amperes each, step-up transformers to 10,000 volts on the line.

The Tomboy mill is about 12,000 feet above sea level. Since May 1st, '98, it has treated 40,000 tons of ore, averaging $10 per ton. It is free milling, and 90% of the mill product is sent to the Denver mint in the form of gold bullion. The output of the mine for the year 1897, according to the sworn statement of the manager, was $497,524.12.

To the enterprising Telluride *Journal* this paper is indebted for the use of the accompanying engravings.

Phœnix, Cal., Group of Gold Mines.

Written for the MINING AND SCIENTIFIC PRESS.

This mine is situated in the Sierra Buttes, one mile from Sierra City, Sierra county, Cal. The Buttes are famous, not only for their ruggedness and height, which make them a landmark visible from long distances, but as well for the very rich mines which are in them and which have yielded many millions of dollars in gold.

The Sierra Buttes consist mainly of a vast mass of quartz-porphyry, which rears its head to the height of 8615 feet above the sea and over 4400 feet above Sierra City, a mining town at its southern base.

On the southern slope of the Buttes, about 1600 feet above the valley of the Middle Yuba, are the outcroppings of the Phœnix ledge, which extends from the Butte mine easterly to the Mountain mine, two miles away.

The Phœnix mine consists of seven United States patent claims along this ledge and two claims on a parallel ledge higher up the mountain. These latter claims will be worked through a crosscut from the Phœnix tunnels.

Five hundred feet below the croppings, where the mine was first opened in 1866, the ledge has been opened through a cross tunnel 700 feet long. At the level of this tunnel drifts, each about 300 feet long, have been run east and west on the ledge. From above these drifts many thousands of tons of quartz have been mined and milled. According to a report made by G. W. Wait, M. E., the average mill returns from this amount of quartz was $7.11 per ton. He also estimates the amount remaining in that ore chute above the drifts and available for mining and milling to be 25,000 tons.

At the end of this tunnel a winze has been sunk on the ledge to the depth of 165 feet. But little quartz has been mined from below the level of the tunnel and drifts. The ledge of quartz exposed in this winze is about 7 feet wide at the bottom and will average over 4 feet. The average assay value of this quartz is $12.50 per ton and is free milling. The small per cent of sulphurets are worth about $200 per ton. The winze is provided at the tunnel level with an elevator hoist, which receives its electric energy from a dynamo in the mill. The tunnel is lighted by electricity. At the mouth of the tunnel is a blacksmith shop, and nearby there is a boarding house for the miners.

From the tunnel the quartz is taken to the mill, 800 feet below, by cars running on a wire rope tramway, 1100 feet long. A full car on descent pulls an empty car up, controlled by a brake.

The mill is a modern one and contains twenty stamps and all the accessories, except concentrators. There is room provided for these. Its capacity is sixty tons or more per day. It is lighted by electricity. Power for the mill is obtained from free water, running through a ditch and flume three miles long, belonging to the property. Abundance of water—even during the past exceptionally dry time—having a fall of nearly 500 feet, supplies all the power which will ever be needed for the purposes of the mine.

Three water wheels of the Pelton type are in the mill and are used to run the machinery for crushing, and also the dynamos for electric light and power. A tunnel will be run 1600 feet to the ledge to tap it 800 feet vertically below the present one, so that the quartz may be transferred directly to the mill, and thus be mined cheaper. Under the present conditions, mining and milling can be done for less than $2 per ton.

The property has been idle for several years because of litigation, which is now at an end. It has recently been purchased by Dr. N. S. Keith of San Francisco, and will be operated by him and associates.

Gold Mining and Milling in South Africa.

The following letter was written by a young Californian from Krugersdorp, South Africa, and while not exactly adapted to the columns of a technical journal, as it treats of everything in a general way without regard to detail, yet it is not without interest, as it is evidently written "first hand"—from personal observation:

I promised to write you some time ago facts that I could gather about the different cyanide processes as used here for the extraction of gold; and it is only since I came out here to the Lancaster mine that I have gained the desired information. I have picked up some other things also in regard to mining as it is carried on in the Rand that may be of interest.

The gold-bearing reef here is known as "banket." The first banket that was worked was found near the surface, was soon worked out and the mines abandoned. Then prospectors came in with their diamond drills, which have proved the reef and brought it to its present state of development. The diamond drill is a series of steel tubes, each about 10 feet long and screwing together with flush joints inside and out. The crown is of steel set with diamonds, so that it cuts a clearance inside and out for the barrel. It is revolved quite slowly, its own weight carrying it down, while water is pumped in at the top, reducing friction and flowing up on the outside, taking with it the cuttings, which are tested from time to time. Additional tubes are screwed on as they go down. When the barrel is pulled up the core sticks in the barrel. It is taken out and assayed when reef is struck.

The average size of drills used for prospecting take up a 1¼-inch core.

The hole may be put down to any depth or angle. There are five shafts on this property; two are vertical, the others at an angle of 45°, which is about the pitch of the whole reef until the deep levels are struck, when it flattens out more nearly parallel to the surface.

The reef is found at different depths, the paying levels being down 1000 feet or more. Then there are the deeper depths, which have not been developed yet. The reef in many places is found to be richer as they go down, and the whole reef contains a tremendous body of payable ore, so you see the companies here are justified in erecting large and expensive plants.

The ore is hauled to the top of the headgear, where the skip dumps itself. If it is waste, a trap is opened and the load enters the waste bin. If ore, it slips over the grizzly, which takes out the fine stuff and enters the ore bin. The fine material is all sent to the crusher house. The larger material is drawn from the bin, sorted, taken to the breaker which reduces it to a suitable size for the crusher or stamp mill; after passing through the stamps, over the amalgamated plate and riffle which takes out the greater part of the gold.

Now we come to the cyanide treatment. After the sand and water leave the battery house it runs into a large wheel, belt-driven, which elevates it so it will flow into the receiving tanks. There are six of these tanks, built of iron, and about 12x40 feet, supported on iron columns above the treating tanks. These tanks are set on masonry, which is open below so that the cars can be run under, the manholes opened and the tanks emptied. The tailings from the battery house can be turned into any one of the six receiving tanks.

The stream enters the center of the tank, into an arrangement something like the old-style lawn sprinkler which turns slowly around, spreading the tailings evenly over the bottom of the tank. There are several outlets in the sides and bottom of these tanks, covered with fiber mats. The water passes through these, taking only a very small quantity of sand with it, which is caught in settling boxes.

When the tank is full the tailings are turned into another tank. Now we have here what is termed a tank of slimes. The manholes are opened in the bottom of the tanks and the slimes emptied into the treating tank below, where a solution of cyanide of potassium is pumped on it and allowed to stand ten days.

There are various devices used to stir up the slimes and allow the cyanide to act. After ten days the cyanide solution, which now contains a large percentage of gold, is filtered out through fiber mats in the bottom. When empty the slimes are discharged through manholes and hauled to the dump.

There are two processes for getting the gold back into a solid state again: the MacArthur-Forrest process, by which it is treated by acids and precipitated on zinc shavings, and the other, the Siemens & Halske process, which is used here as follows:

The plant consists of four wooden tanks about 5 feet wide, 4 feet deep and 30 feet long, and each is divided into twelve equal parts, so arranged that the cyanide enters the top of the first and flows through a small slit near the bottom of the second, and from the top of this to the third, and so on from top to bottom to the last. In each section of the tanks and parallel to the flow of the cyanide are the negative and positive plates, there being twelve in each section of the four large tanks. The positive plate is of sheet iron covered with sacking, and the negative plates that receive the gold are of strips of thin lead foil hung on a copper bar.

The four large tanks are connected in series to a 15-volt dynamo, the sections in each box being parallel to each other. The cyanide, as it flows slowly through each of the twelve sections of the tank, carrying with it gold in solution which is electrolytically deposited on the lead, now reaches the last section of the tank containing now but a slight trace of gold. It is then taken to large iron tanks where it is tested and new cyanide added to it, and so used over and over again. Once a month the lead foils are taken out and sent to the Rand Ore Reduction Co., where the lead and gold are separated.

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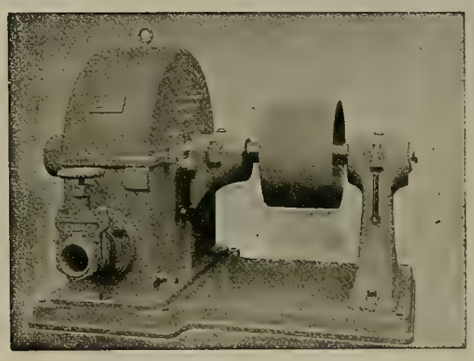

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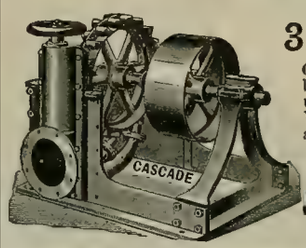

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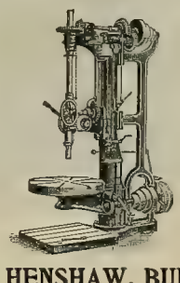

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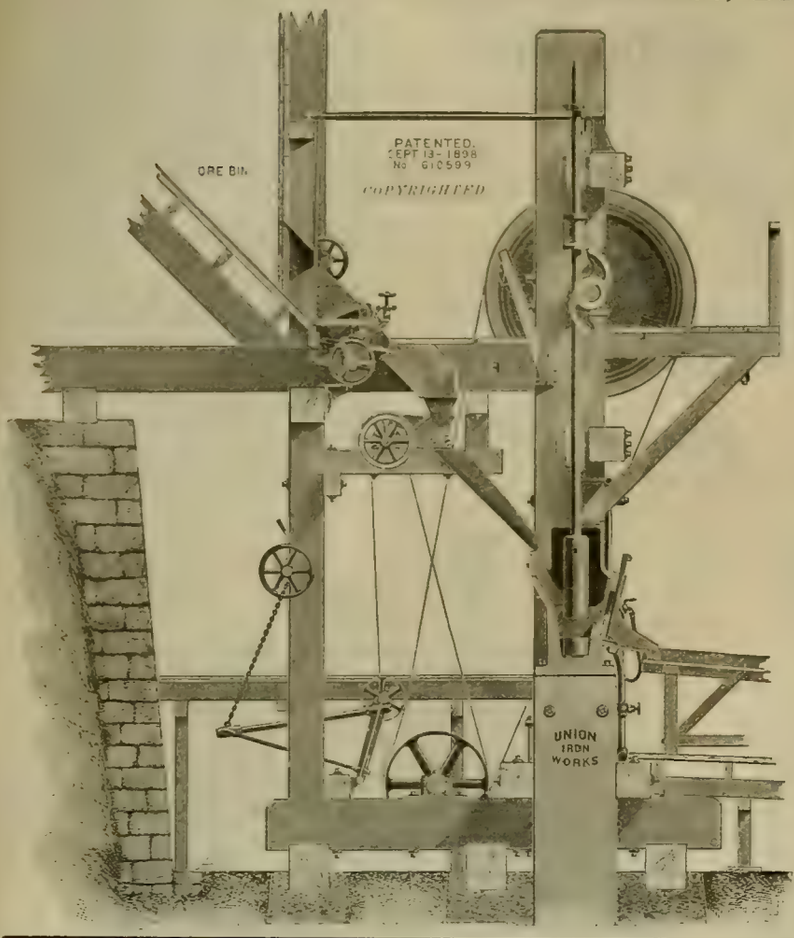

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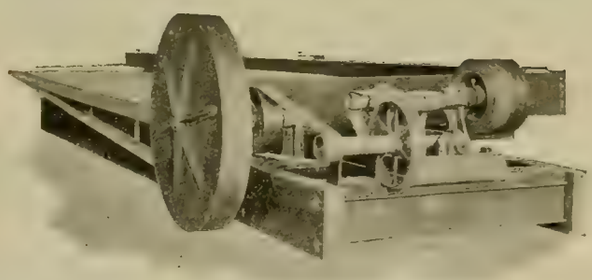

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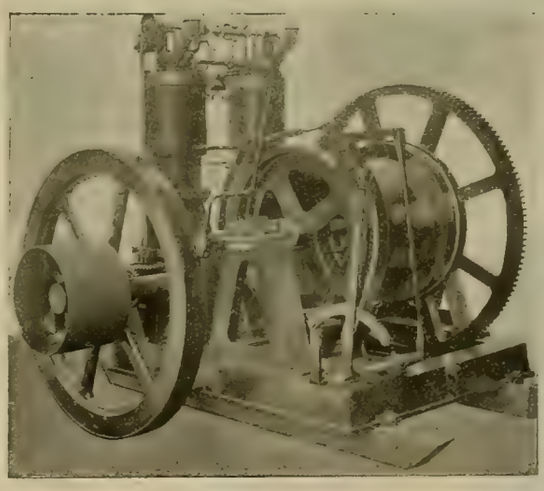

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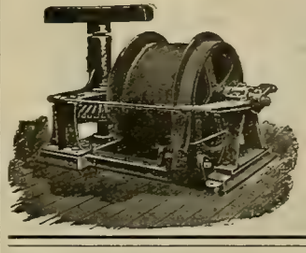

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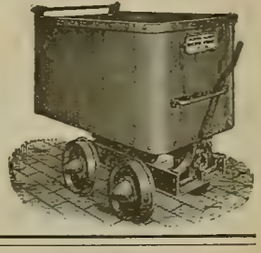

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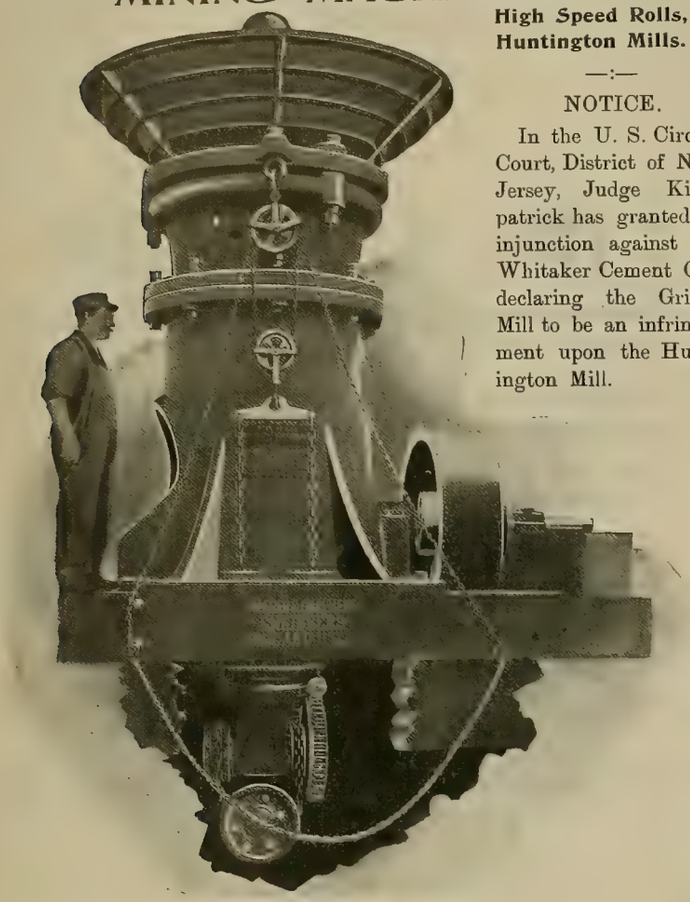

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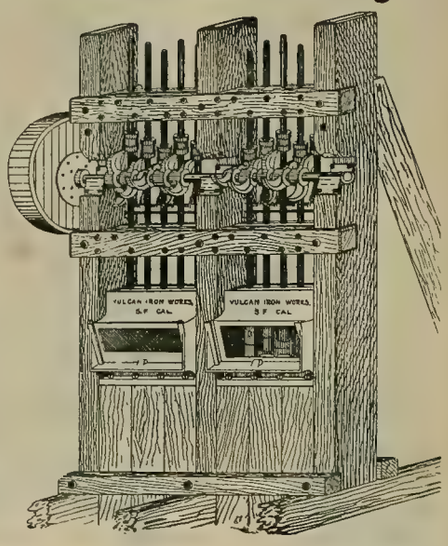

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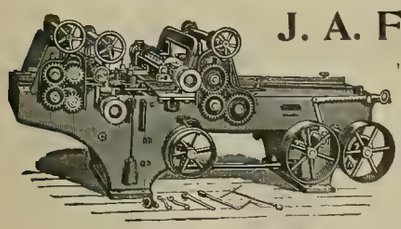

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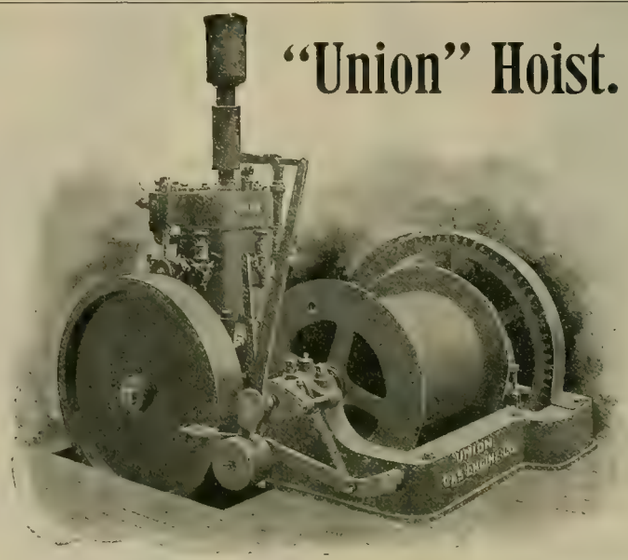

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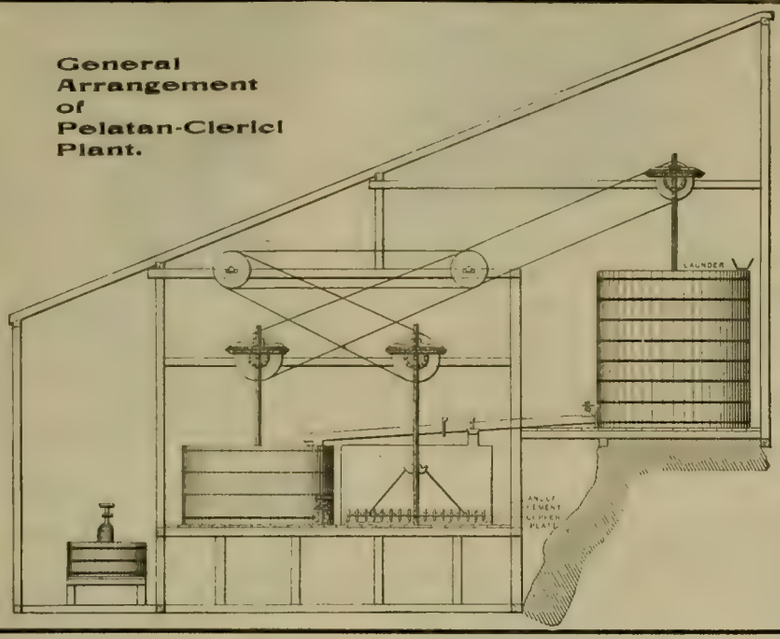

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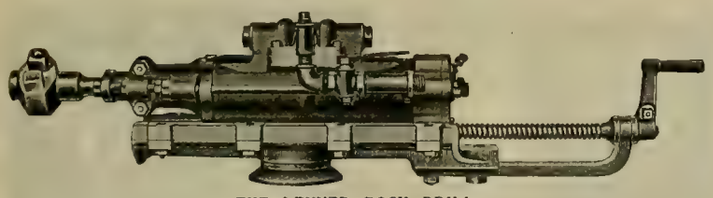

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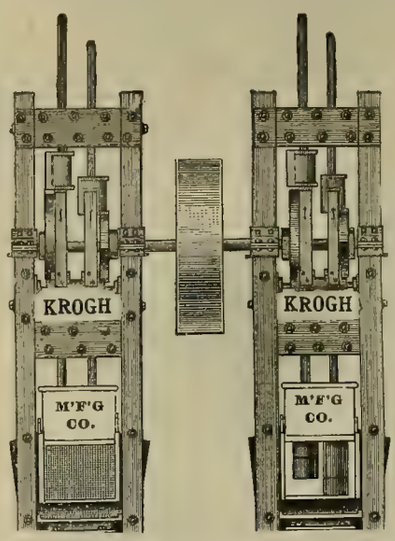

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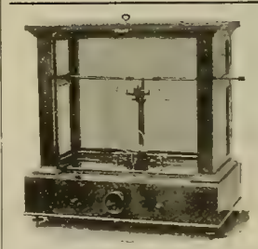

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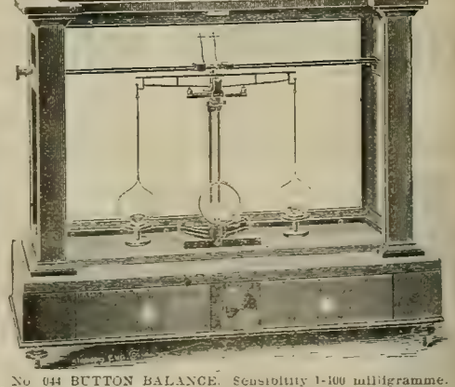

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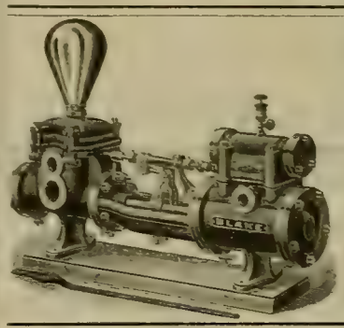

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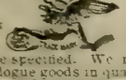
All our catalogue goods, except those listed by us as manufactured by others, are stamped with our name "Keuffel & Esser Co." or our initials "K. & E. Co." and where there is room for it, with our trade mark  or

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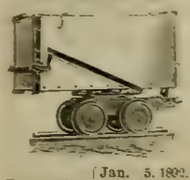

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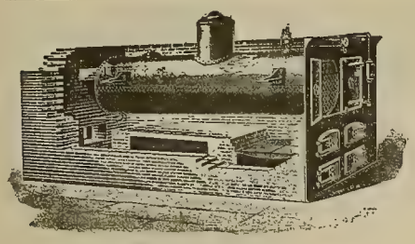

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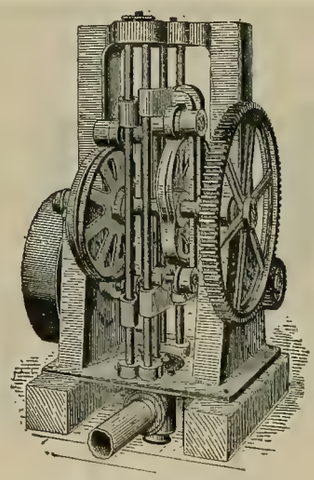

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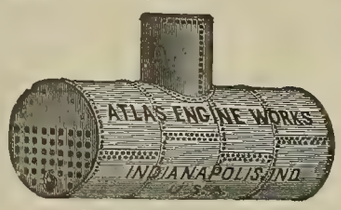

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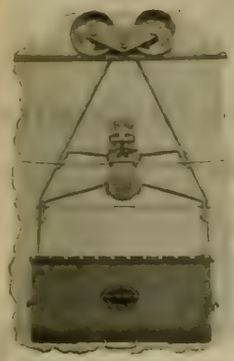

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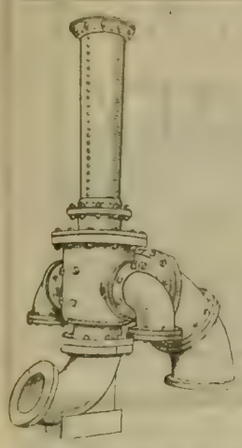

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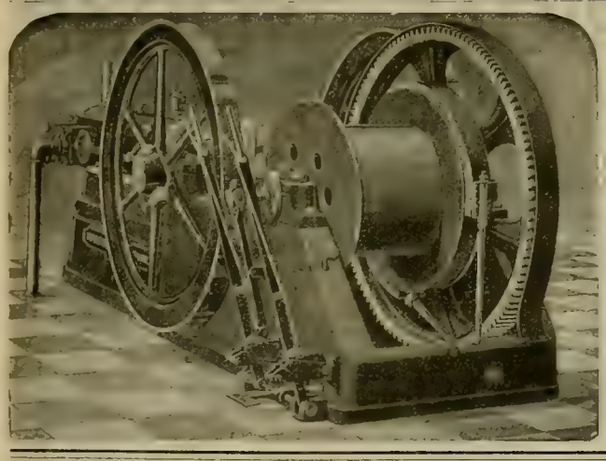

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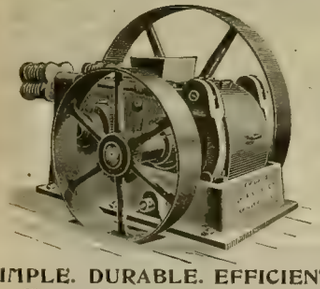

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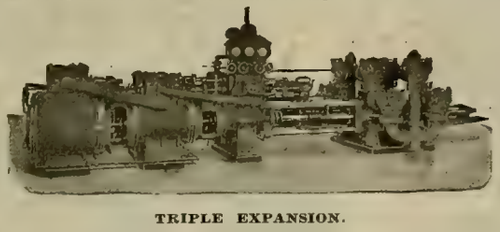

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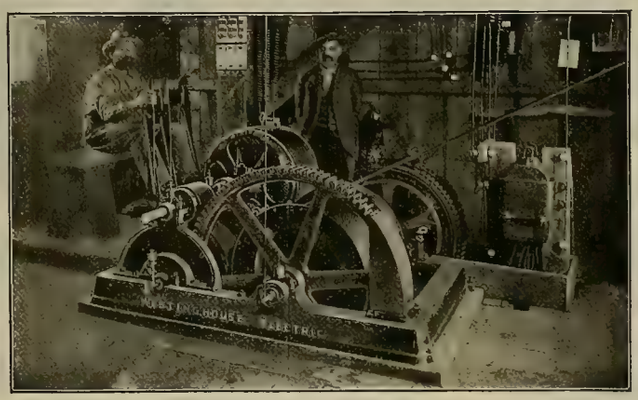

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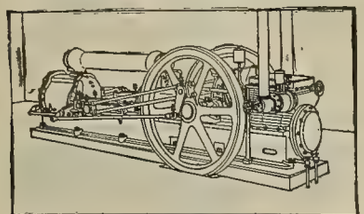

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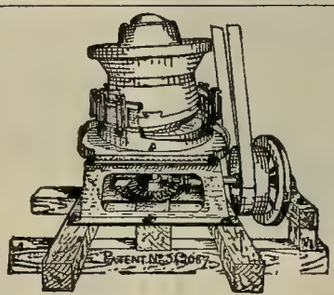

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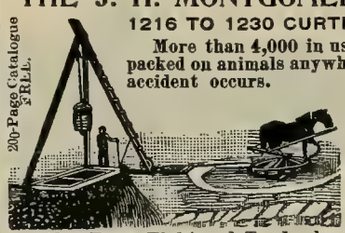

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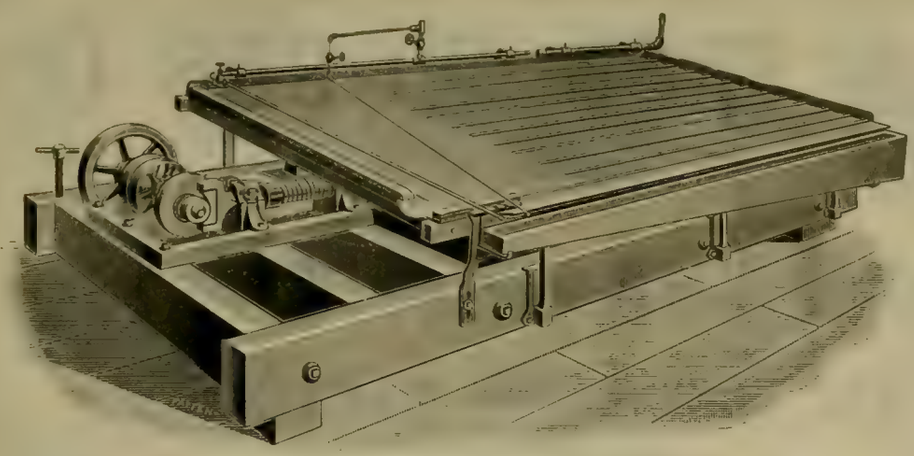

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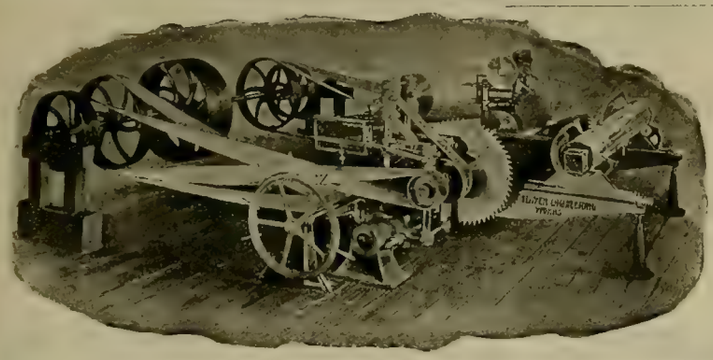

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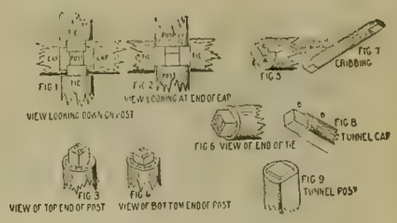

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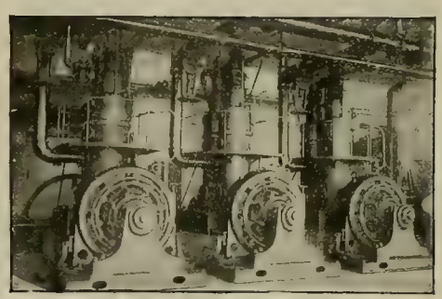

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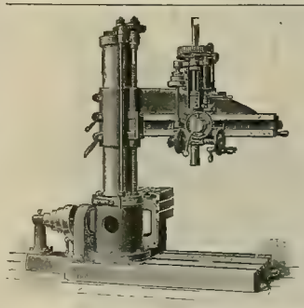

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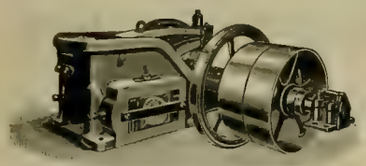

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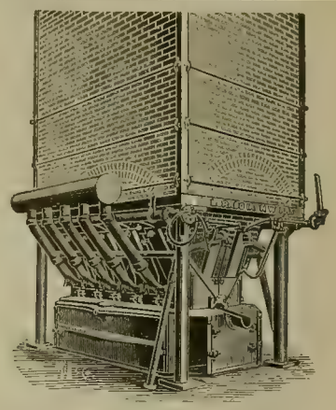

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Market Reports.

The Markets.

SAN FRANCISCO, Jan. 26, 1899.

SILVER. — London, 27 5-16d; New York, 59⅛; San Francisco, 59⅛; Mexican Dollars, 47¾@48. New York exchange, sight, 17½; telegraphic, 20 cents premium.

LEAD. — New York reports "firm" $4.25 bid, $4.27½ asked. The firm naming the settling price for leading miners and smelters at the West quotes Lead at $4.05.

Local, pipe, 6@6¼c; sheet, 6½@7c; pig, 5¾c; bar, 6c.

Four-dollar lead sounds good to the majority of Colorado miners, says the Denver *News*, and is welcome news in the Utah and Idaho camps. This was the smelter quotation yesterday. It was not seen on the boards before since Sept. 8th, '97, when it lasted until Oct. 15th. The day following there was a sudden drop to $3.75 per 100 pounds, and the average for all of '98 was $3.63. The production of lead in the United States last year was 305,459 short tons, compared with 289,835 in '97. Heavy gains were made in Missouri, Kansas and in the Cœur d'Alene district of Idaho. The gain in Colorado was also marked, reading 50,772 tons at $72.60 per ton, as compared with 41,026 tons at $67.60 in '97.

COPPER. — New York reports Lake "strong," $15.75 bid, $16 asked. Local, bar 20c per lb.

According to the official figures of copper production in the United States there was an output from the Montana, Lake Superior and Arizona mining districts in '98 which exceeded that of '97 by over 18,000 tons. The close of the year, however, notwithstanding the large production, found stocks almost exhausted both in this country and in Europe. John Stanton, the statistician of the copper industries, takes the view that higher prices must come and that still greater increase of production will be necessary to meet growing demands. He says:

While the production of copper for '98 shows considerable increase over that of '97, and is by far the largest production ever made in this country, the consumption has also been very large, especially since the close of hostilities with Spain. Stocks in Europe, as well as in the United States at the close of the year, were unusually low, there being practically none in sight. As a consequence, copper has been making very rapid advances, and it has been rather hard to keep track of it for the past two weeks or so. I should say that 16 cents is a fair price for copper to-day, and that represents the highest figure reached in many years. Consumption is so large that it looks, too, as if a higher figure will be obtained.

The peculiarity of copper's position is that during the last few years of depression the production has constantly been increasing, and yet consumption has carried it all off. European stocks have been steadily declining, until now they have reached the lowest point ever known. The electrical industry is a very important factor in the copper business, and its need of copper is growing greater. Wherever railway or other construction is going on there is always a large demand for copper in the form of brass and a variety of other articles. And as the electrical business advances by leaps and bounds it is no easy matter to tell what quantity of copper will in this way be absorbed.

Now that a betterment in business generally is being felt, a great stimulus has been given to the opening of new mines and the development of copper properties. It is apparent that the existing mines have not capacity to furnish the quantity that will be needed in the near future. Companies with good prospects of becoming producers find that their shares are eagerly sought after, and it is the general belief that for some time to come copper mining will prove profitable.

A good deal has been said on the subject of a copper combination. It is quite possible that a combination of certain interests may be effected, but as to a general combination of one between the largest producers, that is simply absurd. I don't think there is any foundation for it at all. Some groups of mines have a tendency to consolidation, being owned and controlled by practically the same men, but where interests are very distinct it would be difficult to arrive at any basis by which consolidation could be carried out equitably. In my judgment, there is no foundation for stories of general trust or combination.

At present there is no difficulty in selling copper at good prices. Everything that is offered is eagerly taken up. Those who have it to sell must look upon the outlook as highly encouraging.

The brokers' price for copper to-day was $16.25.

IRON.—American, soft, $21.75 and $23.75 per ton; Scotch, $24.25. Local bar, 2¼c per lb.

SPELTER.—3¾@9.

TIN.—Pig, 22c per lb.; Bar, 25c. New York reports an advance, $32.20 bid; $32.40 asked.

To-day's *Iron Age* says: "The most interesting developments during the week have been in connection with the tin plate industry. The same parties who carried through the consolidation in this industry are reported to have perfected now a fusion of the leading makers in the central West of tin plate bars, five great plants being named, situated at Youngstown, Newcastle, Columbus and Wheeling. It is reported that arrangements have been made with one great establishment in Pittsburg and another in the Wheeling district to secure exclusive control of this branch of raw material. In other words, outside mills are to find it difficult to obtain the tin plate bars.

"Another important step in the same direction is the completion of the arrangements with foundries and machine shops which make a specialty of tin plate machinery to control their capacity for a considerable period. The effort evidently is to keep out a rush of outside capital into the business."

ANTIMONY.—14.

BABBITT METAL.—No. 3, 7c.

QUICKSILVER. — Local, $42.00; export, $38.50@39.00; carload lots, special rates.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 30 @ 31c per lb.; carloads, 29c; in 10-lb. tins 37c; sulphuric acid, 2¼c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9¼@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1⅞@1¼c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 23½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

CANDLES.—Electric Light Candles—6s, 16 oz., 7½c; 6s, 14 oz., 6½c; 6s, 12 oz., 5½c; 6s, 10 oz., 4½c; Granite (Mining) Candles—6s, 16 oz., 8¾c, 6s, 14 oz., 7¾c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $2.40; cut, $2.25; 10 to 20d, wire, $2.45; cut, $2.30; 8d, wire, $2.50; cut, $2.35; 6 and 7d, wire, $2.60; cut, $2.45; 4 and 5d, wire, $2.70; cut, $2.55; 3d, wire, $2.85; cut, $2.70; 2d, wire, $3.10; cut, $2.95. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, Jan. 26, 1899

9:30 A. M. SESSION.

200 Andes	12c	500 Mexican	35c
100 Belcher	15c	300 Sierra Nevada	79c
200 Chollar	22c	300 Utah	12c
150 C. Cal. & Va.	$1 40	100 Yellow Jacket	15c

2:30 P. M. SESSION.

650 Mexican	34c	200 Sierra Nevada	77c
50 Gould & Curry	23c	600 Union Con.	34c
400 Chollar	22c	700 Alta	03c
500 Belcher	15c		

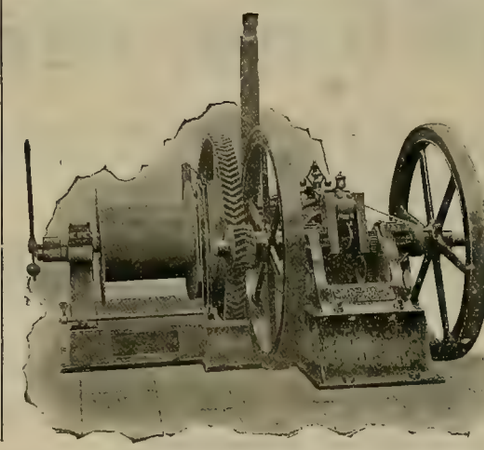
Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.
EDW. N. BREITUNG, Marquette, Mich.
Cable address Edbee Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

J. D. BETHUNE,
(Late Associate Justice Supreme Court.)
Attorney at Law, Mining Law,
PRESCOTT, ARIZONA.
A Valuable Gold Property for Sale.

UTAH
Mines—Dividend Paying and Investment Stock.
W. E. HUBBARD & CO., 15 W. 2d So. Street, SALT LAKE CITY.

Quicksilver
FOR SALE IN LOTS TO SUIT.
Agents for Redington Quicksilver Mine.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Placer Miners' Attention
Is called to the fact that we are purchasers of
OSM-IRIDIUM
In lots of one ounce and upwards.
SELBY SMELTING & LEAD CO., 416 Montgomery Street, San Francisco.



FRESNO, June 25, 1898.

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DEAR SIRS:—

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Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

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Reliable quotations furnished on all standard British Columbia, Washington and Idaho Stocks.
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29-30 Chronicle Building, S. F.

Assessment Notices.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California. location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of January, 1899, an assessment (No. 12) of Ten Cents (10c.) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 6th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. MEITMANN, Secretary.

Office—237 12th street, San Francisco, California.

The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of January, 1899, an assessment (No. 20) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, Rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of February, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 21st day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, Rooms 15 and 17, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of January, 1899, an assessment (No. 17) of 4 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 13th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of January, 1899, an assessment (No. 115) of Twenty cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14 Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on TUESDAY, the 21st day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 13th day of March, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14 Nevada Block, No. 309 Montgomery street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1899, an assessment (No. 16) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of February, 1899, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on SATURDAY, the 11th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

TO WHOM IT MAY CONCERN:

Any one desirous of buying my book, "Hints on Amalgamation," to appear March 1st, '99, should address the publishers, The Modern Machinery Publishing Co., 218 La Salle St., Chicago, Ill., as I shall be absent from San Francisco for an indefinite period. W. J. ADAMS, E. M.,
132 Market St., San Francisco.

DELINQUENT SALE NOTICE.

NATIONAL CONS MINING COMPANY.—Location of principal place of business, San Francisco, California. location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 5th day of December, 1898, the several amounts set opposite the names of the respective shareholders as follows:

	No. Cert.	No. Shares.	Amt.
G. Schmitt	46	1	$ 10
G. Schmitt	53	1000	100 00
G Schmitt	57	500	50 00
G Schmitt	60	500	50 00
G. Schmitt	156	100	10 00
G. Schmitt	152	25	2 50
G. Schmitt	147	119	11 90
G. Schmitt	175	100	10 00
G Schmitt	167	4	40
G. Schmitt	211	50	5 00
G. Schmitt	220	500	50 00
K. Schmitt	6	500	50 00
K Schmitt	7	500	50 00
E Fey	17	100	10 00
E Fey	74	200	20 00
E Fey	108	200	20 00
T. R Squires	124	250	25 00
B Strueven	141	500	50 00
B. Strueven	184	500	50 00
W. I. Smith	173	300	30 00
W. I Smith	217	300	30 00
N Frost	215	500	50 00
N Frost	216	500	50 00
C. Smyth	222	60	6 00

And in accordance with law, and an order from the Board of Directors, made on the 5th day of December, 1898, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, 773 Mission street, San Francisco, California, on WEDNESDAY, the 14th day of February, 1899, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

DELINQUENT SALE NOTICE.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 22) levied on the 3rd day of December, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. F. Anderson	93	2,000	$60 00
Calvert Meade, Trustee	196	200	6 00

And in accordance with law, and an order from the Board of Directors, made on the 3rd day of December, 1898, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 106 Liedesdorff street, San Francisco, California, on MONDAY, the 30th day of January, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessments thereon, together with costs of advertising and expenses of sale. CALVERT MEADE, Secretary.

Office — 106 Leidesdorff St., San Francisco, Cal.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from S. S. Taylor, in the Silver Star Flume and Mining Co.'s Mine, near Spanish Ranch, Plumas Co., to deposit tailings in a worked-out pit; from H. S. Byam, in the Bonanza Claim, in Amador Co. near Michigan Bar, to deposit tailings in Arkansas Creek; and from the Badger Hill and Cherokee Gravel Mining Co., in the Badger Hill Mine, at Cherokee, Nevada Co., to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 30, 1899, at 1:30 P. M.

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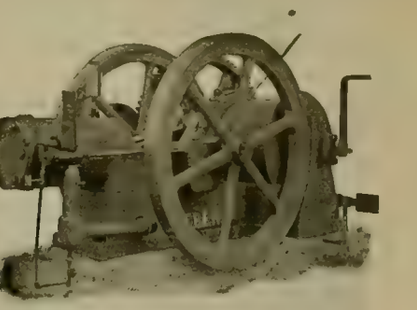

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SPECIAL MEETING.—A special meeting of the stockholders of the Electric Placer Mining Co. will be held at the office of the company, 507 California St., San Francisco, Cal., on SATURDAY, February 11th, 1899, at 2:30 P. M. A. R. VINING, Secretary.

WANTED — POSITION WITH MINING COMPANY.

Chemist, Assayer, Cyanide Process, Surveying, Experienced Machinist and Engineer.

Address A. P., this office.

Mining and Metallurgy.

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Of great practical value to miners and mine owners in making a comprehensive report on mining properties. Useful and convenient to mining engineers as a field notebook. Price, postpaid....50c

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A reference book for miners, mine surveyors, geologists, mineralogists, millmen, assayers and metallurgists. By C. G W. Lock, 472 pages, illustrated, flexible leather....$5

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For the use of Mining Engineers and Technical Schools. Treating of Preparatory and Exploratory Work, Methods of Mining, Hoisting Machinery, Pumping, Ventilation Shafts, Tunnels, Blasting, Timbering, etc., etc. By Prof. Magnus C. Ihlseng, E. M., Ph. D. Third, revised and enlarged, edition. 548 pages, 8vo., cloth....$4

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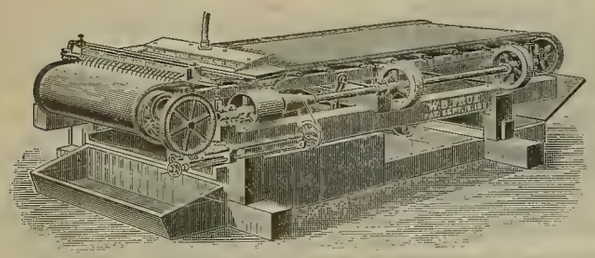

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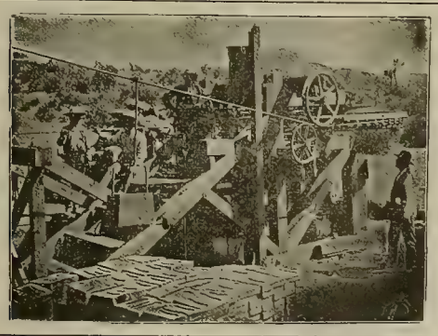

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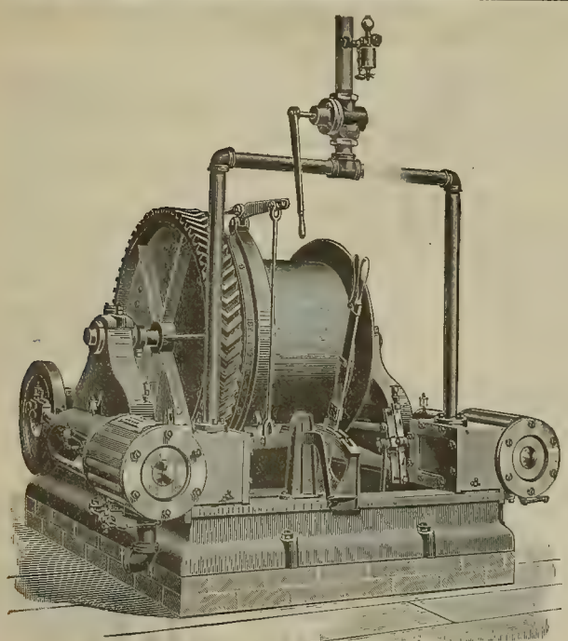

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No. 2013.—VOLUME LXXVIII. Number 5. SAN FRANCISCO, SATURDAY, FEBRUARY 4, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Bursting of Small Cast Iron Flywheels.

Within the last few days have been reported disasters involving loss of life and destruction to property by the bursting of cast iron flywheels. Among others may be noted, at Youngstown, Ohio, the bursting of a flywheel in the bar mill of the Brown-Bonnell Co., wrecking the engine and engine house, and inflicting damage to the amount of $5000, and a similar accident in Lorillard's tobacco factory, Jersey City, N. J., killing two people and probably fatally injuring two more. In view of such frequent disaster, the accompanying article is of timely interest. It was written by Chas. H. Benjamin, and was presented at the recent meeting of the A. S. M. E:

Of late years the failures of large flywheels have become alarmingly common. Every month brings ts record of one or more disasters of this sort, some of them entailing loss of life and serious destruction of property. It is not the purpose of this paper to discuss the causes of such accidents, further than to notice the fact that the high belt speeds and close regulation required in electric plants have been indirectly responsible. Many of the flywheels have failed on account of excessive speed due to disarrangement of the governor and consequent racing of the engine. In some instances it has been difficult to determine the cause on account of the destruction and excitement at the moment. In no small number of instances, however, the wheels have burst at speeds but slightly above the normal and when the factor of safety was apparently ample.

J. Stanwood of this society was the first to point out the condition of stress existing in a flywheel rim and to show that the bending due to centrifugal force might reduce very materially the bursting speed. This subject was further developed by Prof. Lanza, and the probable amount of stress due to bending was indicated, as well as its effect upon rim joints. It occurred to the writer that a series of experiments on small cast iron wheels might throw some light on the causes of failure and lead to more rational formulas for design. The quality of the metal in a small wheel is better than in a large, and the stresses due to uneven cooling are much less. The linear speed of rim at which a large wheel will burst will therefore be less than that obtained by experiments on small wheels. The experiments about to be described were conducted under the immediate direction of the writer at the laboratories of Case School of Applied Science, and he was present at the bursting of nearly every wheel. Acknowledgment should be made of the

Fig. 3.

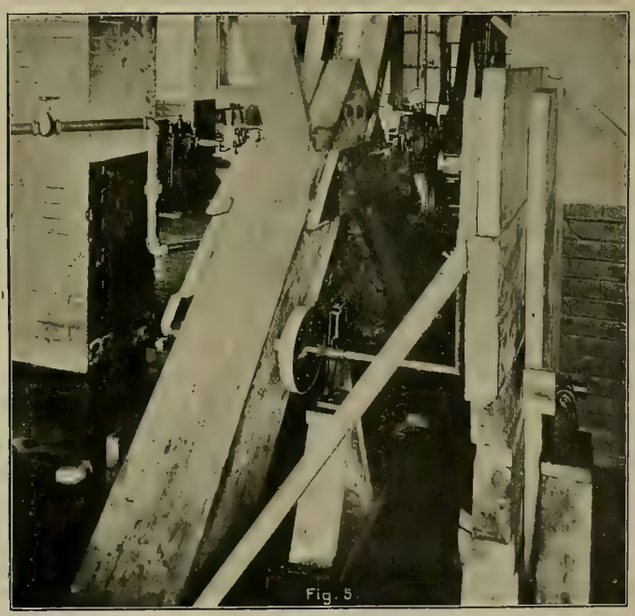

Fig. 5.

(Continued on Page 120.)

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THE advance in lead is indirectly an advantage to silver-lead producing properties, as, ordinarily, with lead at 4½ and silver at 59½ it is about the same as were lead 3.60 and silver 63.

BEGINNING on the 21st inst., the American Institute of Mining Engineers will hold its 76th meeting in New York City. It is expected that the next meeting of the association will be held in San Francisco.

THE report of Wyoming's State Engineer is devoted mainly to discussion of ways and means of irrigation. Like California, Colorado and other States and Territories, that subject is felt in Wyoming to be one of present commercial interest. The recent movement toward the conservation of water and forest preservation, started by the California State Miners' Association, is in the line of practical progress and deserves hearty encouragement and co-operation.

THE ability to rightly guess what will occur is one of the most common means of making money. Boston papers tell of a Massachusetts telephone company whose manager guessed last September that copper and poles would shortly advance in price, and accordingly contracted for the delivery in '99 of 5,000,000 pounds of copper at a price 2 cents below prevailing figures. He also contracted for 100,000 poles at a price 20 cents below present local quotations. Were he so disposed, he could sell his two contracts at a present profit of $120,000.

IN the issue of Dec. 24th, '98, about a column was given on this page setting forth the fact that while other comparatively unimportant details were provided for in the Congressional bill for the 12th U. S. census, the great industry of mining was not by the framers thereof deemed of sufficient importance to have separate and distinct place, and that, so far as the bill was concerned, there was not a word in it that would lead anyone to suppose that there was such a thing as a mine in the United States. To supply so glaring an omission, to obviate such absurdity, and in justice to the basic national industry that fosters and advances all others, Congressman De Vries of California drafted a provision as soon as his attention was thus directed to the matter, and which he has been able to have reported favorably by the Committee on Census. It will doubtless be incorporated in the bill and passed. The addition provides for a census of the gold mining industry, the number of men employed and where, the kind of mines and their proportionate output, with other statistics relative to the business. It is further provided that this information shall not slumber in dusty archives till 1908, but shall be immediately printed in a separate volume and distributed in 1901.

The Modern Frankenstein.

Nothing is more noticeable in '99 in the mining and industrial field than the abnormal creation of combines and "trusts" throughout the country. The ordinary tendency to such business combinations is accountable because of the arguments so readily adduced. Economy of management; freedom from vexatious competition; ability to control the market, local and foreign; opportunity to dispense with numerous employes; ease of centralized action; these are among the arguments used by the promoters of the gigantic trade and manufacturing combinations so frequent in the past five years, and such commercial arguments appeal so strongly to investors in "industrials" that consolidation has been a general fashion. During '98 eighty-eight trusts in many leading lines of industry were established in the United States, with a total aggregate capitalization of $1,292,749,200. But even last year's famous record seems destined to be eclipsed by that of this year. The month of January has witnessed a craze in the direction of trade combinations in which the most conservative business concerns share, and sober, steady institutions advised by equally staid banks are going headlong into the business of consolidation. So far in '99 additions have been made to the list of business amalgamations, till it is believed that at this writing nearly 65% of the great manufacturing corporations of the country have begun to take part in such consolidation. This state of affairs has been greatly aided in '99 by the present general willingness of the banks to rescind their former rule in this matter, and accept the stock of such combinations as collateral for loans.

It will be interesting to note how far this thing will go before the inevitable reaction; for the business pendulum always swings as far one way as the other. Despite the ability to control legislation, corrupt legislators, defy judicial decisions and ignore suggestions of anything not prompted by avarice, the trusts cannot become a permanent feature of American industrial life. However huge they may be, the immutable laws of business will endure and work their ultimate outcome. Stock in rival concerns may be bought at far beyond its actual value, factories may be absorbed and laid idle, good will may be made the subject of capitalization, employes who built up the business and made it worth the taking in may be discharged, economies may be practiced, and the price of products enhanced while the cost of production is lowered, and all things may for a while appear to be prosperous, but such business success is not permanently founded and will surely prove ephemeral. The reason is plain: Sooner or later will come upon such speculation, born of confidence, a blast of distrust, and then, when everyone is trying to unload, will simultaneously come the crash. If ever caution was needed among business men, it is now. Confidence is a plant of slow growth; steadily since '93 it has been unfolding; it were a pity if its further growth were to be so rudely checked.

The New Force.

Considerable space has been devoted herein to recent researches resulting in the production of liquid air, and of late it would seem that the product had advanced from a "scientific curiosity" to a feasible proposition for commercial use, in this way following the line of nearly all great industrial inventions and discoveries, which, originating, subjectively, in some clever brain, ultimated, objectively, in the world's advance. We are not, however, prepared to implicitly accept the enthusiastic statement wired by Prof. Tripler this week, wherein he asserts that he has not only "solved the problem of harnessing this great power to machinery," but continues by saying: "My engine for this purpose works, and it requires only the perfection of a few mechanical details to realize its enormous utility as a motor for all kinds of machinery—for railroad trains, steamships, factories: in short, wheresoever great force is required, from propelling navies to firing guns and blowing up cities and forts. Liquid air is from twenty to one hundred times more powerful than steam, according to the amount of heat applied. Even with the heat of the surrounding atmosphere, its expansive force is twenty times greater than steam." This seems like creating an atmosphere in which to flap the wings of fancy, and while it is conceded that Prof. Tripler has carried the doctrine of compressed air to its logical conclusion by liquefying air, and that he is able to produce it in commercial quantities, yet there will continue the usual amount of popular incredulity, that can only be removed by the "perfection of the few mechanical details" of which the professor writes. If the truth should approximate his assertions this week it means the creation of a new force more potent constructively and destructively than anything which is at present known to exist.

IN Colorado water cases U. S. courts seem as pliant as in California regarding questions of riparian rights. In the issue of the 14th ult. was noticed at some length a ruling in this State thereon which, if finally upheld, would result in considerable disturbance. But at St. Louis, last week, the U. S. Circuit Court announced a decision that exceeds in extent the recent San Francisco case. New York men owned 715 acres placer ground on both sides of the north fork of the San Miguel river, Colorado; work thereon was abandoned in '91; recently Denver men began to take water from the river, lower down, and were enjoined by the New York owners of the placer ground lying on both sides thereof, on the ground that they owned the river. The Denver owners' attorney admitted that complainants owned placer land thereon, but contended that a river could not be the subject of private ownership. The judge, however, decided that it could, and held in favor of the New York men. The case was, of course, appealed. Should, in all unlikelihood, the appellate court affirm the decision it will be in order for enterprising men everywhere to buy little holdings of placer ground lying on either side of flowing streams, and thus secure private ownership of the whole river. The possibilities of such legalized acts would be alluring.

IN the California Legislature, as amendatory to an Act passed in '71, for the protection of stockholders, Assemblyman Caminetti has introduced the following with intent to prevent possible fraud:

"Any bona fide stockholder of a corporation formed under the laws of this State for the purpose of mining, shall be entitled to visit, accompanied by his expert, and examine the mine or mines owned by such corporation, and every part thereof, at any time he may see fit to make such visit and examination; and may take from any part of the mine samples of the ore and samples from the tailings, paying therefore, if demanded by the superintendent, the reasonable value of such samples, and when such stockholder shall make application to the president of such corporation, he shall immediately cause the secretary thereof to issue and deliver to such applicant an order, under the seal of the corporation, directed to the superintendent commanding him to show and exhibit such part of said mine or mines as the party named in said order may desire to visit and examine. In case of the failure or refusal of the superintendent to obey such order, such stockholder shall be entitled to recover in any court of competent jurisdiction the sum of $1000 and traveling expenses as liquidated damages."

ELECTRICITY direct from coal is still and likely to be an unfulfilled dream. At the Milwaukee, Wis., meeting of the Northwestern Electrical Association, on Jan. 19th, an interesting paper was presented on this subject, which, after giving a resume of all the research in that direction for several years, concluded as follows: "While the problem of obtaining electricity from carbon direct has not as yet received a practical solution, it cannot be regarded as insoluble. The chance for success, however, would seem much better in endeavoring to oxidize the easily obtained hydrocarbons and carbon monoxide. We are chasing no will-o'-the wisp in working upon this interesting and far-reaching problem. What is necessary is to discover the right conditions. If we keep closely to the theory of the galvanic cell, as worked out by Nernst and others, we cannot get far astray, and are likely to reach valuable results in the solution of this greatest of technical problems."

THE French Government officially declares protection to patents or trademarks received by any American exhibitor at the Paris Exposition.

Concentrates.

THE technical name of the tool used by tinners to ut sheet tin is "snips."

AT Battle Mountain, Colorado, the reduction works pay $20 per ounce for the gold contents of the ores.

THE largest stamp mill in British Columbia—40—s believed to be that at the Ymir mine at Ymir.

COLORADO stockbrokers' selling charges on $2 stock nd over are 1%; between $1 and $2, 2%.

THE British-American Co., owning the Le Roi mine, Cossland, B. C., are preparing to sink a vertical shaft to cost 100,000.

A "DOKIMASTIC" test is a metallic assay in which ll the accessories are of a nature to justify absolute accuracy n the result.

ON the long distance telephone wires from San Diego, Cal., into Oregon and Idaho—over 2400 miles—a No. 8 wire is used, about 450 pounds of copper to the single mile.

QUICKSILVER'S highest price in San Francisco was in '74-5—$1.55 per pound; lowest, 33 cents in '79. Its present worth in San Francisco is $42 per flask of 76½ pounds.

THE gold output of the Witwatersrand, South Africa, district, for the year '93 was 1,478,473 ounces; for '94, 1,024,159 ounces; '95, 2,277,635; '96, 2,281,875; '97, 3,034,674; '98, 4,555,009.

THE term "ore shoot" is usually applied to a body of ore. The "ore chute" is an inclined boarded slide built between levels, through which ore is dropped for loading cars run on tracks to the hoisting shaft.

GOLD 750 fine is worth $15.50 per ounce; 800 fine, $16.53 per ounce; 850, $17.57; 875, $18.08; 900, $18.60; 920, $19.01; 930, $19.22; 940, $19.43; 950, $19.63. The San Francisco mint charge for recoinage is $1 per 1000 ounces.

IT is learned, authoritatively, that the only change to be made in the royalty clause of the Yukon regulations will be to raise from $3500 to $5000 the amount of output from each claim to be exempted from the 10% royalty.

IN bessemerizing copper mattes the loss of silver is usually very large, proportionately, and the loss of gold comparatively slight. The three principal losses in pyritic smelters are in slags, flue dust and volatilization.

THE highest point in the United States is Mt. Whitney, San Bernardino Co., Cal. The lowest land in the United States, below sea level, is Death valley in the same county, about fifty miles in an air line from Mt. Whitney.

AS a rule all assays, containing in their charge carbon, puff up because of formation of carbonic oxide, thus requiring the use of a larger crucible, which in such case should not be more than two-thirds filled with the assay sample.

THE present copper "boom" gives the promoter opportunities that are being utilized. A Calumet, Mich., official tells of a Lake Superior copper property that had been lately offered for $10,000, but which is now capitalized at $1,000,000.

A LAW in effect since the 1st inst., requires Westralian gold buyers to pay an annual license of $8.50 and keep a record of all such transactions. Mine owners and managers are obliged by the same law to furnish monthly returns of the gold yield.

THE Michigan Bluff, Cal., question asking how to get rid of a partner that won't pay his share is best answered by reading the California statute on "Partnership for Mining Purposes," which covers the case. The Act was passed April 2nd, '66.

THE relative dissolving powers of different gold solvent solutions is given by some metallurgists as follows: Chlorine, 1% solution, 1¼ hours, 4.49%; bromine, 1% solution, ¼ hours, 6.46%; cyanide, 1% solution, 1¼ hours, 0.57%—60° F. in each case.

UNDER the law the books and accounts of any ore reduction works in the State of Nevada must be exhibited on demand to the Assessor or his deputy. Refusal carries a penalty of fine and imprisonment. The statute, however, is not rigidly enforced.

THE recognized charge for continuous power in large units at the electrical plants now in operation at Niagara Falls is $20 per annum for one electrical H. P. delivered to local plants, or $12 per annum for one dynamic H. P. delivered on water wheel shafts at the power stations.

COMMISSIONER OF PATENTS DUELL furnishes the following statement summing up the report of the Patent Office for the calendar year 1898: "Applications were received from 33,915 patents and 22,207 patents were granted, including designs. Total receipts were $1,137,734."

Meeting notices, assessment notices, delinquent sales notices, dividend notices and all such can be legally published in the MINING AND SCIENTIFIC PRESS. Where obscurity, and not wide publicity, is desired, some other medium, would, however, be probably preferred.

THE term "H. P." has been repeatedly discussed herein. Our Cherry Creek, Arizona, correspondent is right; it is "ridiculous" and should be "obsolete" and will be dead and buried when he and all others agree on the substitution of a term conveying the same idea—and not till then.

A PART OWNER of an unpatented mining claim can get it patented in his name and that of the other part owner or owners, who can not be compelled to give consent or pay, but who can not prevent such issuance. The Government will not issue a patent for an individual or divided interest.

TELLURIUM is not of infrequent occurrence in gold ore in Australia, Colorado and California. In California it is found in Butte, Calaveras and Tuolumne counties. It can be most readily determined by a sulphuric acid test applied to the powdered ore thinly spread upon the surface of a shallow porcelain dish.

THIS paper has only two sources of revenue—subscriptions and advertisements—and the proffer of $100 for "a write-up with a picture of the owner," from a British Columbia mine, is, without prejudice, declined. The facts regarding that mine or any other mine if deemed of general interest would gladly be published as a matter of news, but "write-ups" are not included in the province or purpose of this journal, a fact generally understood and commended.

THE beginning of the work of unwatering the old Comstock levels causes wonder in the minds of many old-timers if the great increase in the price of Comstock stocks will be repeated, eclipsing the recent rise in Michigan copper stocks, as when the 108,000 shares California stock were divided into 540,000 shares, and even then it sold for $250 per share.

SO LONG as men with properties to sell want to get for a prospect the price of a developed property, and men with money to buy want to get a developed property for the price of a prospect, so long will exist the condition of things, commented on at such length by a Montana correspondent. Such conditions are not peculiar to the mining business. They pervade every department of the world's bargains and sales.

LAST WEEK was received a letter from an Arizona subscriber, who had renewed his annual subscription about Jan. 1st, but for whom a Phœnix friend, not knowing that he was already getting it, had subsequently subscribed with instructions to send the paper with "compliments of". Upon receipt of the latter letter, the renewal was returned, but came back with the characteristic reply: "File the Phœnix payment as an extension of the original claim."

AN experienced mill man writes: "Although the subject of the temperature of battery water seems to be about exhausted, permit me to remark that the gold in the ore run by Mr. Louis Blanding, as described by him in the issue of Jan. 7th, was probably so free that it amalgamated without difficulty up to a high percentage with water at ordinary temperature. Had it carried considerable silver or had the ore been but partially oxidized, his test would probably have resulted differently."

THE first U. S. patent issued relative to the cyanide process was to J. H. Rae, No. 61,866, Feb. 5th, '67. The first U. S. patent issued to Messrs. MacArthur and Forrest was No. 403,202, May 14th, '89. Two other U. S. patents were issued to them that year. So far as known the first definite mention of the dissolution of metallic gold in cyanide of potassium was by P. Bagration in '43. Its commercial success dates from the introduction of the MacArthur-Forrest process in South Africa in '90.

THE deposits of Iron Hill, Leadville, Colo., are believed to have been formed by molecular substitution and replacement of the dolomitic limestone by hot alkaline mineral-bearing solutions from below. While agreeing to the replacement theory, S. F. Emmons considers the solution came from above, being heated by the overlying porphyry, as deposit commences from the top of the body, and in the region of greatest ore development there is a noticeable absence of ore channels below, through which ascending solution might come.

SEVERAL correspondents are informed that this office does not furnish any of the publications of the California State Mining Bureau. They are published by the State under the auspices of that institution, are furnished by the State Mineralogist to residents of California, and sent postpaid to non-residents on receipt of a small amount specified on a card issued by the State Mining Bureau, to whom all such requests should be addressed. The State Mineralogist is Mr. A. S. Cooper: his office is in the Union Depot, San Francisco, Cal.

IN sampling silver-lead bar bullion samples taken by chipping out of the top and bottom of each bar usually give a result lower than the actual value of the bullion, due to the fact that that part of the bullion lying against the sides of the mold is the richest in silver, and that none of it is obtained in the chip-sample. If chip-samples are to be taken, it would be fairer to take chips from the top, bottom and side of each bar, these to be taken diagonally across the five bars when stacking. This is condensed from a paper read by G. M. Roberts at the Oct., '98, meeting of the A. I. M. E.

NITRO-GLYCERINE is best let alone. Its chemical composition is oxygen 60.66; nitrogen, 19.91; carbon, 17.06; hydrogen, 2.36. It is made by slowly dropping syrup of glycerine into a mixture of equal volumes of nitric and sulphuric acid contained in a strong vessel surrounded by ice, the mixture being thoroughly agitated after each addition of the glycerine. The nitro-glycerine in oily form is skimmed off and repeatedly washed in pure water, though sometimes dissolved in ether or alcohol and then precipitated with water. It must be kept cold. No amateur not tired of life should meddle with it or its manufacture.

A LOW temperature solder for use when the parts to be soldered will not stand a high temperature is made by mixing finely divided copper (obtained by precipitating a solution of copper sulphate with zinc) is mixed with concentrated sulphuric acid in a porcelain mortar; 30 to 36 parts of copper are taken, according to the degree of hardness required, and 70 parts of mercury are stirred in. When the amalgam has completely formed it is washed with hot water till all traces of acid are removed, and then allowed to cool. When this composition is used, it is heated until it is of the consistency of wax, so that the surfaces to be joined may be readily smeared with it. When cold they firmly adhere.

THE admixture of a mineral oil with any other lubricating oil can be often readily detected by shaking the suspected oil in a bottle until bubbles of air are formed, when, holding the bottle up to the light, the mineral oil, if present, will produce a peculiar iridescence, which is an unmistakable evidence of the adulteration. The presence of "still bottom" impurities is also a proof of the mixture of mineral oil. These consist of fine solid particles of the coating formed on the bottoms of the apparatus in which the fractional distillation of mineral oil takes place. They may be detected, sometimes, by the abnormally low temperature at which the oil vaporizes in contact with them, or by dropping the suspected oil on white blotting paper, which will absorb the oil, leaving the black specks of impurity visible.

APPLICANTS for patent to a placer claim, who are also in possession of a known vein or lode included therein, must state in their application that the placer includes such vein or lode. The published and posted notices must also include such statement. If veins or lodes lying within a placer location are owned by other parties, the fact should be distinctly stated in the application for patent, and in all the notices. But in all cases, whether the lode is claimed or not, it must be surveyed and marked upon the plat, the field notes and plat giving the area of the lode claim or claims and the area of the placer separately. It should be remembered that an application which omits to include an application for a known vein or lode therein must be construed as a conclusive declaration that the applicant has no right of possession to the vein or lode. Where there is no known lode or vein the fact must appear by the affidavit of two or more witnesses.

ELECTROLYTIC analysis can be illustrated in the case of a solution of copper sulphate to be thus analyzed: a measured portion of the solution to be placed in a weighed platinum vessel, connected with the zinc plate terminal of a battery; from the other terminal a wire extending and terminating in a plate of platinum immersed in the solution in the vessel. The passage of the current would decompose the copper sulphate, the copper being eventually deposited in a fine coating on the platinum. Subsequently the metal would be washed with distilled water, and then with alcohol, the dish then dried and weighed with the adherent copper. Subtracting the weight of the dish alone from the weight of the dish and copper would accurately determine the weight of the metallic copper in the solution by "electrolytic analysis."

IN Honman & Vulliez's process for making white lead it is produced by carbonic acid acting on a solution of basic lead acetate. Galena is roasted in a reverberatory furnace having an extra large sole. Above the furnace is fitted a boiler for supplying steam through pipes to the furnace just beyond the bridge. The galena is roasted at a low red heat until most of the sulphur has been expelled. The roasted litharge is placed in a vessel and treated with a hot solution of neutral lead acetate, and is fitted with a pipe for drawing off the basic lead acetate formed. The solution is allowed to settle, and the clear basic acetate solution is led into a tank provided with a steam coil and a perforated worm for supplying carbonic acid gas. The white lead formed is drawn off in a special drying vessel; the residue left in the cylinder, which consists of lead sulphate, is dissolved in caustic soda, caustic potash, or ammonium acetate. The solution obtained is run into a pan and white lead is precipitated by means of sodium, potassium, or ammonium carbonate.

L. VANINO recommends commercial formalin, an aqueous solution of formaldehyde, for the quantitative precipitation of gold and silver from its solutions, and gives the following: 1. For gold, add formalin and a small amount of caustic soda to the auri-chloride solution, heat for about five minutes on the water bath, collect the precipitated gold on a dried and weighed filter and heat the filtrate again with some formalin and caustic soda in order to ascertain that the whole of the gold is precipitated. Wash the gold on the filter with water and alcohol, dry at 180° C., or calcine in a porcelain crucible. 2. For silver, the operations are exactly similar to those for estimation of gold with this difference only, that the silver on the filter must ultimately be washed with absolute alcohol in order to completely remove the water which obstinately adheres to the silver. Vanino has further found that chloride of silver can, by formalin and caustic soda, be quantitatively converted into metallic silver, and he is of opinion that this reaction can be utilized for recovering silver from laboratory residues, and also for the production on a large scale of fine silver from silver chloride. Formalin is a 35% aqueous solution of formaldehyde; its present price in San Francisco is 55 cents per pound.

THE bill introduced last week in Congress by Representative Osborne of Wyoming to establish the Department of Mineralogy and Mining follows the recommendations of the mining congress at Salt Lake City, Utah, last July. It proposes that the department shall be under the supervision and control of an executive officer to be known as the Secretary of Mineralogy and Mines, who shall be appointed by the President by and with the advice and consent of the Senate; *provided*, however, that no person shall be appointed to this position unless he shall have a thorough practical knowledge of mineralogy and mining. Section 158 of the Revised Statutes is amended to include such department and the provisions of title 4 of the Revised Statutes, including all amendments thereto, are made applicable to the new department. An Assistant Secretary is to be appointed also by the President, to perform such duties as may be required by law or prescribed by the Secretary of Mineralogy and Mining. The Secretary shall receive the same salary as is paid to Secretaries of each of the executive departments of the Government, and the salary of the Assistant Secretary shall be the same as that now paid to the First Assistant Secretary of Agriculture. The United States Geological Survey, as at present established, together with all records, maps and apparatus now connected therewith, shall be transferred to and made a part of the Department of Mineralogy and Mining. Mr. Osborne's bill provides that the act shall go into effect and be in force on the 4th day of March next succeeding the day of its final passage.

IN electrolytic assay as applied to refined copper the crawfoot or "gravity" cell is, probably, the cheapest reliable primary battery for a moderate amount of general work, not warranting an expensive plant. That current generator may be made to give satisfaction if it is frequently overhauled—at least twice a month when in constant use, or as often as it becomes choked with deposited material at the bottom. It does not pay to use the zincs up too much; but about half the expense may be saved if a mould is provided, and the zincs are cast with the spent fire at the close of a day's work at the wind furnace. The old zincs may be scraped, broken up, and recast with twice the weight of new spelter. Melt the metal at low heat, and use a covering of charcoal in the graphite crucible. A device, the good effects of which have possibly not occurred to all, consists in refilling the cleaned battery jars one-fourth to one-third full of old battery solution (saturated zinc sulphate) and then diluting with water till the zincs are covered. Pure water, alone, offers a great resistance to an electrical current; and much zinc must be dissolved unnecessarily to establish the proper conditions for maximum current, unless old battery solution is introduced as just recommended, when the cell will be found almost immediately to be in good working order. An excellent current generator is a dynamo with incandescent lamps in circuit, preferably combined with a small plant of storage cells at those laboratories where the current from a dynamo is available only at night. The dynamo current may at that time be caused to run the assays and charge the storage cells for use during the day.

The Bursting of Small Cast Iron Flywheels.

(Continued from Page 117.)

services of the students who carried out the experiments, Messrs. Bishop and French of the class of '97 and the Messrs. Emrich, of the class of '98. Without their intelligent and faithful assistance the work could not have been done. The wheels were all of cast iron and were clean, perfect castings. Two diameters were used, 15 and 24 inches, and each wheel was a scale model of some actual flywheel designed by a reputable firm. The wheels numbered 1 to 10 had solid rims with the exception of No. 5. Wheel No. 11 was a special wheel, as will be explained later. The wheels numbered 12 to 17 had each two joints in the rim and were 24 inches in diameter. All the wheels numbered from 1 to 10 were reduced models of a solid rim flywheel 10 feet in diameter now in use on a 12x30 Allis-Corliss engine in the laboratory. The wheels numbered 12 to 15 were models of the same wheel on a large scale, with rim joints designed by the writer. The two wheels numbered 16 and 17 were models of the flywheel of a Corliss blowing engine. Reference to the various cuts will show the general appearance of the various wheels tested before and after breaking. Tables I and III give the dimensions of the wheels in detail.

To give to the wheels the speed necessary for destruction, use was made of a Dow steam turbine capable of being run at any speed up to 10,000 revolutions per minute. The turbine shaft was connected to the shaft carrying the flywheels by a brass sleeve coupling, loosely pinned to the shaft at each end in such a way as to form a universal joint, and so proportioned as to break or slip without injuring the turbine in case of sudden stoppage of the flywheel shaft. Fig. 1 shows clearly the arrangement of wheel and turbine.

One experiment with a shield made of 2-inch plank (see Fig. 2) convinced us that safety did not lie in that direction, and in succeeding experiments with the 15-inch wheels a bombproof constructed of 6x12-inch white oak was used. The first experiment with a 24-inch showed even this to be a flimsy contrivance, as may be seen by Figs. 3 and 4, from photographs taken immediately after the explosion of wheel No. 11. In all subsequent experiments a shield made of 12x12-inch oak was used, as shown in Fig. 5, which represents the apparatus as employed on wheels Nos. 12 to 17. Even this shield was split repeatedly and had to be reenforced by bolts. The brick piers of the basement furnished havens of refuge for the experimenters and no accidents occurred, but sundry holes in the brick wall, broken hangers, and riddled belting remain as souvenirs of the spiteful force of the flying fragments. The wheels were usually demolished by the explosion, as may be seen from the cuts.

No crashing or rending noise was heard, only one quick, sharp report, like a musket shot.

The determination of the speed offered some difficulties at first, it being too great for the successful use of a counter or tachometer. A commutator of one break was arranged on the flywheel shaft and this connected through the battery circuit with an earphone in an adjoining room. This arrangement worked satisfactorily, giving a clear, musical tone, and the number of vibrations corresponded closely to the speed as measured by a reducing countershaft and speed counter. The commutator and the apparatus used in testing it are shown in Fig. 1. It was soon discovered that the audible tone produced by the machine itself when running at a high speed corresponded exactly to the tone in the earphone, and consequently the earphone was discarded. Two observers, having trained musical ears and provided with tuning forks, had no difficulty in determining the pitch within half a tone, the quarter tones being estimated. The error due to this method did not exceed 5 per cent, and was probably less than if an attempt had been made to get the speed with a tachometer. The bursting speed of the wheels having rim joints was too low to produce a musical tone with any distinctness, and it became necessary to resort to the tachometer. It was not deemed safe for the observers to apply the instrument directly to the flywheel shaft, and a counter-shaft reducing the speed from two to three times was employed. Wooden pulleys were used, connected by a band consisting of several thicknesses of electrical tape. Careful observations convinced the writer that there was no appreciable slip.

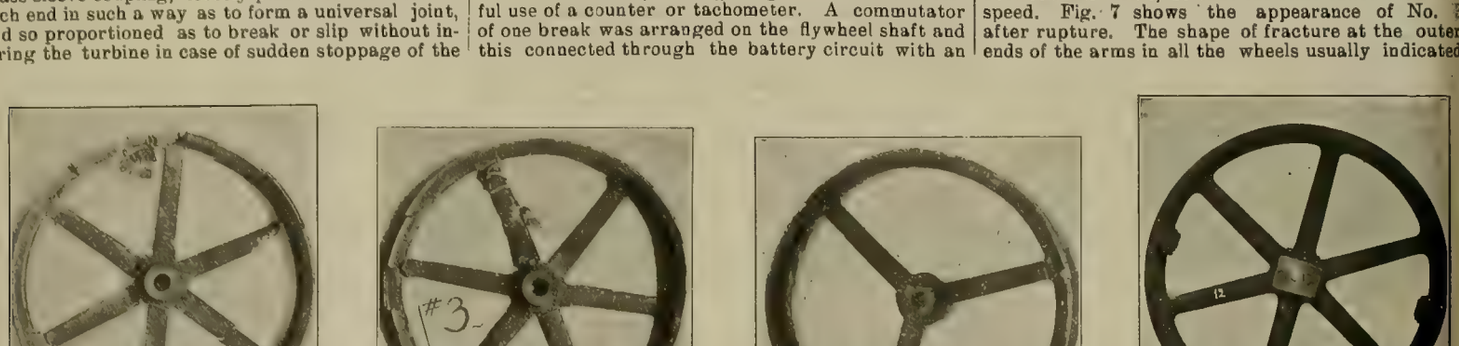
The tachometer used was of the usual rotary pendulum type and was calibrated several times by comparison with a speed counter.

Fifteen-inch Wheels.—Test pieces cast from the same ladle as these wheels were broken in the testing machine, and the following average values obtained for the breaking strength: Tension, 19,000 pounds per square inch. Cross breaking, 39,000 pounds per square inch. The wheels were all turned on the face and edges of the rim, and were carefully balanced by winding copper wire around the arms near the rim.

Wheels Nos. 1 and 2 were practically identical in size and shape, as may be seen by Table I, and broke at the same speed, viz., 6,525 revolutions per minute, or a rim speed of 430 feet per second.

Fig. 6 shows the appearance of No. 2 after rupture.

Nos. 3 and 4 were similar to the preceding, save that the rims were turned down thinner. No. 3 burst at a speed of 6,035 revolutions per minute, or a rim speed of 395 feet per second, and No. 4 at 5,872 revolutions per minute, or 380 feet per second. The rims, being thinner, bent more between the arms, so that the rims failed at a less speed. Fig. 7 shows the appearance of No. 3 after rupture. The shape of fracture at the outer ends of the arms in all the wheels usually indicated that the rim broke first midway between the arms, and that then the parts of the rim flew outward and broke off at the arm.



Wheel No. 5 had two joints in the rim at opposite extremities of a diameter. The strength of the joint was designed to be one-third the tensile strength of the solid rim, but the wheel burst at only 2,925 revolutions per minute with a centrifugal tension of less than one-fourth that of the solid wheels.

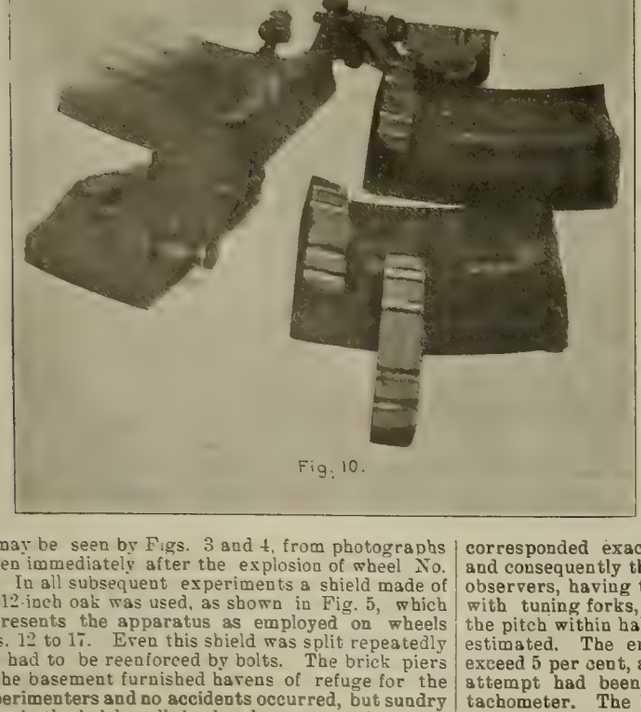


Fig. 10.

Fig. 11.

Nos. 6, 7, and 8 had only three arms, every other arm having been removed from the pattern before casting. The object of this was to show more clearly the bending of rim due to centrifugal force. These three wheels burst at speeds of 5,600 6,18[illegible] and 5,709 revolutions per minute respectively. The figures for No. 6 were obtained with a tachometer and are doubtful, being probably too low. Whee[illegible]

No. 6 is shown in Fig. 8. Wheels Nos. 9 and 10 were of the original six-armed type, but with rims turned down to exceeding thinness, as shown in Table I. They each burst a speed of 5 709 revolutions per minute, or at rim speeds of 365 and 361 feet per second respectively, a reduction of over 5% from Nos. 1 and 2.

TABLE I.—FIFTEEN-INCH WHEELS

No.	Style	RIM Diameter, inches	RIM Breadth, inches	RIM Depth, inches	RIM Area, sq. inches	ARMS Number	ARMS Area, sq. inches	Weight of wheel, pounds
1	Solid	15	2	70	1 4	6	46	20 87
2	"	15	2	65	1 3	6	46	20 44
3	"	15	2	615	1 23	6	46	19 12
4	"	14½	2	52	1 04	6	46	16 62
5	Sectional	15				6	46	20 87
6	Solid	15	2	69	1 38	3	46	19 25
7	"	15	2	615	1 23	3	46	16 56
8	"	14½	2	475	95	3	46	13 68
9	"	14½	1½	400	75	6	46	12 68
10	"	14½	1½	347	65	6	46	13 00

These results are summarized in Table II. An examination of the column containing the values of in feet per second will show that as the segments the rim between the arms become weaker as

joints in the rim, midway between the arms, as shown in Fig. 9. The joints were all carefully planed and the holes drilled to match. The wheels were not turned on the face, but were balanced the same as the others. In none of the experiments was there any shaking or tremor, only a dull roar of increasing intensity, then a single sharp report and quiet, except for the hum of the relieved turbine.

The proportions of the flanges and bolts are given in Table IV. The bolts used were of steel, and samples of each broken in the testing machine gave the results shown in the table.

Wheel No. 12 burst at a speed of less than 1800 revolutions per minute, but the exact speed was not recorded. The flanges broke, as shown in Fig. 10, but the bolts were uninjured, except for a slight stretching.

No. 13 was a duplicate of No. 12 in every way, and burst at 1760 revolutions per minute, or 184 feet per second. Fig. 11 shows the joints after rupture, the bolts uninjured, but the flanges broken through the bolt holes. The flanges of the pattern were then strengthened by adding ¼ inch to the thickness, the bolts remaining the same.

Wheel No. 14 burst at 1875 revolutions per minute with a rim speed of 196 feet per second, in this case the bolts failing, as shown in Fig. 12. This cut is interesting as showing clearly the bending action of the centrifugal force on the bolts, using the inner edge of the flange as a fulcrum. This joint failed first; the wheel then opened like an oyster, fracturing the rim on each side of the joint opposite, the latter joint being left intact.

In No. 15 bolts ⅝ inch in diameter were used, and the wheel failed at 1810 revolutions per minute, or a rim speed of 190 feet per second. In this experiment the flanges of one joint were badly broken, as may be seen from Fig. 13, the bolts remaining whole. The second joint was uninjured, as in No. 14. The broken bolt seen in the cut came from the hub and should not appear. A close inspection of the two bolts in the foreground of the cut shows them to be nearly sheared off at the joint, a phenomenon which is interesting, but which the writer is unable to explain. It would indicate that, as the bolts stretched and the joints loosened, one side of the joint was more affected by the centrifugal force than the other, causing a shearing action in the joint.

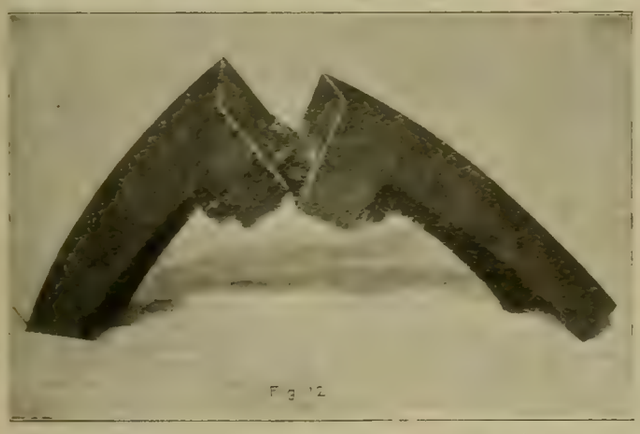


Fig. 12.

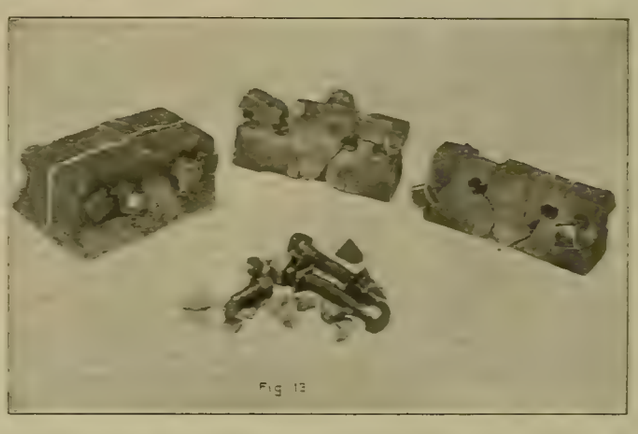


Fig. 13.

ams, either through increase of length or decrease thickness, there is a falling off in the bursting eed.

TABLE II.—FIFTEEN-INCH WHEELS

No.	BURSTING SPEED Revolutions per minute.	Feet per second.	Centrifugal tension $\frac{v^2}{10}$	Remarks.
1	6,525	430	18 500	. . . . .
2	6,525	430	18 500	. . . . .
3	6,035	395	15 600	Thin rim.
4	5 872	380	14.400	Thin rim.
5	2 925	192	3.700	Joint.
6	5,600*	368	13,600	Three arms.
7	6,198	406	16,500	Three arms.
8	5,709	368	13.600	Three arms.
9	5.709	365	13 300	Thin rim.
10	5 709	361	13 000	Thin rim.

*Doubtful.

To determine to what extent the strength is ected by bending, values of $\frac{v^2}{10}$ have been calcu-ted. As has been shown by Mr. Stanwood in the per before referred to, this expression represents proximately the tensile stress on the square inch section of rim, due to the centrifugal force, for st-iron. By comparing these values with the tensile strength of the iron before noted, viz., 19,000 unds per square inch, the amount of stress due to nding may be estimated. This difference varies om 500 pounds per square inch in Nos. 1 and 2 nearly 6000 pounds per square inch in Nos. 9 and —being greatest in the wheels with thin rims or w arms. None of these wheels, however, except o. 5, would have been unsafe at the usual limit for wheel rims of 100 feet per second. Wheel No. 10 ould have had a factor of safety of over 12 at that eed.

Twenty-four-Inch Wheels.—All the wheels numbered om 11 to 17 were of the above diameter. No. 11 as a special wheel which had been in actual use. his wheel burst at 3670 revolutions per minute, or peripheral speed of 385 feet per second, which corsponds well with the average speed of the 15-inch heels. The explosion was very violent and completely wrecked the shield, as shown in Figs. 3 and 4 ne quality of the iron was unknown, save that it ppeared clean and close-grained.

Flanged Joints.—The wheels numbered 12 to 15 ere of the same model as the 15-inch wheels on a rger scale, but each wheel had two internal flange

TABLE III.—TWENTY-FOUR-INCH WHEELS.

No	SHAPE AND SIZE OF RIM. Diameter, inches	Breadth, inches	Depth, inches	Area, sq. inches	Style of joint.	Weight of wheel, pounds.
11	24	2⅛	1.5	3.18	Solid rim	75.25
12	24	4 1/16	.75	3 85	Internal flanges, bolted	92.
13	24	4	.75	3 85	" " "	91.75
14	24	6	.75	3.85	" " "	95.
15	24	4 1/16	.75	3.85	" " "	94.75
16	24	1.2	2.1	2 45	Three lugs and links.	65.1
17	24	1.2	2.1	3.45	Two " " "	65.

TABLE IV.—FLANGES AND BOLTS.

No	FLANGES. Thickness, inches.	Effective breadth, inches.	Effective area, inches.	BOLTS. No. to each joint.	Diameter, inches.	Total tensile strength, pounds.
12	1 1/16 tapering to 1/16	2.8	1.92	4	5/16	16 000
13	1 1/16 tapering to 1/16	2.75	1.89	4	5/16	16 000
14	1 1/16 tapering to 1/16	2.75	2.58	4	5/16	16 000
15	1 1/16 tapering to 1/16	3.5	2.34	4	⅝	20 000

BY TESTING MACHINE

Tensile strength of cast iron = 19,600 pounds per square inch.

Transverse strength of cast iron = 46,600 pounds per square inch.

Tensile strength of 5/16 bolts = 4000 pounds.

Tensile strength of ⅝ bolts = 5000 pounds.

(To be Continued.)

Commodore G. W. Melville.

That the success of the United States navy last summer was largely due to the engineers, is admitted on all sides. That these men are entitled to a higher degree of recognition than was formerly accorded them is equally evident. Prominent in present effort in that direction is Commodore G. W. Melville, Chief Engineer of the U. S. Bureau of Steam Engineering, whose portrait is presented herewith. He and his colleagues have made untiring and intelligent representation of the needs of the navy, and in a measure the success of the Oregon in her famous cruise, subordinate to good construction and able captaincy, is due to his advocacy of the principles which, as supervisor of the designs for her machinery, he was able to put into practical shape.

Commodore Melville is heartily in favor of large boiler power and great speed. In an article in the current number of *Cassier's* he shows that speed of ship is a vital factor in marine engeering, for the greatest improvements in design and manufacture have resulted from the demands for higher speeds, and goes on to say that twenty-five years ago the highest sea speeds for merchant steamers were less than 16 knots, and for war vessels were even less, except in such notable cases as the cruiser Wampanoag of the United States navy. In the merchant service the increase of speed has been gradual since the advent of the Arizona with 17 knots, every few years at least bringing out one or more faster greyhounds, until we have the Kaiser Wilhelm de Grosse, with a record of 564 knots for a day's steaming and an average for that day of 22 83 knots. He cites other notable instances of increase of speed, which he shows has been made possible by the improved economy of the machinery and the reduction of weight per unit of power. Commodore Melville's latest achievement and contribution to the efficiency of the navy is the repair ship Vulcan, the floating machine ship which was of such instant and material aid in Cuban waters last summer, and which this journal illustrated and described in its issue of Oct. 1st, '98.

COMMODORE G. W. MELVILLE.

Minting Gold and Silver.

The precious metals are never found in the pure state, and are deposited at the mint alloyed with other metals, and in a great variety of forms, such as native grains, dust, amalgam, bars or pigs, old jewelry, etc. The mixed metals are known under the generic name of bullion. This is first weighed in the deposit weigh room, taken to the deposit melting room, put in a crucible previously heated in the melting furnace and covered with a thin coating of borax, which forms a sort of fluid glass, acting as a cover to protect the metal, when it is molten, from the oxidizing influence of the air. A workman, wearing a pair of large canvas mitts, somewhat resembling boxing gloves, grasps with a pair of iron tongs a rod of plumbago, thoroughly stirs the fluid mass, and the metal is then cast into an iron mold called a shoe. It is plunged into water to cool, as well as to dissolve off any particles of the borax glass which may have adhered to its surface. It is now returned to the weigh room and reweighed. A slight loss in weight usually occurs, owing to a partial refining out of the base metals, and the new weight is the amount with which the depositor is credited. After the metal has been returned from the melting room, where it was cast into the shoe mold, and the bar reweighed, a small chip is cut off from one end of the bar and taken to the assay laboratory. The sample is rolled into a thin ribbon and stamped with the number of the deposit which it represents; it is then assayed to determine the proportion of gold, silver and base metal, and so accurate are the processes of assay that the exact value of a deposit, frequently aggregating many thousands of dollars in value, is determined to a fraction of a cent by calculations based on the assayer's report.

The largest weight which the assayer uses in making an analysis of gold bullion is the French half gram (about 7¾ grains troy).

The balances used in this work are so sensitive that a weight of one-twentieth of a milligram (less than one-thousandth part of a single grain) will cause the indicator needle to deflect a very appreciable distance from the zero point on the graduated scale marking the equilibrium. These little balances are inclosed in glass cases, provided with sliding windows to exclude any draught of air. The beam is usually made of aluminum, one of the lightest metals, and the knife edges rest on jewels. The weights are made of gold, silver and aluminum and are graduated from the half gram, which is arbitrarily denominated 1000, down to the ten thousandth degree.

The assayer first determines approximately the relative proportions of the metals existing in the alloy, and from this bases his more careful determinations; he weighs out on the balance exactly one-half gram, or 1000 parts of the alloy; he wraps this in an envelope of pure lead and rolls it into the form of a bullet. The bullet is then placed in a small cupel, made of calcined bone dust, which has been brought to a white heat in the muffle or oven of the assay furnace.

The mass melts immediately, and the lead oxidizes rapidly by absorbing oxygen from the heated air which passes continually over its surface, and on account of the extreme fluidity of the oxide it sinks into the pores of the cupel, which absorbs it as readily as a sponge absorbs water; the lead also carries with it all the base metals which may be originally combined in the alloy, but the precious metals, not being oxidizable, simply melt, and are not so fluid as to be capable of sinking into the cupel. A separation thus takes place, and at the moment when all the base metal is removed a flash is observed on the surface of the metal; the button of purified gold and silver resulting from this operation is then removed from the cupel, returned to the balance, and weighed; the loss indicates the proportion of base metal. Another weighing of the same sample is then made, to which is added pure silver in the form of fine granules, in the proportion of about two parts of silver to one of gold, the alloy is enclosed in a sheet of lead and cupelled as before; the silver button remaining is laminated, coiled into a roll called a cornet, and boiled in nitric acid. The acid dissolves the silver, leaving a little roll of nearly pure gold.* This gold cornet is then annealed in the furnace to give it toughness, and is finally weighed; this weight represents the proportion of pure gold. The proportion of silver is ascertained by subtracting the weight of the pure gold plus the weight of the base metal from the original weight of the assay sample.

Silver was formerly assayed in the same way, but it was long known that the result was not quite accurate, owing to a partial volatilization of the metal when exposed to the high temperature of the fire. Experiments were instituted by the French Government to overcome this difficulty, which resulted in the "humid process" devised by Gay-Lussac. This is one of the most accurate methods known to chemical science, and so complete was Gay-Lussac's original description that little room has been left for any improvements, and many thousands of dollars' worth of silver bullion are rapidly and accurately determined every day in the Mint in this way. The rationale of Gay-Lussac's method is very simple, viz.: a given amount of chlorine will precipitate a definite proportion of pure silver from its solution in nitric acid.

The assayer prepares two solutions of common salt water; one is known as the normal solution and the other as the decimal solution. One begins and the other finishes the assay.

The sample of silver to be assayed is weighed out, as in the case of gold, the assayer taking care to place a sufficient weight of the alloy in the scale pan to contain at least one gram (a little over fifteen grains) of pure silver; the weighed sample is then placed in a glass bottle and a charge of nitric acid is added to it; the acid is caused to boil, and in a short time the silver alloy is completely dissolved.

A charge of the normal salt solution is then allowed to flow into the bottle from a glass pipette, made of such a capacity that it shall contain just enough salt water to precipitate one gram of pure silver; the chlorine in the salt water combining instantly with the silver, precipitates it in the form of a white cloud; the bottle is then agitated rapidly for a few moments, when the precipitate settles to the bottom, leaving a clear solution above; the assayer next allows a charge of the decimal solution, which is one-tenth the strength of the normal solution, to flow into the bottle from a burette or glass tube with graduated divisions, each division marking one-hundredth the capacity of the large pipette. If any silver remains in the solution a cloud will be observed on the surface. As this decimal charge is one-tenth the strength and one-hundredth the volume of the large pipette, it will precipitate just one-thousandth as much silver, or one milligram. The bottle is again agitated to settle the precipitate, and successive charges of the decimal solution are added until all the silver is precipitated, and then a simple rule-of-three sum gives the exact proportion of pure silver contained in the original weight of the alloy. The assayer guards against all probable sources of error by an elaborate system of checks, and each set of assays is accompanied in all its mutations by one or more proofs or synthetic assays, made either from pure metal or from alloys of known composition.

After the exact proportions of gold, silver and base metal constituting the alloy have been reported by the assayer to the superintendent, the value of the deposit is calculated, and the depositor is paid the full equivalent, less the charges for refining, the amount of charges depending, of course, upon the nature of the bullion.

The metal now passes into the hands of the melter and refiner.

Suppose that the representative deposit contains a small percentage of base metals, such as tin and lead, which tend to make the alloy brittle or short, rendering it unfit for coin. The first operation is intended to eliminate these impurities, and is called toughening. The metal is melted in a crucible and an oxidizing flux (saltpeter) is added to it while fluid; the saltpeter or niter decomposes and liberates oxygen gas; the oxygen seizes the base metals forming oxides; these rise to the surface and are dissolved in the flux; the flux, when sufficiently thick, is skimmed off, and the purified metal, consisting only of gold and silver, is poured into cold water to form granulations.

(To be Continued.)

*A faint trace of silver remains undissolved by the acid, called the sur-charge. The amount is ascertained by proof assays, using gold 1.00 fine, and proper allowance is made for the sur-charge of silver.

An Official Ruling.

The following is from the general commissioner of the land office:

"I am in receipt of your letter of Dec. 15, 1898. Under the United States placer mining laws one person may make a single location containing twenty acres of placer mining land, two persons may make a single location containing not more than forty acres in a compact body, three may locate sixty acres, etc., but no single location, whether made by eight persons or more, can exceed 160 acres.

"It has been decided that a single location of placer mining ground may embrace 20, 40, 60, 80, 100, 120, 140 or 160 acres in a compact body, according to the number of locations.

"If eight persons should make eight distinct and separate locations of twenty acres each, and seven of the locators should convey their claims to the other, it would require annual assessment work of the value of $800 to maintain the possessory right to all of the claims; but, in the case of a single location, embracing 160 acres of placer mining land, the owner thereof, in order to maintain his possessory right thereto, would not be required to expend $100 worth of mining labor on each twenty acres thereof, but his possessory right to the entire 160 acres might be maintained by performing thereon $100 worth of actual mining work designed in good faith for the improvement of the 160-acre location as a single mining claim."

At Niagara Falls is a paper factory which consumes 150 cords of soft wood a day, which is converted into 120 tons of print paper inside of twelve hours. The wood is chipped or ground and then treated with sulphuric acid and lime, a white pulp resulting. There is then added a certain proportion of rosin and clay, the whole being boiled some seven or eight hours, when it is run off in the usual way, on endless blankets, between steel, steam-heated rollers, and wound ready for perfecting presses. Such paper sells for about 3 cents a pound, and is used in the offices of daily newspapers. It contains no "rag," and soon grows yellow. The paper on which this is printed costs more than twice as much, and is enduring.

The Standard Oil Copper Trust.

It is believed that the name of the new copper combination upon which H. H. Rogers of the Standard Oil Co. and Mr. A. C. Burrage of the Arcadian Copper Mining Co. are at work will be the American Copper Co. and that it will be incorporated in New Jersey, but still nothing has been absolutely settled, and it may be many weeks, if not months or years, before the combination takes fixed form.

One thing, however, we are assured of and that is that a paper capital of $500,000,000 is contemplated, and that there will be very many millions of shares and a low market price in order that the public may not appear to be far from the ground—floor.

It is believed that Mr. A. C. Burrage will take the place of Mr. Lewisohn as the leading copper selling agent in the United States, and it is declared that this will be one of the main economies and that in the aggregate the economies whether reached in reduced railroad rates, reduced miners' wages or reduced selling agents' commission will in the aggregate amount to $6,000,000 per annum, and that this can be capitalized for $100,000,000. A large measure of this $100,000,000 will of course be absorbed by the present owners of the Butte & Boston and the Aracadian copper mines. It is not believed that either of these companies can produce any considerable amount of copper, but they make excellent speculative counters, and into them values can be made to flow through a consolidation scheme.

It is declared that the Calumet & Hecla would be worth more than fifty millions in such a combination for its name alone, but it is not believed that it can be had for any such purpose. Some people who have studied the situation believe that it may take five years to perfect the control of the world's copper market through copper mine ownership, and others who have studied in situation believe the ultimate result will be a low copper market.

Still others believe that the Standard Oil alone does not possess money enough, even if its twenty-five multi-millionaires convert their $400,000,000 of security values into cash to control the copper of the world, either its production, its use or its price.

Nevertheless, from intimations we have from Standard Oil sources, it does appear as though Mr. H. H. Rogers of the Standard Oil Co. was, in conjunction with the millions controlled by his Standard Oil associates, about to take upon his shoulder the task of Sisyphus, to wit: The capitalization of the output of American copper mines at $1 per pound of copper.

In other words, a corporation is to be formed with $500,000,000 capital to represent the production of 500,000,000 pounds of copper per annum, allowing that all the great copper mines in the United States, including Calumet & Hecla and Anaconda, can be embraced in the combination.

The actual cash prices predicted by the Standard Oil men in this combination for the leading copper shares, and prices reasonably in sight if the copper movement continues for three months more as three months in the past, mean nothing less than $500,000,000 of actual market value for this Standard Oil copper trust.

To pay 6% upon this valuation means nothing less than 6c per pound profit upon every pound of copper mined.

The average selling price of copper the last ten years has been under 12c per pound.

Is it reasonable to suppose that a $500,000,000 copper trust can long stand on such a basis?

Let the public "Watch Butte," and, above all, let the New England copper share investor watch the tides of the times! These figures are not set down for the day or the hour, but for remembrance.

There have been combinations of capital before representing as much as $500,000,000, but they have never yet been found invincible because of their size.

The late Calvin S. Brice said: "I do not know of any men who have lost more money in railroad investments than Standard Oil men."

It is well known that they have been the largest sufferers in Missouri, Kansas & Texas, Atchison, Chicago & Northern Pacific, etc. But this should be said to their credit; they have stuck to their own investments whether good or bad and have not been manufacturers of securities for purposes of sale to the public.

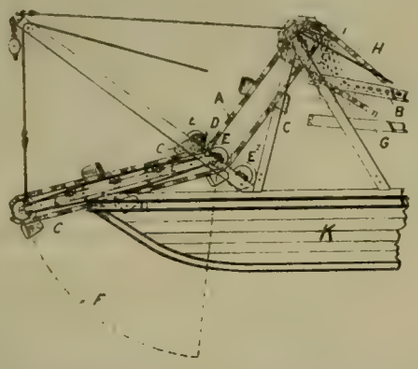
They have been organizers of industry and creators of values and their investment errors have been outside of oil and the products of oil.—Boston News Bureau, Jan. 28.

Latest Mining and Metallurgical Patents.

Patents Issued January 24, 1899.

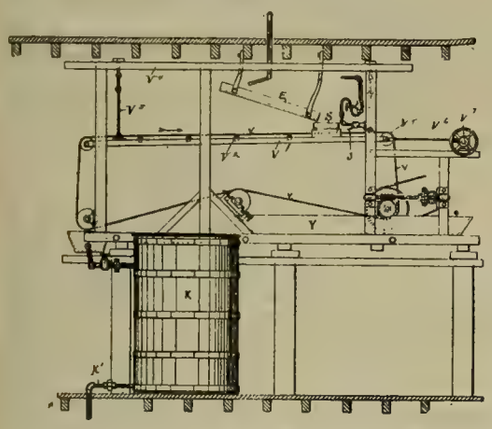
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

DREDGING MACHINE.—No. 618,143; A. Thompson, Tacoma, Wash.



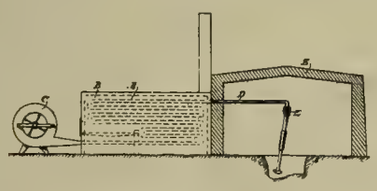
A combination of a pivoted boom or carrier and a sprocket chain thereon of idler pulleys located at or near the pivot of the boom, keeping the tension of the chain constant in any position of the boom, the upper pulley being located upon separate shafts, leaving a clear space between them.

CONVERTING METALLIC LEAD INTO OXIDES.—No. 618,213; A. W. Southard, Newark, N. J.



Agitating in a suitable vessel metallic lead in a comminuted form in the presence of water, and simultaneously introducing air into and throughout the mass; withdrawing a portion of the mass and agitating it to separate the lighter hydroxid from the heavier metallic lead by gravity, and compressing the hydroxid for expelling the water therefrom.

FOR WORKING FROZEN AURIFEROUS EARTH.—No. 618,266; B. F. Gilman, San Francisco, Cal.



For thawing frozen earth or gravel in place, by applying heat directly to the surface and maintaining it in contact therewith, by means of a furnace, an air-forcing mechanism, a substantially tight working inclosure for the operators, the inclosure surrounding the surface to be thawed, a pipe leading from the furnace into the inclosure for conducting the heat thereto, a jet pipe within the inclosure having a horizontal series of jets or discharge passages and a flexible joint within the inclosure, connecting the conveying pipe with the movable jet pipe.

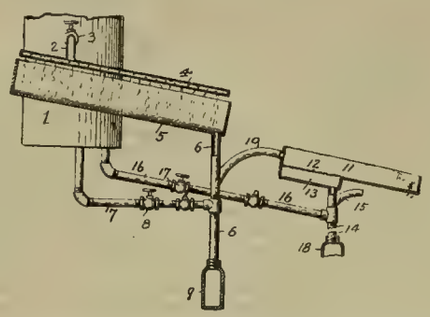
MANUFACTURE OF WELDED PIPE.—No. 618,327; T. J. Bray, Pittsburg, Pa.

Forming welded pipe, preparing skelp by bending the lateral edges to obtain a trough-shaped skelp having an extended flat center of a width substantially half the width of the skelp and raised curved edges, introducing the same into a suitable heating furnace with the flat body portion of the skelp resting upon the furnace bottom and the lateral curved edges projecting above bottom, raising the edges of the skelp to a welding heat and the body of the skelp to a bending heat, and finally passing skelp from the furnace into and through a suitable contiguous welding device.

MINERS' PICK.—No. 618,377; E. Daly, Monterey, Cal.

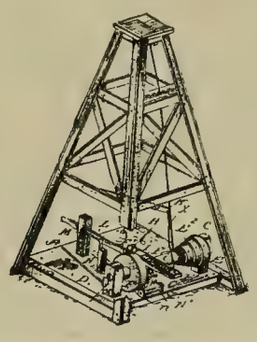
A combination with pick head having a slot in the end, a detachable point having a tongue to fit the slot, an overhanging top flange and an excess of metal on the lower edge of the tongue for swaging the tongue over the edges of the slot and the cushion interposed between the heel of the tongue and the back of the slot.

GOLD SEPARATOR.—No. 618,270; F. E. Jackson and L. R. Henley, Greentown, Ind.



A concentrating machine, in which is combined an elevated water tank, inclined sluice-box, perforated pipe located above the sluice-box and extending from end to end thereof and connected with the tank, a vertical pipe connected with the lower end of the sluice-box having a sight receptacle at the lower end and provided intermediate its ends with a pipe leading to the tank, the curved pipe connected with the vertical pipe above the connection of the pipe leading to the tank, the inclined trough having a box connected with its upper end provided with a screen flush with the bottom of the trough, the trough provided with a vertical pipe connected with the tank and having a curved discharge pipe above connection and with a sight receptacle at the lower end.

OIL WELL DERRICK.—No. 618,297; F. R. Shaw, Chatham Center, Ohio.

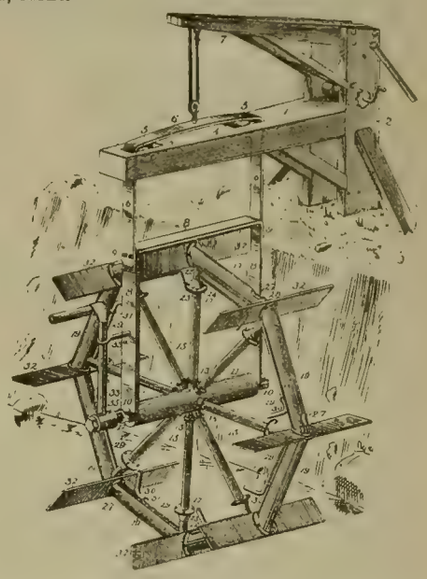


In a lifting device of the character delineated, a shaft *D* journaled in suitable bearings having rigid thereon a cone pulley, a brake wheel *F*, a brake band *F'* adapted to engage therewith, a lever for operating brake band; a tooth wheel having forwardly curved teeth, a pawl *N'* rigidly secured to the lever *N*, pivoted to a suitable base and adapted to engage the teeth of wheel to hold the drum in lock position and a lever *O* adapted to engage the lever *N* to hold the pawl out of engagement with the wheel, in combination with a suitable derrick having a rope supporting and carrying means therein, a rope adapted to be secured to and wound upon pulley and a guide piece in derrick adapted to guide and hold the rope on the proper step of pulley.

ELECTROLYTIC REFINING OF COPPER.—No. 617,886; E. A. Smith, Anaconda, Mont.

An electrolytic method of refining copper consisting in depositing the copper from anodes immersed in an acid bath, concentrating the resultant impure electrolyte to recover by crystallization the bulk of the copper salts (blue vitriol), further treating the "mother liquor" by progressive shallow evaporation at high temperature, under air exposure, to throw down the iron salts and to gradually concentrate the free acid, and upon subsequent cooling then adding suitable hyposulphite to remove the antimony and arsenic while retaining liberated sulphurous acid in solution, and thereupon diluting to complete the precipitation of antimony and arsenic prior to the return of the free acid to the refinery bath.

CURRENT WHEEL.—No. 618,148; T. J. Vance, Rosebud, Mont.



A current wheel comprising a suitable carrying frame provided with journal bearings, a tubular wheel shaft having a hollow trunnion or journal, a series of hollow-valved spokes communicating with the wheel shaft, a series of hollow-valved rim sections communicating separately with the spokes, a series of paddles clamped between the rim sections, a discharge pipe supported on the frame and a coupling united to the pipe and the tubular journal of the shaft.

Patent Office Requirements.

The Patent Office is divided into divisions to each of which is allotted several classes of inventions, the entire system covering every art and science known to the world. These divisions are each in charge of a principal examiner and a crops of assistants, whose duty it is to examine carefully the applications for patents that have been filed with the Patent Office.

The rules of the Patent Office require that every application shall consist of a petition directed to the Commissioner of Patents, praying for the grant of a patent upon the alleged new and useful invention or improvement thereof, and a full description or specification, setting forth in detail the invention and advantages possessed over similar devices known to the art. The specification must be summed up by one or more claims, pointing out particularly that part of the invention claimed as new and for which the inventor seeks protection. An oath is also required, which is to the effect that the person or persons making the application believe themselves to be the original and first inventors of the invention described and claimed, and stating whether or not the invention has been in use for more than two years, which would bar the grant of a patent, and also stating in what foreign countries, if any, the invention has been previously patented.

The application papers must also, when possible, be accompanied by a drawing showing the invention in detail. All of these papers should be prepared with the greatest care, and it is here that the skill of the solicitor is required. The rules and statutes governing the grant of patents makes it necessary that the application and claims shall be prepared absolutely in accordance therewith and what might sometimes appear to be a slight error or omission, might result in having the patent declared void. The claims should be drawn with a full knowledge of the prior state of the art, and a failure to set out all those parts of the invention which properly belong to the inventor would mean a forfeiture of a part of it to the public for which the inventor would receive no return. The drawings must be prepared by a skilled draftsman in accordance with the rules and requirements of the office. These are generally made from a model or sketches of the invention furnished the attorney by the inventor. No pains should be expended in the preparation of an application as the case should be presented to the Patent Office in the best form possible.

The Genesis of Petroleum and Asphaltum in California.

NUMBER I.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

It can be tentatively stated that fossil bitumens are principally derived from terrestrial and marine vegetation, which were deposited in sedimentary strata, then changed to carbonaceous matter, and afterwards distilled by the heat of metamorphism.

In other words, the bitumens are Nature's coal oils and tars distilled in Nature's still, generally with infinite slowness when compared with a modern tar still or retort.

Although some of the hydrocarbons can be produced synthetically in the laboratory, still it is to be believed that nearly all, if not all, of the accumulations of fossil hydrocarbons owe their existence to the vital principle, that they are derived directly or indirectly from organized beings—animal or vegetable, probably the latter, for reasons given hereafter.

In the decomposition of vegetable tissue, when air is wholly or partially excluded from it, as, for example, when buried in the ground, the constituent elements of the vegetable tissue rearrange themselves mutually into new products either with or without the co-operation of the elements of water, the oxygen gradually uniting with the carbon to form carbonic acid, which separates and leaves as a residue substances rich in carbon and hydrogen. It is in this way that bituminous coal, peat and brown coal (lignite) have been formed from vegetable matter.

With carbonaceous material in the same deposit, the same series of strata or in the same stratum, there are differences of composition. The varieties of carbonaceous materials may have been produced from different kinds of plant form, from which coal has been derived, and the peculiar conditions of the districts where the plants flourished, before their downfall and inhumation or submersion. The changes that have taken place in the original plants during their passage from woody fiber into coal are ascribed to evolution of a part of their hydrogen and oxygen, as there are less of these elements in coal than in wood. This will be observed by viewing the following table:

Organic.	*Format'on.*	*C.*	*H.*	*O.*
Wood	Recent	52.65	5.25	42.10
Peat	Recent	60.44	5 96	33 60
Lignite.	Cretaceous and Tertiary..	66.96	5.27	27.76
Brown coal.	Cretaceous and Tertiary..	74.20	5.89	19.90
Coal	Secondary	76.18	5.64	18.07
Coal	Older	90.50	5.05	4 40
Anthracite.	Crystalline	92.85	3.96	3.19
Graphite	Crystalline and Archæan..	100.00		

There is no strict line of demarcation between the above-named organic matter; the one below gradually merges into the one above.

The older the formation, the greater the amount of carbon contained in the coal, the amount of hydrogen and oxygen having been diminished. This fact may be ascribed chiefly or in part to the degree of heat and pressure to which the lower and older coal strata have been and still are subjected.

Graphitic and anthracitic varieties of coal are metamorphic coal produced by heat, the volatile matter being vaporized, which probably afterwards condensed in fissures and porous rock above, as bitumen, petroleum, etc.

Graphite occurs in the Archæan, but none of the other coals are found in these rocks, neither is bitumen or petroleum oil found in the Archæan formation, but they are found in all the other formations lying above the Archæan. From this it would seem that the bitumens originated in or above the Laurentian rocks, and not below them. The absence of the bitumens and petroleum in the Archæan formation is evidence against the theory that petroleums are produced by the action of water upon red-hot carbonized iron in the interior of the earth. It is at least conclusive evidence that this process is not at present in operation.

Graphite is in all probability the ultimate stage in the series of changes which vegetable matter undergoes passing through the conditions of heat, lignite and mineral coal to end in graphite. Several modifications of graphite may be produced artificially. When cast iron is melted with an excess of charcoal it dissolves a portion of the carbon. This carbon, when the iron is allowed to cool, slowly crystallizes out in the form of large and beautiful leaflets of graphite.

Anthracitic varieties of coal are associated with folded and metamorphic rocks. Anthracitic condition of coal may sometimes be traced to local effect of igneous rocks. As rocks grow less and less metamorphic, the more bituminous is the coal contained in them.

Graphite is disseminated in strings, veins and beds through hundreds of feet of the Lower Laurentian strata, and its amount is calculated to be equal in quantity to the coal seams of an equal area of the Carboniferous rocks.

In central Scotland, where the coal fields have been so abundantly pierced by igneous masses, petroleum and asphaltum are of frequent occurrence, sometimes in chinks and veins of sandstone and other sedimentary strata, sometimes in the cavities of the igneous rocks themselves. In West Lothian intrusive sheets traversing a group of strata containing seams of coal and oil shale have a distinct bituminous odor when freshly broken, and little globules of petroleum may be detected in their cavities. In the same district the joints and fissures of a massive sandstone are filled with solid, brown asphalt, which the quarrymen manufacture into candles.

Graphite has probably the same vegetable origin as mineral coal. It is now generally conceded to be of organic origin, the result of metamorphism of some of the products of destructive distillation of vegetable tissues. In general arrangement and microscopic structure the layers of graphite correspond frequently with coal and some bituminous deposits.

The majority of coal mines in California are in the Cretaceous rocks of the Lower Tertiary. The rocks underlying the Tertiary formation and the lower parts of the Tertiary formation are in many instances metamorphic, the Cretaceous and Tertiary rocks having been changed to metamorphic rock by hydrothermal action, and, if they contained carbonaceous material, petroleum was distilled, which ascended in a vaporous condition and was condensed in the unaltered rocks. After condensation, it was carried upwards by gas and hydrostatic pressure and in some instances by rock pressure.

The presence of nitrogen in the California petroleum oils has been adduced as a proof that they are of animal origin; this proof is not conclusive, as most all of the coals and carbonaceous shales yield nitrogeneous products when subjected to destructive distillation. As a proof of the animal origin of petroleum, it has been stated that pools of petroleum have been found which were filled with live maggots.

Many hundreds of pools of petroleum in California have been examined without discovering any maggots or other forms of life in them, although there have been swarms of flies and other insect life in their neighborhood. In the vicinity of pools of petroleum female flies quickly discover and lay their eggs on spoiled or moist food stuffs, meat, decaying meat, meat broths, dead animals, in manure heaps, etc. Taking into consideration the persistency of female flies to deposit their eggs upon anything capable of sustaining the life of their young, it is to be believed that all pools of petroleum would be filled with maggots if flies were present and petroleum was a suitable food for their larvæ.

Maggots feed upon animal and vegetable tissues and liquids, and not upon their fats and oils.

When animal hydrocarbons are deprived of all animal tissues and liquids, they are not molested by flies. Petroleum is also found to be an excellent maggot killer.

There are only four ways of preserving animal remains from decay and putrification: First.—In a case from which the air has been completely removed and excluded. Second.—By antiseptic agents. Third.—Subjected to a heat exceeding 100° C. Fourth.—Subjected to a cold under 0° C.

To secure and preserve any quantity of animal remains by any of these four ways cataclysms of nature must occur. Geology does not show that any large quantity of animals have been inhumed in the earth by cataclysms; even provided animals were buried in this manner, there is sufficient oxygen present to start decay, and, after this has commenced, putrefication ensues.

The ordinary rate at which sedimentary rocks are deposited is too slow to effect the inhumation of animal substances so that they will be excluded from the air and preserved.

But few animal remains are found encased in ice, and these are not buried beneath the earth; there is no other way in which they can be preserved by cold.

There is no way in nature that animal remains can be maintained at a temperature of 100° C. from the time of their death until changed to bitumen.

Very seldom are animal remains preserved by antiseptics in nature, and, if so preserved, their aggregate amount is small. All the ways that can be employed to preserve animal substances are destructive to animal life. The presence of life and the conditions and way necessary for the preservation of animal substances cannot exist in the same place at the same time.

In order that petroleum oil may be derived from animal remains, it is first necessary that such remains be placed and preserved in a condition for such change.

In the present age the inevitable end of animal after life is to furnish nutriment to the scavengers of the earth and sea or their decomposition by putrefication.

There is no reason why that in former ages this was not the ultimate fate of animals.

The products of the decomposition of nitrogenized animal substances are as follows: The oxygen of the substance unites with the carbon to form carbonic acid, while the hydrogen divides itself between the nitrogen, the sulphur and the phosphorous and form ammonia with sulphuretted and phosphoretted hydrogen.

The surroundings would indicate that the fossils in the petroliferous formations of California lived and died and were embedded in the same manner as the mollusca of the present day; in fact, a large number of the fossils in these formations are the prototypes of existing mollusca and must have lived and died in the same manner. There is nothing showing that after death the mollusca existing at the present day are preserved for the future manufacture of petroleum. This is also true of the infusoria.

The fossil animals do not show any stage of transition between animal matter and petroleum oil.

Large quantities of fossil shells exist in the shales and sandstones of California; these are usually filled with silt or the shells have been changed to silica and the interior filled with silica, or molds and casts exist, the carbonate of lime having been leached away. They only contain bitumen when the interspaces and cracks in the adjoining rocks are filled with bitumen. There is no carbon in these fossils, except in some instances the carbonate of lime constituting their shells. There is no carbonaceous matter from which bitumens could be derived by any known process. There are no more fossils in the rocks which are impregnated with bitumen than those which are destitute of bitumen.

Bitumens are found in the unaltered sedimentary rocks of California sandstones, shales, limestones, etc. There is no bitumen in the metamorphic rocks. The only substances originally contained in these rocks that could and can be converted to bitumen is organic vegetable remains in the form of coal, lignite and carbonaceous shales. These carbonaceous substances are not changed to bituminous unless distilled by heat.

Most all of the known beds of coal, lignite and carbonaceous shale belong to the Cretaceous or Tertiary formations.

If bitumens exist in them at all, the surrounding and accompanying phenomena show that these accumulations of bitumen are secondary.

A primary deposit of petroleum is in the rocks in which it was formed.

A secondary deposit is where it has migrated from the rocks in which it was formed and accumulated in other rocks.

If petroleum is produced by destructive distillation it cannot remain in the rocks in which it formed.

(*To be Continued.*)

The California Water Wheel.

TO THE EDITOR:—Recently, in looking through a text book upon hydraulics, which has passed through several editions—which indicates that it has been extensively introduced—I noticed that the California jet water wheel is classed as an impulse wheel, and pronounced as being exactly similar in its action to an undershot wheel. To endeavor to establish this wheel—which is wholly of California origin—in the true and meritorious position to which it belongs, to prevent it from a foundling's fate, and perchance prevent other authors or educators from compiling or continuing this error, is my object in writing.

The two wheels—the undershot and California—utilize the force of gravity, and there the similarity ceases.

With the undershot wheel, the water moving upon an inclined plane makes impulsive contact with the buckets and pushes them along, utilizing a portion of its required velocity and a portion of its fall.

The California wheel—by which I refer to the class, and no individual member—receives its water as a jet, with velocities ranging from 40 feet to nearly 400 feet per second, dependent upon height of head. The range of velocity given being as already applied, the principle of its action is such that, to obtain great efficiency, the buckets should recede from the jet with a little less than half its velocity, just enough less that the water shall be turned back back upon itself, or its course in the bucket, but not enough to cause it to jet back. In action the buckets receive a blow equal to one-half of jet velocity, and were that the termination of action we could realize but one-half the jet force, the other half passing on with the buckets and beyond the wheel as velocity. Instead, through the differences of velocities above noted, all the energy of projection is struck from the jet, and, following a gravity impulse, it falls vertically.

There are many manufactures of wheels embodying this principle of action, many of which not showing high efficiency, but there are enough good ones as that no purchaser should accept a guarantee of less than 80% by actual honest test. The very best ones test as high as 90%, which is a remarkably good showing.

This California impact wheel, I will so name it, is purely of California origin, and, comparatively, a new device, having been brought into existence since the days of '49. Its first embodiment as a principle was very crude and unpretentious, but upon it has been a continuous improvement to the present time; some of the better forms of recent designs transmitting nearly all the applied force that can possibly be obtained for service.

Along this highway of improvement are strewn many devices which show no vitality, and many others representing all degrees of vitality, which, for the benefit of users of wheels, should be devitalized, but, as a recompense for all this effort, there has been developed and perfected upon new lines a wheel of highest efficiency. CALIFORNIA MINER.

The Copper Deposits of the "Seven Devils," Idaho.

Written for the MINING AND SCIENTIFIC PRESS by WALDEMAR LINDGREN.

Introduction. — Between Weiser on the Oregon Short Line and Lewiston, both in Idaho, the Snake river passes through a continuous canyon, in depth and grandeur equalled by the few in the United States. The distance between the two points is in a straight line about 170 miles. In the deepest part of this canyon the Salmon river joins the Snake, and, above the junction, the two rivers for forty or fifty miles flow nearly parallel, separated only by an extremely abrupt and rocky ridge. Somewhat farther south this ridge culminates in a group of sharp peaks, to which the name of Seven Devils is given. Rising on the eastern, Idaho, side of the river they attain an elevation of about 10,000 feet above sea level or 8000 feet above the bottom of the canyon only a few miles distant. They overlook the monotonous lava plateaus southward, and westward, across the canyon, the same lava flows extend to the foot of the Eagle Creek range, Oregon.

A few miles south of the Seven Devils, nearly on the brink of the canyon, are situated the copper prospects which lately have attracted so much attention. The nearest point on the railroad is Weiser, seventy-five miles distant. A good road with easy grades leads from Weiser via Salubria and Council valley to the copper camp. The elevation at the mines is about 6500 feet.

Mining Operations.—During the first excitement in the eighties many locations were made and a little town of log cabins called Helena was built near the prospects. Very little, however, was accomplished in the way of development and aside from the operations of a few persistent prospectors everything became dormant for a series of years. At the time of my visit in October, '97, work was being resumed chiefly on the principal location, the Peacock; ore was being taken out and a small smelter erected on Indian Creek about ten miles south of the mines and at a considerably lower elevation. Practically no development work had been done on any of the claims in the district; nothing but some open cuts, small tunnels and shallow shafts were seen, a somewhat remarkable fact considering the many years during which the deposits have been known. During the summer of '98 the smelter was in operation for some time, producing copper matte which was shipped to Weiser; some thousand tons of ore were mined from the open cut on the Peacock claim, but very little development work was done. On an adjoining claim, the South Peacock, it is stated that a 130-foot shaft has been sunk and 500 feet of drift run. The results of this prospecting have not been made public.

Many varied and sometimes erratic projects have been advanced for the establishing of communication with the railroad. At least twice have plans been made for building a railroad to Weiser; other schemes include an aerial tramway from the mines to the river and transportation by steamer to Huntington; one of the latest projects involves a railroad line along the river from Huntington to a point south of the mines.

Topography.—After leaving the smelter site on Indian creek the road passes up the western side of this creek, ascending the valley side until, some miles from the smelter, Lockwood Saddle is passed. For two miles the road then runs along the slope of the main canyon of Snake river, affording a magnificent view westward and southward. Then across a broad salient from White Monument hill into the upper, more gently sloping valley of Deep creek, which a short distance northward turns into a precipitous canyon joining the river a few miles farther on. In this upper part of Deep creek are situated the Peacock and other prospects while still others are located farther south, near Lockwood Saddle. Scattered fir and black pine partly cover the gentler slopes, but the abrupt canyon sides are rocky and bare.

Geology.—The principal rocks of the Seven Devils are green porphyries of various kinds, most of them old, partly altered andesites and rhyolites, accompanied by frequent agglomerates and tuffs. In this series are embedded larger and smaller masses of sedimentary rocks, consisting of highly compressed black slates, tuffaceous slates and limestone; in the latter crinoid stems were found and its age is probably Carboniferous. The whole series is exceedingly similar to that from certain parts of the Sierra Nevada. The effusive porphyries are largely, at least, contemporaneous with the sedimentary rocks. Between Peacock and Lockwood Saddle is an irregular area of diorite, enclosed in the porphyries and probably intrusive in the same. Extending from a point south of Lockwood Saddle to White Monument, about a mile south of the Peacock claim, is a narrow band of highly crystalline limestone or rather marble; this is enclosed in diorite.

The Mineral Deposits.—The principal interest centers in the Peacock claim, which has been developed more than any of the others and which shows a large ore body. This claim is situated near the head of Deep creek and is one of the most northerly claims in the mining district. It was the first one located, having been found by miners who were making their way up the creek prospecting for gold. A little placer work has been done just below the claim, the the gold evidently resulting from the decomposition of the copper ores. The deposit is well exposed in an open cut and shows an ore body about 35 feet wide. On its eastern and western side this ore body is adjoined by a coarse diorite. The ore consists of bornite or Peacock ore, part of which is altered into malachite. The gangue consists of epidote, garnet, and a little quartz and calcite; there are also streaks of specularite running through the mass in various directions. About 200 feet south of the open cut the ore body is cut off by a mass of green porphyry, which only contains some slight copper stain. North of the cut no copper ore has thus far been discovered. No fissures or fault planes appear to separate the deposit from the surrounding rock, though the line of demarcation is quite sharp; nor are there any evidences of fissures in the ore body itself. There is no doubt that a large body of copper ore is here exposed. As to its percentage of copper I have no exact data, it may possibly be in the neighborhood of 10%. A short distance southwest of this claim is the South Peacock on which some work has been done this year. In '97 a small shaft was noted, sunk in coarse diorite, and on the dump some bornite and malachite as well as epidote and garnet were found. The ore here shows more quartz than in the claim first described.

About two miles south of the Peacock a long series of claims begins, on all of which more or less copper ore has been found. In no case, however, are the developments extensive. The most northerly of these claims is the White Monument, located several hundred feet above the road near a prominent mass of crystalline limestone imbedded in the diorite. This limestone, a few hundred feet wide, is bordered by a streak of garnets on each side along which chimneys of rich ore have been found. About a mile south of the White Monument follow the Lockwood, Alaska, Queen, Blue Jacket, Helena, and other claims, all of which appear to follow a narrow streak of highly crystalline limestone which, again, is imbedded in the diorite. The Alaska is located about a quarter of a mile east of Lockwood Saddle referred to above. The deposit lies on the contact between crystalline limestone or marble and diorite, and its character is that of irregular bunches of bornite, malachite and chrysocolla, with a gangue consisting of garnet, epidote, specularite, quartz and calcite. The general character of the other claims in the vicinity is similar to that of the Alaska.

Type of Deposits.—The copper deposits of the Seven Devils as described above are typical contact deposits formed by the chemical action of the diorite on the limestone when the former was intruded in a molten state into the sedimentary series. Especially intense, naturally, was the metamorphic action on smaller masses of limestone torn loose from the main mass by the intrusion. The garnet, epidote, specularite, etc., which form the typical gangue of the deposits, are the characteristic products of contact metamorphism of limestone. The copper sulphides certainly appear to be formed at the same time as the garnet and the epidote, and their origin must be sought in the superheated waters which accompanied the intrusion and found their way from the cooling magma which evidently was in a state of aqueoigneous fusion. The origin of the copper ore is, therefore of a pneumatolytic character.

The only difference between the Peacock deposit and those farther south is that in the latter the limestone mass is larger and only metamorphosed along the edges while the Peacock represents a small detached fragment of limestone wholly altered into contact minerals.

Similar Deposits Elsewhere.—It is well known that many iron and copper deposits occur, similarly to this, on the contact of granitic rocks and limestone. Some noted deposits of this kind occur in the Old World, but there are no lack of them either in our western country along the Cordilleran mountains, where intrusive granitic rocks are so abundant. I have noted similar copper deposits in California in several places, though, as a rule, they are not economically of great importance. All are characterized by a gangue of garnet and epidote, and the ores are apparently always bornite and chalcopyrite. None of them seem to be connected with fissures or fault planes. One of these deposits is found near the road from Coloma to Pilot Hill, El Dorado county, another in the canyon of the Middle Fork of Cosumnes river, three miles northeast of Fairplay, also in El Dorado county. Still another is found in Hope valley, Alpine county, and is known as the Barnes mine. According to reports there are many other deposits which may be referred to this class, thus, for instance, the copper prospects in Lost river valley, Idaho, near Heuston. Further, some deposits on Boundary creek in British Columbia, and others on Texada Island, in the same province. From notes in the reports of the Provincial Mineralogist of '96 and '97 there cannot be much doubt of the character of the last mentioned deposits. Mr. Ordonez mentions the occurrence of similar deposits from several places in Mexico, where intrusive diorites come into contact with Cretaceous limestones. Here, as in many other cases, these contact deposits carry some gold. None of the large copper deposits of the world appear to belong to this type.

Question of Permanence.—Ore bodies of this kind are pretty certain to be of very irregular outlines. However, if the contact continues in depth there is no reason why good sized ore shoots should not be found along it; in other words the conditions for the formation of these ore deposits were surely as favorable in greater depths as at the present surface. It must be remembered that the surface at the time of the intrusion of the diorite was far above the present one. Actual exploration only can decide the question of the permanence and size of the ore bodies in the Seven Devils district.

Cyaniding Base Ores.

Written for the MINING AND SCIENTIFIC PRESS by MATT W. ALDERSON.

The ideal liquid process for gold and silver ores containing antimony, arsenic, etc., in combination with sulphur has not been discovered; or, if it has, has not so established itself thus far as to make its importance felt. The nearest approach to it, in my opinion, is chlorination; but, unfortunately, that does not make a saving of the silver values that may be in the ore, and it is more expensive than cyanidation. The ideal treatment for ores of this class is an acid treatment, and I believe that to the fact that the solvent in chlorination is acid is due in a great measure the superior record in the past of chlorination over cyanidation in treating certain classes of material. I believe that the acid assists in freeing the gold from the metallic combination in which it is held, and is to be credited with what is usually claimed to result from the penetrative power of the chlorine gas. But this is simply an opinion. We are face to face with the fact that we need a process for certain classes of base ores, and as cyanide is the only solvent by which we can hope to make a saving of both gold and silver in an ore, we must depend on that.

There are two kinds of pyritic ores from which one may secure a fair extraction without first roasting. The first is the typical pyritic ore where the sulphide occurs in cubical form and the gold is in a free state in the honeycombs of the cubes. The second is a sulphide presenting very much the appearance of a granulated substance like sugar, so held together as to give the impression that a few blows would separate a chunk into its individual particles. An extraction of 70% to 80% can be secured from these ores, treated raw, providing oxidization of the sulphides is not fairly under way. If it is, the consumption of cyanide will be so great as to preclude good work without roasting.

Arsenical ores are successfully cyanided at the Golden Gate mill at Mercur, Utah, after receiving a preliminary roast, the credited extraction being 75% to 80%.

The base ores of Cripple Creek are handled without difficulty after being roasted. The tellurium is soon driven off in roasting, and all roasting tests are made on the quantity of sulphur. The proportion of sulphur is not great—about 2%—and over 90% of this is eliminated. On ores of $20 valuation an extraction of 90% is secured, a still higher per cent on richer ores and lower on those of lesser value.

Authorities on cyanide work tell us that a good extraction can be secured from antimonial ores by fine grinding and long contact, but that the usual practice is to subject the ore to a preliminary roast. I confess to having made several hundred laboratory tests on this class of material before I satisfied myself that in neither way could one do as good work as he would wish to do in running a plant. I have taken tailings from a mill where about 50% of the values in the ore had been extracted by amalgamation and concentration, and by pulverizing to 120-mesh and leaching for several weeks I have succeeded in making an extraction as high as 80%. Taking the same material with the idea that all coarse gold and all antimonides of appreciable size were removed from it, and subjecting it to a thorough roast and then leaching it, I have failed to do even so well. I have roasted and reroasted, thinking that part of the work had been imperfectly done, but results were uniformly unsatisfactory. Finally, after repeated failures on a sample which I was determined to master, I concluded to pan the ore after roasting. I knew the gold in the ore, which had been removed by amalgamation, was coarse, even in some instances being what would be called nuggets. I sought to ascertain if the gold after roasting had such a body to it as to prevent its being dissolved by cyanide in reasonable time. Chemically combined in the first place with the antimony and sulphur, the roasting should leave it free to be saved in one way or another. In my first pan colors were found which would not pass the mesh of the screen through which the ore had passed prior to its being roasted.

The problem was solved. After the coarse gold

had been removed no difficulty was experienced in securing a good proportion of the remaining values. But how did the coarse gold get there? It was certainly not in the material originally. How came it to be in the roasted product?

In the process of assaying we add litharge to the charge, and the resulting button is lead and gold, chemically combined. If we were to pulverize the lead to pass a 60-mesh screen—that is, if it could be done—we would know that the gold would be in a very finely divided state. If we were to mix this pulverized material with quartz and roast it, the lead would be driven off and the gold would be left in a free state. But would each individual particle remain separate, or would not the reasonable probability be that several of the particles would come together? It is understood, of course, that pyrites would not become fluid at so low a temperature as lead. But have we not considered the finely divided and separate sulphides and other ides as distinct particles whose natural tendency would be to remain such, especially with silicious material intervening, even though subjected to the intense heat of a "dead roast?" Some of the particles would no doubt be side by side in roasting, and as the base substances were driven off, what would be more natural than that they should practically fuse together? There is no doubt that they do.

In a previous article I have spoken of coarse gold being recovered by concentration from Cripple Creek ores after leaching, when there is an absence of such in the original ore. If we take a piece of an unoxidized telluride ore, rich in gold, bring it to a red heat and then plunge it into water, we will find on its removal that the surface is covered with particles of gold. This gold will generally appear in two forms on each sample. One form will be globular and the other like a splash, as if a drop had fallen on the surface and had spread out in all directions. Prof. Arthur Lakes, in an article on "Tellurium and Telluride Ores of Cripple Creek, Colorado, as Illustrated by Specimens in the State Mining Bureau, Denver," says (*Mines and Minerals*, July, '98): "From the Victor mine is a fine specimen of roasted telluride rock. The gold covers the rock in rough, hollow bubbles about the size of a large pin head. Sometimes these bubbles have burst and look under the magnifier like the open craters on the surface of the moon. By the side of this roasted specimen is a cut and polished sample of the original ore. It is a breccia consisting of a darkish ground mass, in which are imbedded gray fragments of rock, traversed by dark veins, showing streaks of telluride."

From the evidence thus far it would seem that the natural tendency of gold sulphides when subjected to the heat of a roasting furnace is for the gold to assume the globular form, somewhat similar to its action in the process of cupelling. With the more volatile base substances this will be more perfect. The fact that with telluride ores these globes are hollow explains why such success has followed the leaching of this class of base gold ores. When the particles had more body to them the cyanide or chlorine has been unable to dissolve them, and this explains why they can be recovered from the tailings as concentrates in the form of coarse gold. Everyone knows the difficulty of roasting sulphides without their matting together. If they matte and all the sulphur is not driven off, a concentrate is the result. If all the sulphur is eliminated, coarse gold must remain. If it were possible to so roast sulphides as to separate each molecule of sulphur from the molecule of gold incorporated with it, then in finely crushed material no difficulty would be experienced in dissolving the gold, but in actual practice this is an impossibility.

It follows, then, that in treating antimonial, arsenical, telluride and most sulphide ores amalgamation and concentration must follow roasting, either before or after leaching, as may be most convenient. The preferable way would seem to be before, as with the coarser particles recovered it will be easier to determine when the leaching has been properly done and the extraction made complete.

Mining as a Legitimate Business.

That mining can be carried on as legitimately as merchandizing or manufacturing needs no argument. At the same time there is likely to be no field of operation so productive of worthless and fraudulent ventures as that of mining. There is no section of the country where some people are not holding worthless mining stocks bought under this or that scheme under promise of making a bonanza investment. And not one in a thousand of these schemes ever get beyond the beautiful pictures which are painted to those who buy the stock. Yet, this fact does not impair the possibilites of legitimate mining, distinguished from mining stocks when carried on under proper safeguards and on lines of actual and systematic development.

Mines are made by putting labor and means into the property itself and not into the stock and pockets of the promoters. Few mining properties, indeed, which show any possibilities of becoming mines with development, and which in fact justify exploitation disappoint the miner upon his outlay. There is to-day a greater demand for good, developed mines than heretofore in the history of the mining States, and larger developing projects are constantly being undertaken. Brought down to a true economic working basis mining (not speculating in mines) offers greater returns upon the capital invested, and is upon the whole no more hazardous than any ordinary mercantile venture.

To develop any kind of a mine capital is necessary. There are those who have the means to individually accomplish this; but such instances are few. It more often requires the united capital of several to accomplish anything in this line. How to associate a number of people in an enterprise to raise the necessary amount required for a developed proposition, has been the stumbling block in the way of many ventures. Stock propositions have been resorted to, and are the means by which it is usually accomplished. They are safe and convenient means to the end, if lawfully and judiciously employed. The provisions of statutes, however, are in most cases evaded, rather than followed, and the stockholder left without protection from liability on his stock or recourse from his losses.

Again the stock is too often manipulated in the interest of the few to the prejudice of the many. The property of the company if of any value, oftimes run into debt, is sold out and bought up in the interest of the few. But these methods are perhaps less to be condemned than the more vicious practice of floating large stock schemes upon worthless property, merely to market the stock for what it will bring, or speculate in it on the boards. The capital is fixed at a figure to give ample paper for the transactions, and while it represents in the eye of the law the amount which is actually paid into the corporation in money, property or services, at a fair and reasonable valuation, it is found in the hands of the promoters, fully paid up (?) and non-assessable, and offered, in most cases, at a fraction of a cent of its par value. While such propositions in most cases bear the stamp of fraud upon their face, too many have been unwittingly entrapped into dealings with them, hoping for large gains on so small an outlay, or to gain something for nothing, failing in which they condemn all mining ventures.

Notwithstanding all this, there have been many great mines, gold and silver, which have produced many millions of dollars in wealth to the owners, many which are to-day swelling the world's stock of the precious metals, and many more discovered each year and made to produce great wealth. All had first to be developed; for mines are made, not found. They are the result of expensive exploitation and economic engineering, not the result of stock speculations.

Disbelief in the "Ancient River" Theory.

TO THE EDITOR:—Many miners, scientists and other people have been interested in the study of how the great gold-bearing gravel leads or channels were formed. Several theories have been advanced to account for their occurrence, the generally accepted one being that of some prehistoric river flowing from somewhere in the north and dumping in the ocean somewhere near Monterey bay. A few have the idea that the present river systems are responsible for the vast deposits of auriferous gravel found in the Sierra Nevada range, but that in consequence of the elevation of the land and the depositing of lava from now extinct volcanic vents, the course of the rivers have been changed. But no theory advanced explains the presence of marine shells found in many of the gravel channels and in the gravel found under the "hardpan" of the northern part of the Sacramento valley, and in that section of the State the gold-bearing gravel may be traced from the channels in the hills to where it disappears beneath the "hardpan," which in large part constitutes the floor of the valley. My observations as a miner and prospector lead me to reject the ancient river theory as untenable, because of the presence of innumerable beds of marine shells in the sand lying over the gravel in a large part of the gravel section. Where those shells are lacking the character of the gravel appears to be the same, a difference in color, but otherwise it everywhere appears to have been derived from the same rocks and earths, with the exception of the material overlying the gravel to the south and east of a line drawn from the headwaters of Feather river, near the State line, following down the river to Oroville, in Butte county, thence skirting the edge of the foothills of the Sierra Nevada range south to a point in the San Joaquin valley opposite the northern end of the Mount Diablo range of hills, crossing the valley and following the western flank of that range south to a point opposite the southern shore of Monterey bay. We will find that the gravel is overlain with what the miners call pipeclay, and this deposit contains no fossils, except petrified wood and a few leaves from the same kind of timber and brush as may be found growing on the surface of the so-called lava that covers the pipeclay. North and west of the line drawn the gravel is to a large extent covered with red sand, hardened at places so that it is of the nature of stone; above this is the lava that covers most of the mining region. And this part of the country appears to have been formed at a much later date than that to the south of it. South of the line but few fossils other than petrified wood have ever been found, a few impressions of ammonites and belemnites in some of the slates making up the list. This part of the country rose from the waters so long ago that the fossil remains that were probably once there have almost entirely disappeared, much of the pipeclay over the gravel containing sufficient alkali to destroy any shell remains.* Petrified wood does not prove the existence of an ancient river system, as such wood has been found on the crests of some of the highest lava and granite ridges of the Sierra Nevada range, as well as in the Great Salt Lake and Colorado river basins. North and west of the line referred to the country is rich in remains of marine shells and plants, with portions of the skeletons of some prehistoric animals or reptiles. The shells and plants are of the same character, whether they are found on the remains of former sea beaches near the mouth of Russian river and other points on the present coast line, now far above sea level, or in the Contra Costa hills, the low buttes near the shores of Suisun and San Pablo bays, or the eastern flank of the Coast Range, under the hardpan of the upper Sacramento valley or the western flank of the Sierra Nevada range from Oroville to some distance above Redding. All these things go to prove that there was no such thing as a prehistoric Amazonic river system, having its rise far to the north and emptying into the sea near Monterey bay. The traces of former sea beaches found on the coast are duplicated on the foothills of the Coast and Sierra Nevada ranges, not only in appearance and number, but in their elevation above the level of the sea, where the hills border on the sides of the upper Sacramento valley, from Oroville for many miles northward, wherever the flow of the lava was strong enough to reach the shores of the then inland sea, now the Sacramento valley. It is argued by scientists that the Pacific coast line is slowly rising at the present time; the story told by the former sea beaches is that there were periods of sudden upheavals of large extent of territory for many feet at a time, and in so short a space that the waves of the sea did not have time to form even the semblance of a beach between the times when the cataclysms began and quiet was again restored.

It is recognized that quartz veins received their contents from the interior of the earth, and I advance the theory that the veins were forced into place while the land in which they lie was still beneath the sea, and during the different periods of convulsion the apex of the veins were broken and crushed, and the sea, driven into swift-flowing currents, formed the sand and gravel and deposited it in the lower parts of the sea bottom, the lava being deposited at a later date before and after the gravel deposits rose from the water.

This theory will account for the presence of sea shells above the gravel in the hardened sands, for the petrified wood in both the sand and gravel, and for the difference in the color of the gravel deposits. The older quartz veins were of a blue color; from those the gravel of the blue lead was derived, and also the pipeclay, or, rather, the quartz portion of the pipeclays of the older portion of the State. Afterward the red veins made their appearance; from the debris of these the red gravel was deposited over the blue lead and such low parts of the sea bottom as were not occupied by the blue deposit. The theory will also account for the difference in the degree of oxidization that has taken place in the metal-bearing veins north and south of Feather river; the country south of the river rose from the sea ages before that north of the stream, and its veins are oxidized to a much greater depth. It will account for the somewhat odd position of the outlet of the two great river systems of the State. The more natural outlet would appear farther south; but during the periods of sudden upheaval, after the tops of the Coast Range had risen far enough to enclose the water in what is now the Sacramento and San Joaquin valleys, each subsequent and sudden elevation of the bed of the enclosed sea caused a resistless rush of the water from north and south to the lowest part of the coast line, and, following the course of one of the greatest fissures—that were there owing to its being then, as now, near one of the centers of seismic disturbance—swept the debris to the depths beyond, and thus formed the Golden Gate. A careful study of existing conditions in the country south of the Columbia river and west of the Rocky mountains, down to the Mexican line, will lead the student to the belief that, some thousands of centuries before the Spanish novelist's ideas acquired form, and are said to have given our State its name, the "Isles of California," were not a myth.

E. H. MOORE.

Nevada City, Cal., Jan. 21st, '99.

*Much of the pipeclay in Yuba, Nevada and Placer counties is yet so strongly impregnated with alkali, as is also the lava deposit above the pipeclay, that any shells or remains of marine growths would soon yield to its destructive action.

It is estimated that from 1801 to 1888 the world has produced 12,700,000,000 tons of mineral, of which 10,601,000,000 tons were of coal, 1,275,000,000 of iron, 612,000,000 of gold quartz, 49,000,000 of silver ore, 80,000,000 of copper and 80,000,000 of lead ore.

Mining Summary.

ALASKA.

The Sumdum Chief and the Bald Eagle mining companies at Sumdum bay have been consolidated into the Sumdum M. Co., paid up capital $200,000. N. S. Trowbridge continues as Mgr. It is the intention to push the main tunnel through the Bald Eagle ground and on to the Sumdum Chief mine, until the ore bodies of the Chief are fully developed, thus giving to the new company ore backs of 800 feet below the bottom of the Sumdum Chief shaft, or 1100 feet from the croppings at the surface.

ARIZONA.

Near Big Bug the Oriental M. Co., represented by W. A. Kent, owns fifteen different mines and a mill. They are running a tunnel which, when completed, will be 5700 feet in length. The Lottie has developed a body of ore that warrants this. By compressed air the tunnel has been driven 1000 feet.——At the Red Jacket, a new mine opened by S. J. Fleming, a steam hoist is in operation. The shaft is down 100 feet and the ore taken from the drifts is being milled at the Annie.——The Redrock is one of Big Bug's well developed properties. The shaft is down 314 feet and drifting has been done 2200 feet. The mine is owned by Spruance, Stanley & Co. of San Francisco. The mine produces gold, silver and copper. The gold will average $25, while the copper and silver will pay for the shipping and smelting.——In the Annie mine the shaft is down 381 feet and ore is taken from three levels. The company contemplates putting in a concentrating plant. They have 1000 tons of concentrates on the dump.——The Sterling mine is owned by Taft & Dunn of Binghamton, N. Y. The shaft is down 80 feet. Ore is being taken from the 60-foot level, 115 feet north and 248 feet south. A carload of ore was shipped last week and three more carloads are on the dump waiting improved condition of the roads. The company intends putting in a hoist to sink a 500-foot shaft. The ore taken out will average $30 to the ton and the pay streak averages 12 inches.——A mining sale was consummated in Tucson between F. A. Huntington of San Francisco and Richardson, Morgan & Wise, owners. The property is known as the Virgin Copper mine, in the Patagonia mountains near Crittenden. The price was $40,000.

Cook Bros. are pushing work on their gold mine at Virginia Camp. They have a 15-inch streak in the vein that averages $100 in gold, besides a large amount of good milling ore.

Near Mayer, the recent strike at the Senator, from a mill run last week of forty-one tons, yilded $30,000 in bullion. One ton of picked ore resulted in a cleanup of $8000.

J. Cope last week sold two mining claims at Tonto Basin for $35,000 cash. These mines run free gold and concentrate ore.

Phœnix *Republican*: Near Cherry creek station, the North American Expl. Co., through its representative, G. W. Middleton of Denver, has eight mines called the Dewey group, all named after eight of the principal cities of the U. S. Work is confined at present to the Denver and Chicago claims. On the Denver two shifts are working. Since Dec. 1 a shaft has been sunk on this mine 75 feet. A gasoline hoist will be put in service shortly. The Boston & Arizona Copper Co. has six claims adjoining the Denver group and has sunk a shaft 160 feet deep on one of the mines. The company has fifty tons of shipping ore already on the dump.——At Huron, a new mining town, the Swindler mine employs twenty men. The Wingfields have six valuable claims near by and are doing development work on all of them. They have an assay on ore taken from the Last Chance mine in this group that shows $80 gold, $20 in silver and 14½% copper. They will soon begin shipping ore.——G. Rhopeter, on the Lone Pine mine, has done 400 feet of sinking and tunneling on the property. He has a 2-foot vein of ore that goes $100 to the ton.——The North American Expl. Co. is interested in the Montezuma group of seven claims near the Swindler. A shaft is being sunk. Copper develops in paying quantities.——A. Knackenberger, on the Mountain Chief mine, is taking out ore that shows $20 in gold, $4 in silver and $50 in copper. It is plain that the new railroad has added a considerable impetus to mining in this section, which abounds in gold and copper from low grade, but merchantable ore, to that of high assay. Mines are now worked in this and adjacent territory that could not be touched before, because of cost of transportation of ore.——At McCabe, known as Chaparral before the postoffice was given the name of McCabe, on the McCabe mine, owned by Wells, Parsons & McCrum, one of Yavapai's greatest producers, the mill is running night and day, employing fifty-five men.——The Jessie mine, which in the past has produced over $600,000, is idle, but it is locally believed the mill will be running full capacity before the summer is ended.——In the Gopher mine, near McCabe, being operated as the Gopher G. M. Co., Seattle people are interested with M. Hanna. The shaft is down 220 feet and a gasoline hoist is in use. Three hundred feet to the south another shaft has been sunk 100 feet and the two shafts are connected by a drift. Ore is being taken out of both shafts, furnishing employment for fifteen men. The shipping ore runs $70 to the ton. The low grade, averaging $20, is held for the new 5-stamp mill that will be erected at once.

CALIFORNIA.

Amador.

Sutter Creek *Record*: The Sternemans have started work on the China Hill mine near Pine Grove.——At the Lincoln mine, Sutter Creek, they are cleaning out the sump at the 800 level and Feb. 1st will begin sinking the shaft 400 feet deeper.——The Amelia mine has encountered the ledge at the 800-foot level.——The Blue Lakes people have 125 men on the ditch work.——The Ballot mill started up last Sunday and is running on half time.——The old Camp Contreas mine, now known as the Watkins in Pioneer district, twenty-five years ago produced a large sum of money and was abandoned. A year ago Watkins relocated the claim and after sinking struck into a body of ore and shipped ore that yielded $15,000. Last week Watkins sold the mine to San Francisco people for $45,000.

Jackson *Ledger*: About fifteen men are employed at the Ivanhoe mine at Plymouth. The mill is running with good prospects for its continuing.——Milling the dump at the Empire mine at Plymouth is in progress and is yielding satisfactorily. Two more Huntington mills will be put in.——M. Byson recently secured an option on the Bay State mine and commenced to reopen the property. About twenty men are employed. The mill is in operation.——The Centennial mine near Drytown was examined last week by A. M. Womble of San Francisco, F. H. Brown of Melrose, Mass., and E. I. Drisko of Boston, with a view to purchase.——About twenty men are employed at the Douglas mine at Pine Grove. Crosscutting and running three levels is being pushed.——The 10-stamp mill on the Allison mine at Plymouth, the property of Stockton people, will be ready to crush ore in about three weeks.

Jackson *Dispatch*: The new shaft at the Kennedy mine at Jackson is down 50 feet. Sinking is done by three shifts of three men each. The air compressors will be in position in two weeks, when it is intended to use steam drills in sinking.——Supt. Haley has opened up a large body of ore in the Paragon group of mines, and the mill is to be put in operation in a few days.——The Porteous Bros.' claim near Jackson is yielding fair returns.——At the Anita mine they have stopped sinking and are driving from the 750-foot level.——Driving the tunnel to crosscut the ledge at the Butte Mountain mine is progressing, they have passed through the rim of hard rock encountered some time ago.

Jackson *Republican*: Crosscutting is being done at the Oneida mine at Jackson.——At the Argonaut everything is running in good order.——At the Ivanhoe sinking is in progress. Twenty stamps are in motion.——At the Keystone mine, Boulder City, fifteen stamps are working. A gasoline engine is being put in at the mill.

Butte.

The *Register* reports that at Cherokee men are at work on a tunnel to test the ground for gold where there is a dispute as to the ownership of the land. A part of the Cherokee mine was taken up under a location and the company had no patent for it. W. P. Lynch took up the claim under a homestead right and declares it is not mineral land.

Calaveras.

At Murphys, work is being pushed at the May Day mine.——The Utica Co. has a force widening the Utica ditch, to convey water to the San Domingo M. Co., at Dogtown, which is ready to start up.——The Big Horn mine will start work soon.

San Andreas *Prospect*: At the Thorpe mine, at Fourth Crossing, the company is beginning extensive operation in the development of the mine and the reduction of ores. The 30-stamp mill was started up last week and works successfully. There are twelve concentrators. The old shaft has been enlarged and retimbered. The old dump, which has a large quantity of good ore taken out of the mine under the former management, will be milled. The mill, concentrators and rock breaker are operated by electric power. Hoisting is done by steam, but will eventually be supplanted by electricity or by compressed air. All the works are lighted by electricity. Sixty men are employed.

San Andreas *Citizen*: Near Angels Camp, work has begun at the Last Chance mine once more. C. D. Lane held a bond on this property two years ago, sunk an 80-foot shaft, run a crosscut and quit work.——The Bald Hill mine is being unwatered, preparatory to inspection for purchase.——The Carson Creek M. Co. have been clearing out their ditch and the property will be started up shortly. There is a 40-stamp mill on the property that will be put in running order.——Preparation is being made to start up the old Angels mine, known as the Coleman property.——The Santa Ana mine, at Carson, is running full capacity.——The Vallecito M. Co. have given up their old shaft and started a new one.

Kern.

Randsburg *Miner*: R. F. Harrison is putting up a 10-stamp mill on his mine in Pleasant canyon near Ballarat.——The machinery of the California Borax Works started up this week. They will make the first shipment of their product Feb. 15th. They will ship about 100 tons refined borax per month.——The Hard Cash mill near Randsburg is working. The Hard Cash is a heavy body of low-grade ore. The mill is capable of grinding and concentrating a ton an hour. The first concentration puts about 22 into 1, then a second time through reduces this about 15 to 1, making a total concentration of over 300 to 1. Arrangements are being made to amalgamate the concentrates. Another mill is on the way.——At Johannesburg C. A. Burcham has purchased the Golden Rule mine and will soon begin operations on the property.——Koehn & Wilson are sinking again on the Ruby mine.——E. Bryden is taking out ore from his Rustler mine.——In Tuber canyon in the Panamint country the Montgomerys have milled the ore from two shafts, one 400 feet deep, and it averaged $26 per ton.——The Yellow Aster mill at Randsburg began crushing ore this week.

Mariposa.

(Special Correspondence). — It is reported that the Merced Co. will shortly enlarge their mill by adding twenty stamps to the forty now in operation.

The Supreme Court has set aside the conviction secured in the local court last spring in State vs. Opie, the somewhat celebrated Merced ore-stealing cases. The two Opies were accused of stealing a large amount of specimen ore from the Mary Harrison mine and after two trials one was convicted of petit larceny. As the case has already cost Mariposa county nearly $4000, it is thought the matter will never come to trial again.

Mariposa, Jan. 25th, '99.

Nevada.

(Special Correspondence). — The old time activity in this county in the milling industry of ores which for a time lay dormant during the dry season of last autumn has revived and all the wheels are again turning.

Precautions are being taken by the several water companies against the recurrence of any failure of water supply, by building storage dams and reservoirs. Together with this electric power is becoming a dominant feature in many of the mines, and Nevada under any circumstances will be well provided against the repetition of last season's stoppage of work in mines and mills.

Prospecting and development work have been greatly stimulated and it is safe to say that the opening of properties destined from present appearances to become producers is a certainty.

The placing of machinery is likely to assume greater proportions this year on new properties in this county than has been the case in an equal period at any time.

The Washington and Maybert sections and Grizzly Ridge country have especially done much new work. The same may be said of Graniteville, Rough and Ready, as well as the neighborhood of Grass Valley and Nevada City.

Grass Valley, Jan. 23rd, '99.

Nevada City *Transcript*: Gray & Bullard, on their hydraulic mine at Gravel Hill on Little Deer creek, are running full capacity. Major Heuer of the U. S. Debris Commission last week inspected the arrangements for impounding the tailings and pronounced the restraining dam one of the most efficient structures of the kind built under the terms of the Caminetti law. It is 50 feet high, nearly 200 feet long, and made of log crib-work filled with stones. The whole is anchored to the bedrock. The water has a fall of 150 feet. One monitor is employed.

Grass Valley *Union*: The new 10-stamp mill at the Texas mine, near Nevada City, was tested last week and made a successful trial run. Changing the machinery so that the water power can be used will be completed in three weeks and the shaft will be provided with a cage.——Phelan Bros. of Shady Creek have bonded their mine to W. E. Monroe and others of Nevada City.

Nevada City *Transcript*: Nihell Bros. had a crushing made from the Union mine at Banner Mountain and the cleanup was satisfactory.——The Reddick drift mine, near Nevada City, started up again this week. Supt. Skewes has a force at work in all departments, and forty men find employment. The shut-down was occasioned by a failure of the water supply and later by the blocking of the ditch by snow.

Grass Valley *Union*: At the Brunswick mine near Grass Valley a new 15 and 11-inch pipe line 1400 feet long will be laid to bring water from the Maryland line.

Placer.

The Blue lead at Dutch Flat has been found again after being lost trace of for many years. A tunnel 780 feet in length was driven under the lava capping when the lead was encountered. The cement gravel is of good grade.

A large force is employed at the drift mine at Gold Run cleaning out the old tunnel. A pipe line will be laid when the mine is reopened.

Riverside.

The Gold Canyon M. Co. is erecting a 10-stamp mill near Salton.

San Diego.

The Ready Relief M. & M. Co. at Banner have started their mill.

The High Peak and Roosevelt mines and a one-third interest in the Rossland mine in the Julian district have been sold to L. M. Smith by W. W. Boswell for $6000.

In the Cargo Muchacho district E. Valdez made a strike near the Cargo Muchacho mine of a ledge 2 feet in width, and the ore runs $27.70 in gold per ton.——The Philippines is the name of another strike in the same neighborhood of a ledge 4 feet in width. The ore has an average value of $12 per ton.——H. W. Blaisdell has taken down the mill and other machinery with which he has been reducing the ores of his low-grade mines at Venus, in Picacho district. It is locally said that he is about to become interested in the King of Arizona mine and that the Venus machinery will be moved to that camp and a pipe line from the Colorado river will supply water. The closing down of the Venus property was a surprise.

Shasta.

Redding *Democrat*: All the furnaces at the Keswick smelters are running night and day, producing three carloads of copper matte daily.——For a year D. McCarthy has been stoping out low-grade ore and selling it to the smelter for flux. Recently a pay streak several inches wide was found, the ore from which assays an average of over $200 a ton.

Ellery & O'Shay have secrved a lease upon the Milkmaid mine in the French Gulch district and will commence working the property Feb. 1st.——The Hart mine at Hart is in possession of the Bank of Tehama county at Red Bluff, which has started to unwater the mine. When the mine was worked a shaft was sunk from the lower tunnel to the depth of 200 feet. The tunnel strikes the ledge at a depth of 900 feet.

Sierra.

E. K. Downer, long and honorably connected with Sierra, Cal., journalism, is in San Francisco. From Mr. Downer it is learned that rich quartz has recently been struck in the Kenton quartz mine near Alleghany. From adjacent property, the Oriental, water has been drained 160 feet to the fifth level, 75 feet above bottom of shaft, by a pump with capacity of 500 gallons a minute.

Pay gravel is being taken out of the Worth Fork drift mine near Forest City.

The Oriental mine near Alleghany has been unwatered to within 70 feet of the bottom of the shaft, 600 feet having been cleared of water since last fall. Supt. Hill will put in another pump and start a drift from the 600-foot level.

Siskiyou.

Yreka *News*: At the King Solomon mine on Salmon river they are milling with good results.——Good milling ore is being taken out at the Black Bear mine where they are sinking.——Peterson Bros. at the Eddy's gulch claim in the Salmon country are piping with a good head of water.——Travers & Johnson are working a claim on Six Mile creek that was abandoned by Chinamen, and are getting good returns.——The Madame Clark hydraulic mine near Scott Bar has started up and is running full time.——A San Francisco company is examining the Black Jack quartz mine near Hornbrook, with a view to purchasing and developing the property.——Pane & Steele, the lessees of the McCarthy hydraulic mine, have begun operations.——Sulphurets from the tailings of the Black Bear and Yellow Jacket mines were treated at the Selby Smelting Works recently and yielded $100 per ton.——The Never Sweat mine on Mill creek is showing good prospects.——The Aromas Co. are pushing work and will soon begin piping and elevating.——The new mill at the Sheba mine on Patterson creek is ready to start up. The ledge is 22 feet wide, yielding $50 per ton. The property comprises about 200 acres.

Yreka *Journal*: The tunnel at the Golden Star mine on Humbug, formerly the old Spencer mine, is in over 600 feet.——In the Callahans, Scott River district, five quartz claims were opened last year on which work will be continued in spring.——The Montezuma river claim at Callahans is worked with a full force and a good supply of water.——The quartz mill of the Yreka M. Co. at Salmon river has been started up and men employed to get out ore.

Trinity.

Mrs. U. Blakemore of Lewiston, has men doing development work on the Daisy quartz mine. While driving a crosscut a good ledge of sulphuret ore over 3 feet in thickness was encountered.

Weaverville *Journal*: At Minersville, O'Keefe & Gallagher have a 5-foot vein of gold-bearing quartz. They have sunk on it 90 feet. The ore will go $20 ton. They have built an arrastra with a 30-foot overshot wheel and will commence crushing ore as soon as the weather permits.——Ryan & Co. have a quartz property equipped with an arrastra with an 18 foot overshot wheel. The company is running steadily and crushing a ton a day. The rock will average about $40 a ton.——The Enterprise Co., at East Fork, are running the mill on good ore. They are also doing development work.——The Yellowstone mine is running a tunnel to cut the ledge.——Meckel & Co. began work on their placer mine last week. They have put in a pipe line 1600 feet long and are well equipped for the season's run.——Zuella & Clark are running their placer on East Fork, and J. Watrous is also working his placer mine.

Tuolumne.

Jamestown *Magnet*: The forty stamps in the Shawmut mill, near Stent, are working by water power.——The Santa Ysabel is dropping twenty stamps on ore from the central ore chute, which is showing well on the plates. No. 1 shaft is 560 feet deep and still sinking. No. 3 hoist was started last week, and as soon as the mine is drained stoping will begin on the Knox & Boyle chute.——The Densmore mill, near Columbia, started running last week.——McCormick & Co. have acquired possession of the Vine Springs mine, which was a producer some years ago, and begun reopening the property.——San Francisco capitalists are reported negotiating for the Alabama mine, near Columbia. The vein on this property is over 6 feet wide and carries high-grade sulphurets.——At the works of the Columbia Exploration & Tunnel Co., on Gold Hill, boring progresses with encouraging results.

Sonora *Independent*: At the Lost Fox group of mines, near Sonora, as soon as the machinery arrives, the sinking of the shaft to the 1000 foot mark will begin. The tunnel will also be continued. The mine has a large water supply. Supt. Kerrigan will have a large force at work soon.——The Standard G. M. Co. have sunk their shaft 170 feet in the old Excelsior mine. Their hoist is operated by steam power. Compressors will be put up as soon as water can be brought to the mine and compressed air will be used.——Grant & Thomasson struck a pocket in their mine at Brown's Flat last week and took out $1480.——The Elsbree & O'Hara pocket mine on Brown's Flat is yielding good returns.——Copp & Jardeen of Jackass Hill shipped $2300 recently and last week they took out seventy-five pounds of gold.——At the Street mine, at Tuttletown, a new hoist is being put in to be run by steam. The mine is bonded to F. L. Wooster, who with a company is developing the property. Eight men are at work cleaning out the upper part of the shaft. When the hoist is completed, sinking will be commenced on the shaft, which is down 110 feet.

Sonora *Democrat*: The Excelsior shaft, near Sonora, has reached a depth of 170 feet, and will be continued until it is 330 feet deeper.——The Dead Horse mine has thirty-five men employed. This will be doubled and the mill started up shortly.

COLORADO.

BOULDER COUNTY.

R. G. Johns and associates in the Bryan group, near Ward, at 180 feet struck a cross

vein 3 feet wide that runs $10 in gold. At 120 feet they broke into a body of mineralized matter 10 feet wide.——Near Boulder the Denver group of mines is sacking fine ore for shipment.——The Silver Point of Caribou is making regular shipments of high-grade ore. ——The Larson Bros. have their arrangements completed for hoisting 3000 tons of ore below the Adit dump level, near Narel, and are taking out seventy-five tons days.——The Village Belle mine of Eldora is shipping high-grade ore. The New York company recently paid its second installment of $7000 on the property.

The Puzzler mine in Ward district has been sold for $40,000 to Massachusetts capitalists. The vein has received 2000 feet of development work, the ore running from $20 to $30 per ton.——Work has resumed on the Honest John mine at Ward; day and night shifts sinking the shaft and development work is pushed. The shaft is 180 feet deep.

CLEAR CREEK COUNTY.

Leasers are doing well in the Lee mine at Dumont, owned by R. M. Curtiss of New York. In the 100-foot level there is ore the entire length, 250 feet, from which they are are taking smelting ore which runs $70 a ton. ——J. A. Wheeler, at Upper Clear Creek, shipped a car of $65 ore.——The Gold Anchor has another shipment of ore ready that will run over $100 per ton.—— A mill run of twenty-four and one-half tons of ore from Maxwell and Hood strike on the Griffith mine, near Georgetown, returned 47.75 per cent lead, 34.75 ounces silver and 0.11 ounces gold per ton. The ore netted $88.11 per ton.

EAGLE COUNTY.

Ten cars of ore were shipped last week from Battle Mountain district.

EL PASO COUNTY.

Universal attention has been attracted during the week to the Isabella mine by reason of the extraordinary reports therefrom. Last Monday Manager Kilburn asserted that a streak of metallic gold 80% fine and 20 feet sylvanite ore body was discovered at a depth of 850 feet, assaying from $10,000 to $50,000 per ton, and that between the seventh and ninth levels was blocked out $5,000,000 worth of ore. The effect of such wired statement on the stock in the mining exchanges was to send it up from 90 to $1.75. In the closing months of '98 it had sold down to 22. The Isabella had paid monthly dividends of $30,000, but two years ago they ceased and the stock sagged. During the week the price went back to $1.29 and advanced to $1.65. The company is capitalized at $2,250,000; at the highest figure reached the mine property would have a value of nearly $4,000,000. The statements regarding the richness and extent of the strike have not been entirely corroborated.

Victor *Record*: The Creston Leasing Co. last week shipped from the Jack Pot mine at Victor 125 tons of ore that will average better than three ounces to the ton. This week's shipments averaged seventy-five tons per day.——From the Guess mine a carload of ore screenings returned $50 per ton and the sacked rock, of which there was about 3000 pounds, yielded thirteen ounces per ton.—— Carr Bros., lessees on the Wedge, at a depth of 280 feet have an ore body of 2 feet that assays eight ounces to the ton.——Two cars of ore were shipped from the Associated G. M. Co.'s lease on the Lovett shaft that will average two ounces to the ton.——Tillery & Co., leasing on the Fannie B., from an eight-ton shipment last week received $80 a ton. This was supposed to be a worked out mine.—— ——Last week a large body of 40-ounce ore was opened in the lower level of the Rouse lease on the Republic. The vein matter is 4 feet in thickness.——Twenty-five tons of ore recently shipped from the Zenobia yielded $35 per ton.——Steady shipments are made from the Pinson lease on the Eclipse tunnel. Last week a 40-ton shipment brought $40 a ton.—— Returns on a shipment of twenty-two tons of ore from the Carpenter lease on the Findley were $32 60 a ton.——Miller & Gray are making shipments of ten tons daily.——Returns from a 25-ton shipment from the Spratt lease the Granite give $70 a ton.

LAKE COUNTY.

The Leadville Pumping Association is raising 4000 gallons of water per minute.

One of Leadville's three railroads, the Denver & Rio Grande, is daily billing from that station from 750 to 1000 tons of ore to the various valley smelters.

The January tonnage from the Fanny Rawlings mine netted from $50 to $1000 per ton. A large output is maintained. Two-thirds of the employes are engaged in development work and the mine is showing large ore reserves. In the lower level last week some rich ore was encountered which is being sacked. It samples thirty ounces gold, 100 ounces silver and 7% copper. Much of the ore will control six ounces in gold, fifty ounces in silver and 7% copper.

SAN JUAN COUNTY.

Silverton *Standard*: The resurrection of the Sampson mine, near Silverton, is under way. The company owning the property will add fifteen or twenty more stamps to the ten that are now crushing ore. C. H. Nazro is Supt. The old 10-stamp mill was remodeled. The ore from two big veins of the Sampson group has been proven to contain from $7 to $12 in value, gold predominating, the ore being reduced from five to one in concentrates. The shaft has reached a depth of 102 feet. The company is incorporated, at the head of which W. Lennox is president.

SAN MIGUEL COUNTY.

At the Liberty Bell mine near Telluride ten stamps are running on low-grade concentrates from the dump, pending the completion of a 90-foot upraise for ventilation. The ten stamps are reducing forty tons per day, running as high as forty-five tons in twenty-four hours. An additional ten stamps will soon be ready to begin operations, and last week the framework was raised for housing another twenty stamps, giving the mill a capacity of 150 tons, with forty stamps.——The Meldrum tunnel is in nearly 1800 feet. Better progress has been made the past month than any month since the big bore was started, due to the improved nature of the ground for drilling and breaking. A number of veins have been cut and locally it is understood that some of the lodes are of a promising nature. The breast is approaching a territory known to be intersected by numerous mineral-bearing veins.——The Euclid Avenue G. M. & M. Co. recently put its new 10-stamp mill and wire rope tramway near Telluride in operation. The mill is treating from eighteen to twenty-five tons of gold quartz every twenty-four hours, while the tram has a capacity of transporting several times that amount of mineral in ten hours. The tramway is 2700 feet long, comprising but a single span. The Euclid Avenue Co. is a subsidiary company of the Colorado Expl. Co. The lead carries from 2 to 6 feet of mineral matter, most all of which is milling material.

Telluride *Journal*: The annual report of the Tomboy G. M. Co. at Telluride shows the total production of the financial year to have been $338,655, the yield of 24,620 tons of ore obtained at a total operating expense of $277,-710. The last six months produced 21,833 tons, yielding $314,930, at a cost of $179,237, including development work and improvements aggregating $47,262. The lower level, where a year ago no pay ore had been opened, shows much improvement, the ground between the lower and the upper tunnel yielding a good supply of profitable ore.

SUMMIT COUNTY.

From the Victoria mine at Frisco last week six cars were shipped to the smelter. Eleven men are employed. The composition of this ore is 72% silica excess, 1.7 ounces gold and about three-quarters of an ounce silver.

IDAHO.

(Special Correspondence).—The mines at Wallace, Wardner and Mullan are mining approximately 100,000 tons of ore per month, which is concentrated to about 18,000 tons before shipping to the smelters. The mines which produce this are the Bunker Hill & Sullivan and Last Chance at Wardner; the Tiger & Poorman, Helena & Frisco, Standard, Mammoth, Black Bear and Hecla near Wallace, and the Morning at Mullan. It is estimated that the output of these properties for 1899 will be an increase of 20% over that of 1898.

The Mammoth, Hecla and Black Bear are new properties, but their output is becoming large. The Black Bear is under bond to Larson & Greenough of the Morning and Joe MacDonald of the Helena & Frisco. They have made their second payment on the bond.

The Old Abe at Wardner is being developed by means of a 1500-foot crosscut tunnel. Good bodies of silver-lead ores have been encountered, as well as rich streaks of copper glance. Its ores are a good deal in the form of chalcopyrites. This property belongs to John Finch and St. Clair Bros. of Wardner, who will put in a compressor plant early the coming spring.

The Bunker Hill & Sullivan tunnel, connecting the mine with the mill, is being driven at the rate of 325 feet per month. It has been driven about 4000 feet, with 6000 feet more to go before completion. The 9-inch main from the compressor to the mine is two miles long and goes over a great mountain. This main will be laid in the tunnel when the latter is completed.

The value of the output of the Cœur d'Alenes is estimated at $45,000 per day.

Branscombe & Sonnemann of Spokane have just added twenty men to their force on the Cumberland mine at Silver City.

C. P. Richardson of Newsome, Idaho county, has been operating two giants on his Moose creek placers the past year. His ground is on an ancient channel, 800 feet above the bed of the present south fork of Clearwater river. He says he has two miles of ditch, 800 feet for dump, 135 feet depth of gravel and a channel 800 feet wide. WASCOTT.

Wallace, Idaho, Jan. 23rd, '99.

S. Silverman has fifteen men at work on the Big Buffalo claim, which he recently bonded. They are running an open crosscut from wall to wall to test the ledge.

A Spokane dispatch says the Buffalo group of claims in the Buffalo Hump camp has been sold to F. L. Clark and C. Sweeny of that city for $650,000, a very large price for an undeveloped property.

Near Hailey after lying idle for three years shipping ore has been found in the Red Cloud mine, formerly one of the bonanza mines of this section by leasers.

The Josephine Placer Co. will work the placer land near Boise this spring. They have 500 acres of land. The prospecting work done on the property has demonstrated that the ground is all good, while quantities of it carry high values. There are other properties in the river with some bodies of ground that are known to carry from $10 to $15 a yard.

The Weiser *Record* says arrangements were concluded in Salt Lake City on the 23d ult. that put DeLamar in control of the principal properties in the Buffalo Hump district.—— J. Warton, who has charge of the South Peacock mine in the Seven Devils for a Boston company, has bonded the Great Vale copper claim near Cuprum for $10,000.——At De Lamar next summer there will be three plants working on tailings.——The Checkmate mine at Willow Springs shipped last week its initial lot of ore from the new body that was recently encountered in the new shaft. The assays from the consignment show 3.8 ounces in gold, 12.6 ounces silver and 5.5% lead per ton, with a valuation of about $35 per ton.——Near Soda Springs there is a large deposit of sulphur, which a company has been developing for several months and shipped several carloads East for trial. A plant for refining will be put in during the spring. There will be a steam plant and melting furnaces to treat the ore by the steam process. Some sulphur shipped East went 98% and the whole bed so far opened, showing many thousands of tons, runs from 20% up to 90% sulphur.

MONTANA.

Near Revenue, the Monitor Co. shipped last week twenty tons of high-grade ore.——The Revenue mill is reducing forty tons of ore per day, and, when the new tanks are placed in position, will have a capacity of seventy tons per day.——The Galena shipped two carloads of ore recently which is said to have paid well. ——The leasers of the Pony mine, near Sterling, shipped a carload of high-grade ore.—— H. Muntzer of Butte has bonded the Emperor mine and put men to sinking a shaft.

Greenwell & Vaughn encountered an ancient bed of Libby creek and found gravel which is rich in coarse placer gold. They calculate $100,000 can be taken out next season. The tunnel has opened 70 feet of this gravel.

Butte *Miner*: The Silver King mine, in Butte, a silver property owned by Murray & King, but being worked under a lease by the Waller estate and M. H. Sanders, recently sunk an air shaft near the main shaft and connection made at a depth of 350 feet. Very little water is handled, and the lease is an ideal poor man's proposition. Ore is being hoisted from a 20-foot ledge of high-grade silver rock. About fifty tons are hauled to the smelters daily from the claim and the leasers are reaping a rich reward. Current report has it that $36,000 worth of rock was handled in December.

Butte *Inter-Mountain*: The Cable gold mine near Georgetown, which produced millions during the palmy days of Montana, is likely to be started up again after an idleness of ten years. The principal owner is J. C. Savery. The mill at the mine is composed of thirty stamps and is in good repair. There is a mountain of ore in the Cable mine, something like a ledge 175 feet wide. The Cable was one of the first and greatest gold quartz producing mines in Montana. Georgetown has one cyanide plant, which operated last year with success.

NEVADA.

In the case of Blair against Hanchett in the matter of the Silver Peak mines, Blair secured a judgment against Hanchett for $19,-200. Part of this is for royalty due on ore extracted by Hanchett and part is for alleged damages to the mine during Hanchett's lease. It is claimed that the mines are no longer in the market and that about April 1st M. Blair will go to Silver Peak and begin work on the mines.

At Goiconda the railroad is bringing ores from the mines at the rate of ninety tons a day. The mill has started up and it was expected the furnaces would be sufficiently heated to begin the reduction of ore this week. The mill is lighted by electricity.

At Virginia the Comstock Pumping Association the past week finished the tank on the 1750 station. Retimbering the station was not finished as the foundation for the Risdon pump plant had to be built just below this station. Everything about the shaft and machinery is in good order.

The North Mountain Co. at Egan will start up again March 1st.

Last week a force was put to work in the Star mine putting in the air compressor to work the power drills. When completed a big force will be put to work in the mines.

The Glasgow & Western Co.'s mines will restart getting out ore early in February to be ready for the mill being built.

At the American Victor mine the shaft is 60 feet deep and the ledge is increasing in size.

Austin *Reveille*: J. F. Mitchell made the second payment on the New Pass mill and mining properties, near Austin, last week, and took charge of the same. The mine has several large bodies of ore uncovered, exposing enough to keep a 20-stamp mill in operation. The company contemplates erecting a quartz mill of fifteen or twenty stamps, and during the intervening time the present mill of about eight tons capacity every twenty-four hours will be kept running.

Pioche *Record*: A. Bybee of Chicago has purchased the Great Eastern and Vesuvius mining claims in Bristol mining district for $10,000. It is the intention to develop these properties and work is now going on.

NEW MEXICO.

In the Memphis claim in Bitter Creek, Red River district, a mill run across a 4-foot vein yielded $188 per ton.

At Mogollon the Confidence mine is working seventy men. The ore bodies in the mine are of large extent and good average grade. The main adit level has attained a length of 1700 feet. The electric hoist will soon be in place.——At Central the Texas shaft has attained a depth of 500 feet and is producing first-class shipping ore and a large body of concentrating ore. The mill is turning out a good grade of concentrates.——At the Chloride mines, near Silver City, fifteen men are taking out iron and lead ores which contain a fair value in silver.——The Rescue mine is being worked under lease and is getting out good ore.

Hillsboro *Advocate*: Four Mexican dry washers of the Hillsboro placers sold $435 worth of gold dust and nuggets last week, the result of five weeks' work.——A pocket containing $380 in gold was found last week in the Richmond mine, near Hillsboro, by Leasers Wayland and Zimmerman.——Robins & Crews bought $478 worth of gold dust and nuggets last week from Mexican dry washers. Keller & Co. bought $675 worth, one nugget therein being valued at $92.——Four sacks of ore from the Opportunity mine last week yielded $165. ——J. Smith shipped forty-three tons of ore from his Commonwealth mine.——A piece of ore weighing fifty pounds and containing $115 was taken from the Trippe mine last week.——Hopewell & Tomlinson made an ore shipment of twenty-seven tons from the Seventy-Nine mine.——E. Teaford shipped thirty tons of first-class ore from the Nancy Lee mine to the Charter Oak mill.——L. E. Nowers bought $178 worth of gold dust from A. Farrington, a Hillsboro placer worker.

Silver City *Enterprise*: The Silver City Reduction Works is running at its full capacity, the two smelter stacks running 135 tons of ore daily. It is locally stated that the capacity of the works will soon be largely increased and that a lead-smelting stack will also be added to the works.——W. H. Newcomb is shipping twenty tons of iron per day from his mines. ——Crawford & Derbyshire have contracted with the manager of the Hearst interests in the copper mines of Silver City, to concentrate the ore in the large dumps of the various properties which the estate controls. The capacity of the plant will be seventy-five tons of ore per day.——Ashton & Co. struck ore on the Montoya mine which yields 60 to 80% copper.

OREGON.

The Shorty-Hope M. Co. at Ashland are running their 10-stamp quartz mill day and night.

Barron & White of Spokane have let a contract to drive a 300-foot crosscut tunnel near Ashland at a depth of 200 feet below the surface. They expect to have the work finished in 100 days and began operations this week. This property is a dyke formation and one class of ore worked $45 per ton and another $15 per ton gold in milling tests. The ore was taken out at a depth of 80 feet.

Grant's Pass *Journal*: G. W. Woodcock of Woodville brought $175 in gold dust to Grant's Pass last week.——The Pickett Creek M. Co, have six men at work on their hydraulic piping plenty of water.——At Camp Jupiter a company is developing the F. Houston property. ——From the Hayes, Jewell & Moore placer on Oscar creek the result of only three days' piping one nugget worth $242 and some smaller ones, making in all over $500, were brought to Grant's Pass recently.—— The Jump-off-Joe M. Co. is running two giants night and day. An electric light has been installed.

Sumpter *News*: The Cornucopia mines near Sumpter are shipping monthly fifty tons of concentrates. These are half the amount shipped during the summer months.——The E. & E. mine shipped three carloads of ore to the Baker City sampling works.

Baker City *Republican*: The Bonanza mine near Baker City last week produced $35,000—the result of a seventeen-day cleanup—in four bricks weighing 2072½ ounces. ——Near Susanville the Badger M. Co., which has a bond on the Badger group of mines, has been pushing operations ever since the completion of its new quartz mill last fall. The best ore is shipped to the Baker City Sampling Works, while the second grade is being worked in its new mill. The ore contains a good per cent of free gold and the concentrates are shipped to the smelter.——Aimes & Simmons, who recently purchased a quartz property from W. C. Gibbs, have had day and night forces at work during the winter. They sunk a shaft 100 feet and will continue to 200 feet depth. Their ledge is of good width and grade.

SOUTH DAKOTA.

Last week from the Harrison mine near Lead forty tons of wolframite, valued at $200 per ton, was shipped to the Phœnixville Metallurgical Steel & Iron Works.

The Esmeralda mine, near Central City, is shipping ore to Deadwood that yields $50 per ton.

UTAH.

The Red Wing mine of Bingham shipped 200 tons of ore last week.——The Centennial-Eureka mine at Eureka recently shipped three cars of ore.

In Tintic district, in the Little Chief mine, a vein of quartz heavily impregnated with copper was encountered in the 150-foot shaft, assays thirty ounces in silver, $4.50 gold and 12% copper. The company will at once install a steam hoist and deepen the shaft.——In the 300-foot level in the Star Consolidated mine at Tintic a strike has just been made, samples from which indicate a heavy percentage in copper, with the usual amount of gold in that locality.

The Lower Mammoth at Tintic has encountered the main ore chute on the 400-foot level and hoisting of ore has begun. Assays from it show 12% copper, sixty-two ounces silver, from 12% to 60% lead and $1.80 in gold; 4 feet of ore is exposed.

At Bingham ore from the Julia Dean mine showed 123 ounces gold, 13% lead and 23 ounces silver per ton. From lower down in the stope the ore gave an average of 110 ounces silver, 60% lead and $3 gold.——The Martha Washington mine, at Tintic, has resumed work again. The company will introduce a pump and continue sinking to a depth of 600 feet, the ground to be prospected off intermediate levels and the work to be put forward with three eight-hour shifts. In the workings off the 350-foot level there is a showing of milling ore and a large body also at 420 feet. ——In the Triumph M. Co., embracing eight claims, at Silver City, the production of ore will be resumed soon. At 100 feet they encountered ore that yielded from 60 to 315 ounces silver, with 7% copper and 5% lead. The vein is 30 feet wide.

At Mercur, La Cigale mill is in successful operation. The roasters are not being used at present, as there is plenty of ore that will leach without being roasted, though the black ore will have to be calcined. The self-dumping tanks work well; they can be dumped and filled in twenty minutes. Twenty-eight zinc boxes are used and nearly 200 pounds of auro-cyanides are on hand. No cleanup and shipment has been made. The incline is down 850 feet. Twenty-five men are employed and 100 tons per day are being leached.

The Queen of Sheba of Deep Creek last week shipped gold bullion amounting to $1300. ——The International mine at West Tintic, while cutting out a station 200 feet from the

mouth of the tunnel, exposed 12 feet of milling ore. The ore shows $15 in lead, silver and gold. A mill has been decided on by the company.

R. C. Chambers tells a representative of the MINING AND SCIENTIFIC PRESS that the Ontario at Park City will start up next spring if silver's present price is maintained.

At Eureka the Tesora M. Co. has let a contract for a 200-foot shaft and ordered a steam hoist with a 1000-foot lifting capacity.——Supt. Earls is running a drift from the bottom of the 1800 foot shaft in the Mammoth mine to tap the ore body that gave good values on the level above. About 200 tons of first-class ore are being marketed.

The Red Wing of Bingham last week made a shipment of forty-five tons of concentrates. The previous consignment netted the company over $25 per ton. A shipment of high-grade crude ore was shipped this week.

The *Miner* reports consignments from Tintic last week to be seventy-three cars of ore. In addition to this, the Mammoth mill sent out three cars of concentrates and two bars of bullion.

Mercur *Mercury*: The No You Don't mine of Stockton, in a shaft 400 feet deep, last week opened a vein which shows 45% lead and 100 ounces silver. Shipments of high-grade ore will soon be resumed.——The Northern Light last week marketed two lots of ore. The first-class lot showed values of 449 ounces silver, 16% lead and $10 80 in gold and the second class contained 204 ounces silver, 7% lead and $4 in gold to the ton ——At the Hillside two drifts are being run at 465 feet depth in ore of a good milling variety.——The new ore body in the Eagle yields $5.60 and the averages are high enough to give a fair margin in treating.

Bingham *Bulletin*: The Bingham Copper & Gold Co. is preparing for extensive operations on the Commercial group. About fifteen men are employed, and the old lower workings will soon be all clear and retimbered. There are several hundred tons of ore on dump and in bins, mostly milling grade, but including a proportion of high-grade copper.——Last week the Spanish shipped eight carloads of galena.

Park *Record*: At Park City a lease and bond have been secured on the west half of the twenty patented claims comprising the West Ontario group. The ground consists of a block approximately 3000 feet square. Loofbourow & Co. secured the lease for two years for $40,000 ——The shipments of ore and concentrates from Park City the past week were 1,811,590 pounds.——Recent samples from the Superior mine showed 98 ounces silver, 64% lead and $1.03 in gold.

Salt Lake *Tribune*: The shareholders of the Daly-West M. Co. met in special session last Tuesday to ratify the terms of compromise upon which the factions have agreed. In doing so, they consent to an increase of the capital stock from 75,000 to 150,000 shares, and to an increase in the capitalization to $3,000,000, or double the present figure; 75,000 shares of the stock will be delivered to J. B. Haggin and others owning one-half interest.——The Mercur M. Co. has decided to refine its gold dust and will build a refinery.——In the Lulah Con. M. Co.'s ground at Diamond ore has been encountered that carries a good margin in copper, silver and lead, with some gold.

WASHINGTON.

The Gold Park M. Co. of Tacoma recently sold the Eagle mine near Liberty, Kittitas county, to a New York corporation for $45,000. A 10-stamp mill with a capacity of fifty tons is included in the sale. The ore is free milling running from $15 to $35 per ton.

Work will be resumed soon on the Trail & Tenderfoot. The property has had considerable work done on it. There are several hundred feet of tunnel and some surface work. There is a large body of quartz that runs from $5 to $8 per ton gold.——At Nelson, J. Fox on the Echo claim, from across a 6-foot ledge, is taking out ore that assays from $22 to $56 per ton in gold and copper, with two to five ounces in silver.

At Republic from the Mountain Lion mine 7 feet of the ore body is being taken out, and it yields $70 per ton. There is not a pound of waste. An air compressor plant will be put in.——In the El Caliph there are 2 feet of ore in the shaft which averages $31 in gold per ton. Fifty feet of stripping has been done, showing a good ledge the entire distance.——The tunnel being driven on the Morning Glory struck a ledge 5 feet in width. An average assay across the ledge gives $67.17.

The Spokane *Electrician* says that the La Fleur-Comstock group of claims near Nelson was sold to the B. A. C. Co. for $32,500.

WYOMING.

In Grand Encampment district Boyce & Prosser have struck a 2-foot vein of high-grade grey copper ore. They are going down on the lead.

The Union Pacific Railway coal mining department had an average of 2166 men employed every day of '98 in its mines in Wyoming. The operation of that one department furnishes labor and support for 15,000 persons.

FOREIGN.

BRITISH COLUMBIA.

(Special Correspondence).—The War Eagle shaft, over which is a steel gallows frame over 100 feet high, is being fitted up with an electric hoist, which is probably as powerful and capable of as rapid work as any in existence of that kind. At the same time an electrically operated air compressor is being installed, under the same roof, capable of operating forty drills. The power for hoist and compressor is transmitted from the electric plant of the West Kootenay Light and Power Co., thirty-one miles away.

The Iron Mask, owned by D. C. Corbin, Austin Corbin, E. J. Roberts, J. F. Herrick, H. M. Richards, A. T. Herrick and others of Spokane, is under the superintendence of S. W. Hall, formerly of Butte. It has an output of ore of from 250 to 400 tons per month. The ores are a copper pyrite, with sulphides of copper and calcite. The vein structure is a replacement along lines of small fissures. The values run about $30 gold, 2.2% copper, net from the smelter. The underground workings comprise about 4700 feet of tunnels, drifts, winzes and raises. The main tunnel passes from the east end line through the claim, 1353 feet in length. This tunnel is used in common by the Iron Mask and War Eagle companies. From the tunnel level winzes sink on the vein. A 12 drill compressor is being put in. It is a belted machine, run from a motor by a counter shaft.

The Le Roi group has a compound condensing compressor, 22x34x48 air and 22x40x48 steam, which is now operating thirty drills and is capable of operating forty. The main shaft is 800 feet deep and has a 20x42 direct-acting hoisting engine. From the shaft there are drifts at 100-foot stations.

The Virginia Mining Co. are developing their property north of town. A shaft sinks 500 feet to get the vein. Some ore has been encountered.

The Lode Star G. M. & D. Co. of Rossland are developing five claims on Duncan river, in the northern part of the province. In this locality the ores carry gold, silver, lead and copper. Samples from these claims are said to run 53 to 100 ounces silver, $18 gold, 40% lead and 21% copper.

Rossland, B. C., Jan. 20th, '99.

(Special Correspondence).—Greenwood camp is attracting great attention by reason of the discovery, development and product of the properties known as the Ironsides and Knob Hill, which are on the same ledge and controlled by the same parties, though forming separate corporations. This camp is near Boundary creek, about ten miles north of Midway, and is one of the main points on the new branch of the Canadian Pacific railroad, being extended from Robson to Penticton via Cascades and Grand Forks.

On the Ironsides there is a shaft 200 feet deep. At the 100-foot level a crosscut drift has been driven 108 feet, 60 feet of which is in ore, the drift being across the vein toward the hanging wall. At the 200-foot level a second crosscut was driven 282 feet, 130 feet of which was through a ledge of ore. Samples of every car of ore taken out were tested, resulting in values of from $12 to $40 per ton in gold and silver.

On the Knob Hill a crosscut tunnel, not at right angles to the wall, was driven 382 feet, the last 172 feet of which was in ore. Samples from every car of this gave about $10 gold, three ounces silver and 6% copper. In one particular section of high grade ore, 30 feet wide, which was encountered, there was an average value of $48 gold. The owners of these properties are residents of Toronto, New York, Boston, Philadelphia and Spokane. It is announced that they will put up a smelter on the ground.

The ores are a species of chalcopyrite, carrying gold and silver. It was on the report of N. E. Lindsley of Spokane that the present owners took hold of the Ironsides and Knob Hill.

Greenwood, Jan. 15th, '99.

At Ymir the new 40-stamp mill at the Ymir mine is in operation. The Ymir mill is said to be the largest one in operation in British Columbia.——The 50-ton concentrator of the Dundee mine started recently.

The Last Chance mine in the Slocan shipped 840 tons of ore since July 1st, '98. The mill is sending twenty tons per day over the tram.——A carload of ore has been shipped to the Selby smelter, San Francisco, from the Sapphire. The ore runs 160 ounces silver and 70% lead. Regular shipments will be made.——Forty thousand dollars has been spent this year by the Minnesota Silver Co. on its Slocan properties. Further expenditures are contemplated to the amount of $60,000 for tramway and concentrator.

CHINA.

A Peking dispatch says that a mining concession has been signed. It is understood that the contract secures for W. P. Morgan of Wales, in partnership with an American syndicate and the Chinese authorities, control of all the mines and oil fields in the province, the Americans providing 25% of the capital, the Chinese officials 30% and Morgan the remainder. He, it is asserted, intends to start with a capital of £1,000,000 and proposes to administrate Szechuen on the same lines as followed by Cecil Rhodes in South Africa.

MEXICO.

The La Descubedora mine near Chihuahua is shipping fifty tons of ore per day.

Near Chihuahua the El Socorro M. Co. is producing a high-grade ore—silver and gold.

The gold mine of Kraft & Anderson near Chihuahua is one of the most regular and heavy shippers in the State of Chihuahua. The ore goes to the works at the rate of 100 tons per day. It is manganese oxide and carries a very uniform value in gold.——The mines near the Laguna de Guemes are presenting good results. The Bismarck produces 125 to 150 tons of very fair grade ore a month, and the Australia is working on some rich veins.

The Bismarck mines near Guzman and the Aventurera group near Sabinal are owned by the Juarez Co. The Bismarck ores run from 12 to 15 ounces silver, 20% lead and enough iron to make them excellent for fluxing. The Aventurera ores carry twelve to fourteen ounces of silver, half an ounce of gold, 10% of lead and iron. They are shipping sixty tons from the Aventurera and fifteen tons from the Bismarck daily to Sabinal. The ores go over the Sierra Madre line to Ciudad Juarez, where the Juarez Co. has reduction works employing 300 men.

ONTARIO.

At Mine Center the last cleanup of the Golden Star mine is said to have run over $16,000. The mill is a 10-stamp of two and one-half tons capacity per day. The shaft is down over 400 feet.

THE PHILIPPINES.

The following is reproduced from a recent issue of the *American Soldier*, published at Manila. Its statements may be so, but are not considered reliable: "A party of Minnesota men have just returned from an eight-day prospecting tour into the country. Their names are Sergeants Hemphill & Corrie and Privates Manning, Bowe, Newton, Handscome, Weisse, Upson and Mitchell. Some time ago Newton learned that there was considerable gold in the interior mountain streams. He obtained a sample from a wandering mountaineer and also the information that there was plenty more to be found. Therefore, with permission of Major Diggles, Newton organized the above mentioned party and set out for a jaunt through the insurgent territory. The party went up the Pasig river to its terminus in a native casco, and continued the rest of the way on foot. They thoroughly prospected the San Juan and Monte Blanc mountains, fifty miles distant from the American lines. They found the natives inclined to be friendly but very curious. The mountain streams are very swift, the water is clear and cold; as a rule they are quite shallow, and many species of fish live in them. All of them find their way into the Pasig. In all of these streams that the party prospected save one, evidences of gold were found and one or two of the streams showed good yields. The natives have wooden long-toms and manage to wash out about a tablespoonful of gold a day, for which the insurgents pay them two Mexican dollars, when in reality that amount of gold is worth somewhere in the neighborhood of $85, American. Up the streams, farther than the insurgents allowed the boys to go, there must be some very rich drifts. The men who strike one of these will be staked for life. There was one stream discovered that promised to be a regular Eldorado. The boys followed it some time. Dust and nuggets were panned out. The signs grew richer as they advanced, but as luck would have it a party of insurgent soldiers ordered them not to ascend the river any farther, offering as a reason for the order that they feared the mountaineers would attack them and the Americans would hold the insurgent government responsible for their lives. This was not the true reason, however, as the boys learned later from a native, that farther up the river Aguinaldo had a supply house and the insurgents feared the Americans were desirous of locating it."

Personal.

P. M. MCCREE is Supt. Commercial mine, Bingham, Utah.

G. H. GILES is Supt. Copper Queen mine, Basin, Montana.

M. HANLEY has been appointed Supt. Ibex mine, Leadville, Colo.

F. B. HILL, Supt. Oriental mine, Alleghany, Cal., is in San Francisco.

F. J. MARTIN, Supt. Fortuna mine, Fortuna, Ariz., is in San Francisco.

F. C. INNES of Spokane, Wash., is building a 5-stamp mill in Butte Co., Cal.

N. M. BRADBURY succeeds O. Jones as Supt. North Fork gravel mines, Forest, Cal.

A. T. EAGAR, formerly Supt. Occidental and Utah mines, Virginia, Nev., has gone to Mexico.

D. J. MOORE, Supt. Culbertson mine, Graniteville, Cal., has returned from San Francisco.

M. W. MATHER, Supt. Plumbago mine, Alleghany, Cal., has returned from San Francisco.

S. C. WILMANS, Supt. Boulder mine, Shingle Springs, Cal., has returned to the mine from San Francisco.

DANIEL JUTTON, formerly Supt. Royal mine, has gone to Shasta county, Cal., to examine some mining property for foreign capitalists.

DR. A. SCHEIDEL, now operating in Victoria, N. S. W., has bought some mining property at Ballarat, for which a $50,000 working capital is to be provided.

SAMUEL WHARTON, who was recently in Spokane, Wash., is building a 40-stamp concentration mill on the old Dahlonega gold mine near Dahlonega, Georgia.

ROBERT G. WELLS, connected with the Nicopol-Maripol Mining & Metallurgical Co. of Maripol, Russia, has placed orders for machinery aggregating $1,000,000 for plants at Maripol.

JAMES B. SOVEREIGN has resigned as editor of the organ of the Western Federation of Miners, because the Populist State Senators combined with the Republicans in Idaho to organize the State Senate.

W. A. CLARK, a miner, elected last week to the U. S. Senate from Montana by questionable methods, will be the richest man in that body, and, in a few years time, may be the richest man in the United States, if not in the world.

JOHN S. CAREY, manager of the Mine & Smelter Supply Co. of Denver, Colo., was recently in Salt Lake City and purchased the stock and business of the Utah & Montana Machinery Co. at the latter place, and will operate the business as a branch of the Mine & Smelter Supply Co.

Recent Mining Incorporations.

Blue Gravel M. & M. Co., San Francisco; capital stock $40,000, subscribed $35,000; E. A. Moody, A. H. Bangs, G. E. Beach, J. T. Newell, M. J. Kern.

Mach Con. G. M. Co., San Francisco; capital stock $200,000, subscribed $600; J. A. Chanslor, R. Spreckels, W. Wayte, J. Cross, E. Hirschler.

Experimental M. Co., San Jose; capital stock $300,000, subscribed $200,000; W. Crites, C. E. Hailstone, F. W. Graham, W. J. Graham, W. F. Phillips.

Industrial Notes.

—The Sierra railway is to be finished to Sonora, Cal., February 20th.

—The Santa Ana & Newport, Cal., railway, twenty-two miles long, has been sold to J. R. Clark for $500,000.

—British Columbia imported over 500 more Chinamen in '98 than in '97. That is the class of labor 3000 coal miners of Washington compete with.

—The Oregon Railroad & Navigation Co.'s statement for the six months ending Dec. 31st shows: gross earnings, $3,858,467; operating expenses, $2,193,018.

—Nine horseless carriages are to be operated by the Santa Fe road between Flagstaff, Ariz., and the Grand canyon—three to cost $4000 each, six $1500 each.

Senator Perkins writes that the Government has during the past year made purchases amounting to $10,000,000 in California and other Pacific coast States.

—St. Petersburg discovers that the greater part of the trade of north Siberia is going to the United States. The whole of the Tschu Kshi peninsula is in economical dependence on Americans, who own the neighboring island of St. Lawrence in Bering sea.

—About 3000 tons of steel rails have been bought at New York for immediate shipment to the Nevada, California & Oregon railway at Reno, Nev. At present the railroad extends from Reno to Amadee, Cal., eighty miles. It is proposed to run the line to Susanville, Cal.

—The amount of insurance written on the Pacific coast in '98 was $656,057,065; the amount of premiums was $10,793,558, an increase over '97 in the former total of $160,000,000 and in the latter of $2,400,000. The coast losses amounted to $5,638,021 last year and to $4,040,541 in '97.

—It is again asserted with great positiveness that preparations are afoot for the transfer to a big continental railway company of the San Francisco & North Pacific Railroad, which runs from Ukiah southward to Point Tiburon, Cal., and thence has ferry connections across the bay to San Francisco.

—Current has been turned on from the new electric power plant of the Dexter M. Co., eighteen miles from Tuscarora, Nevada. The water of a neighboring stream is brought around the mountain in an open flume to Chicken creek, where it empties into a steel pipe 3000 feet long and is conveyed to the power house under a pressure of nearly 400 feet. It is estimated that 900 H. P. can be developed at the wheel under a full head, sufficent to run forty stamps besides the hoist, pumps, compressors and lights for the town.

—In his annual report on the commerce and industries of Mexico, United States Consul-General Barlow has this to say of the general high standing of the merchants of that country: "The business conditions of Mexico are noteworthy, and it will be of much pecuniary benefit to our merchants to study them. In the first place, there are very few concerns doing business here that have not ample credit to carry out all the contracts into which they may enter. Failures are very rare indeed, and, when they do occur, are carefully investigated by the authorities in the interests of creditors, and any attempts to defraud are severely punished. Book entries are regarded as sacred; all books kept by business houses are known and small stamp taxes paid on them, and thus a sort of surveillance is kept over them by Government authorities. All this tends to keep up a high standard of commercial credit."

—Capt. A. S. Crowninshield, writing in the January *Century* of the "Advantages of the Nicaragua Canal," says: When the divide between the Atlantic and the Pacific is cut through part of the waters of the lake, which for untold ages have flowed east to the Caribbean sea, will flow west to the Pacific. Lake Nicaragua, covering, as it does, nearly 3000 square miles, becomes not only a part of the water route itself, but a grand reservoir, located exactly where it is most needed—at the summit level. Thus it will be seen that while nature has not quite opened through Nicaragua a complete water route to the Pacific, she has come very near to it. In fact, of all the routes for an interoceanic canal that have received consideration it must be admitted that so much has already been accomplished by nature toward this end that the work which remains for man to do will be far less than by any other route.

—Manila hemp is a commercial success only when raised in the Philippines. It is one of the chief resources of the islands, and for ten years this country has taken an average of 41% of the total exports. From the bast, or fibrous outer leaf, comes the coarse, strong fiber, which is the best material used for sailcloths and cordage. It is particularly recommended by the fact that it is not easily rotted by salt water. The fiber yielded by the inner stalks is fine and weak, and from it are woven textile fabrics superior in softness and lightness to those made of the best Russian hemp. These fabrics are seldom exported, being bought by Chinese merchants at Manila for local consumption. This useful variety of the banana plant, accordingly, yields two qualities of fiber, the one strong and coarse and the other fine, soft and pliable, and both are in great demand. Manila hemp produces, under the best conditions, as high as 3000 pounds of fiber to the acre, and, though 6,528,964 bales have been exported in the last ten years, the industry is still in its infancy and is capable of enormous expansion. Its development, like all things under Spanish colonial rule, has been spasmodic and unsystematic. A recent writer on the Philippines says that, under proper encouragement, the Orient itself would absorb more than the entire present product. The world's markets will take several fold the quantities of fiber that is now supplied.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JANUARY 24, 1899.

618,317.—PIE-RACK—E. V. Anderson, Van, Or.
618,264.—BED LOUNGEBOX—W. H. Burtless, Sacramento, Cal.
618,377.—MINER'S PICK—E. Daly, Monterey, Cal.
618,266.—WORKING FROZEN EARTH—B. F. Gilman, S. F.
618,348.—LINOTYPE MACHINE—J. D. Harvey, S. F.
618,098.—WEEDER—L. P. Hopkins, Rosedale, Cal.
618,295.—PADDLE WHEEL—R. Schlegel, S. F.
618,298.—STATION INDICATOR—R. Sperber, Seattle, Wash.
618,143.—DREDGER—A. Thompson, Tacoma, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BED LOUNGE BOX ATTACHMENT.—W. H. Burtless, Sacramento, Cal. No. 618,264. Dated Jan. 24, 1899. This invention relates to improvements in bed lounges. The object is to provide a convenient containing attachment for holding bed clothing, pillows and like articles, and so connecting it that it can be withdrawn from the lounge for the purpose of removing or replacing articles, and then closed in beneath the lounge so as to form a support for one of its angles. The lounge has a full support at the head and a single leg at the rear of the opposite end. This leg serves as a swivel post for the box, which has a hole made through the bottom and fitting the leg so that the box can be turned about the post. The other angles of the box have casters so that it will turn freely. In its normal position it swings about the swivel post and stands beneath the lounge, where its contents are entirely concealed, and its front angle serves as a support for the front lower end of the lounge, which has no leg. When the box is swung out, it is entirely open and exposed, so that articles can be conveniently packed in it and removed therefrom.

LINOTYPE OR LINE CASTING MACHINE.—John D. Harvey, San Francisco, Cal. No. 618,348. Dated Jan. 24, 1899. This invention relates to improvements in linotype or line casting machines, in which lines of matrices are assembled and the metal afterwards cast to form a complete line of type. The object of the invention is to enable the compositor especially to introduce italics, or other desired characters, into the line of type, without multiplying the line of matrices now in use. To do this the matrices are formed with two lines of letters or characters upon the edges, and by the use of suitable mechanism any number of matrices may be raised to form the italic or other line, and after the casting has been done they may be again returned to their normal position so as to be in form for distribution.

PADDLE WHEEL.—R. Schiegel, San Francisco, Cal., one-half assigned to John Bauman, same place. No. 618,295. Dated Jan. 24, 1899. This invention relates to that class of wheels used in connection with the propulsion of vessels which are known as "feathering paddle wheels" in which the blades or floats are made to dip into the water and pass through the ark of rotation while they are in the water without changing their essentially vertical position so that the beating upon the water when blades of the usual construction enter, and the lifting or dragging when they leave the water, is avoided. The invention consists essentially in the novel arrangement of disks mounted upon the main and upon supplemental shafts out of line with each other, journal pins on the peripheries of the disks, and floats or blades so connected that the journal pins have to be maintained in essentially the same plane during the revolution of the wheel, said blades being also so constructed as to dip into the water without the necessity of submerging the wheel rims so as to create frictional resistance to the revolution.

APPARATUS FOR WORKING FROZEN EARTH.—B. F. Gilman, San Francisco, Cal. No. 618,266. Dated Jan. 24, 1899. This invention relates to an apparatus which is especially useful in regions where the winter temperature is so severe that the ground becomes frozen to a very great depth, and does not thaw out during the short summer months sufficiently to allow it to be worked. This invention is designed to soften this frozen earth so that it can be excavated. It consists essentially of a furnace with heating passages or chambers, a means for forcing air through the furnace so that it may be heated to a high temperature, means for directing the heated air upon enclosed surfaces of the frozen ground so that the latter may be thawed and softened sufficiently to be afterwards excavated. The heated air delivered from the furnace is conveyed to a flexible or jointed pipe to a nozzle through which it may be discharged against the surface of the ground, or within the shaft to be worked, and in order to contain the utmost value for the heat it is preferable to enclose the ground which is being worked to prevent the escape. This may be by means of a surrounding structure, or in case of a shaft or tunnel, of sufficient depth by closing the mouth thereof.

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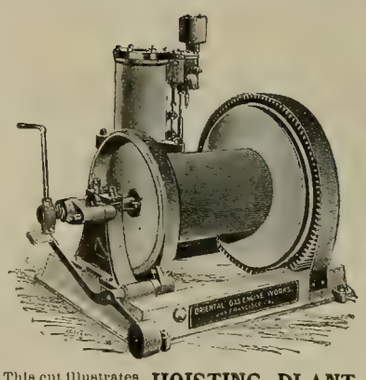

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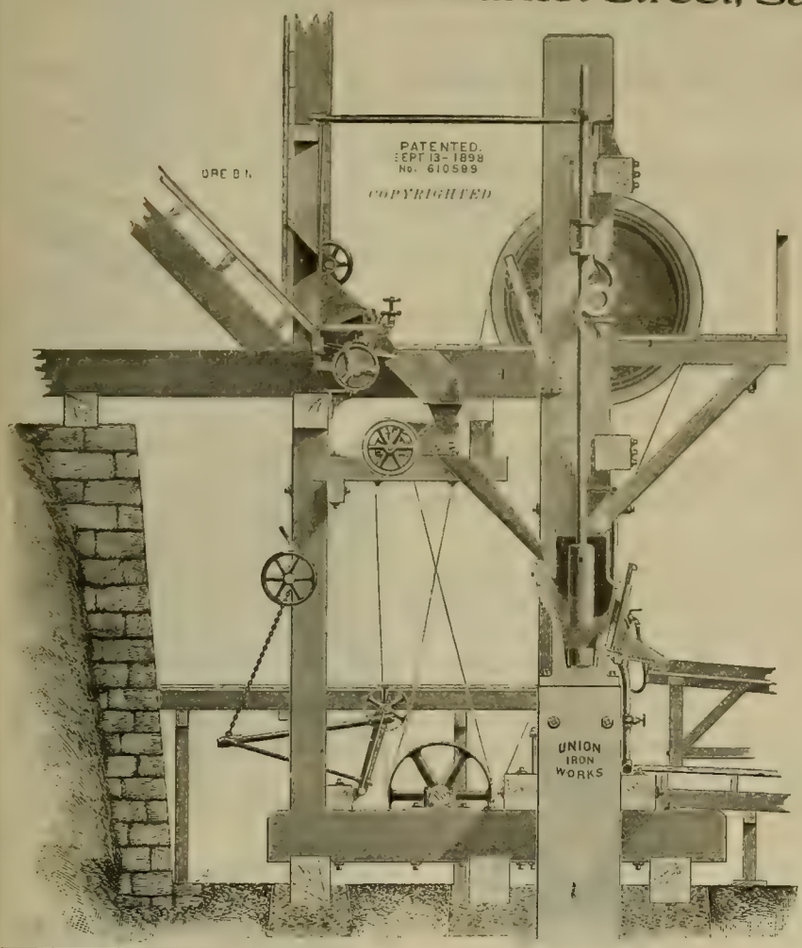

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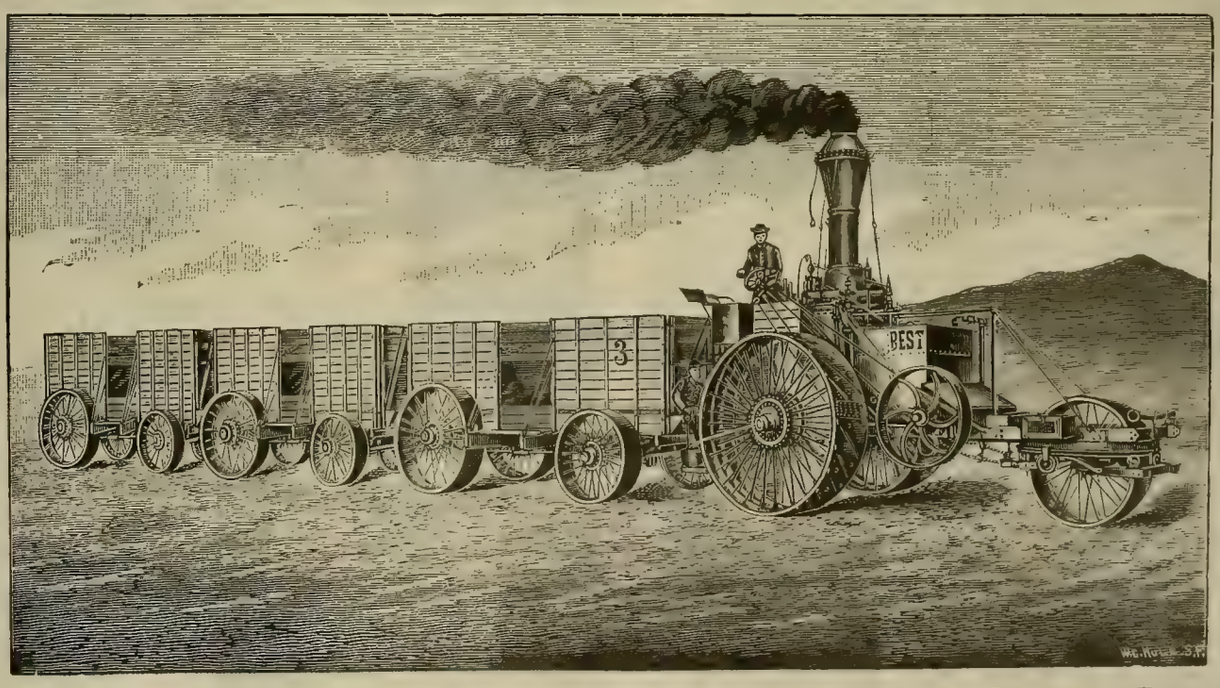

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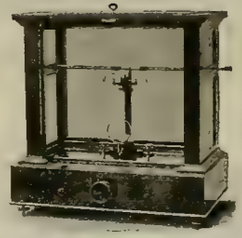

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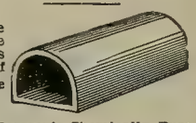

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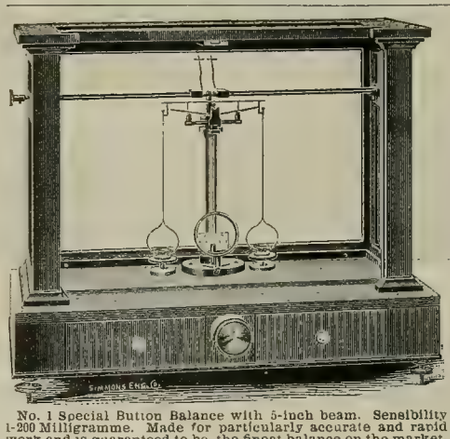

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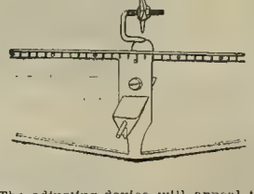

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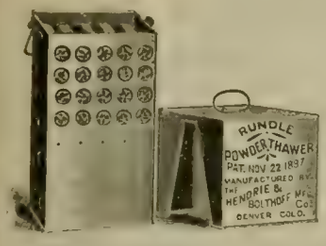

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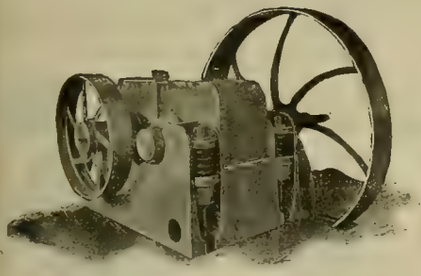

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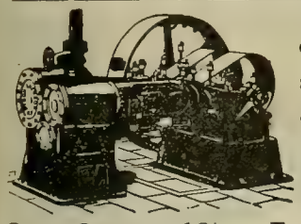

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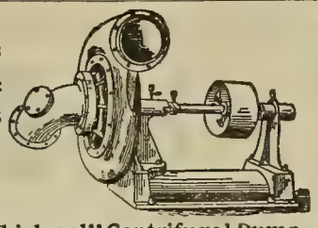

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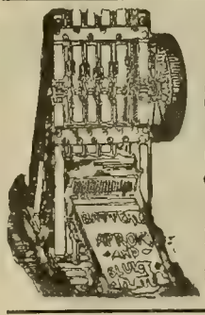

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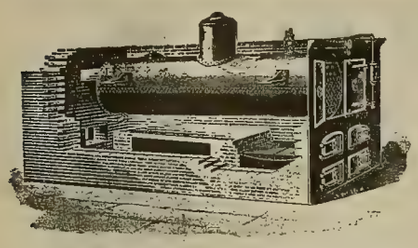

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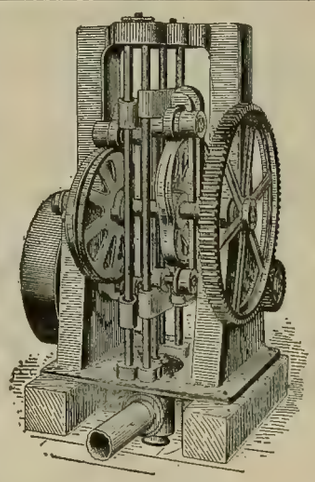
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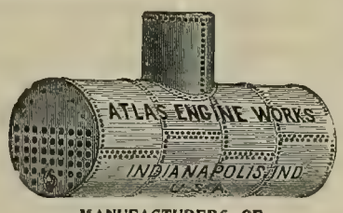

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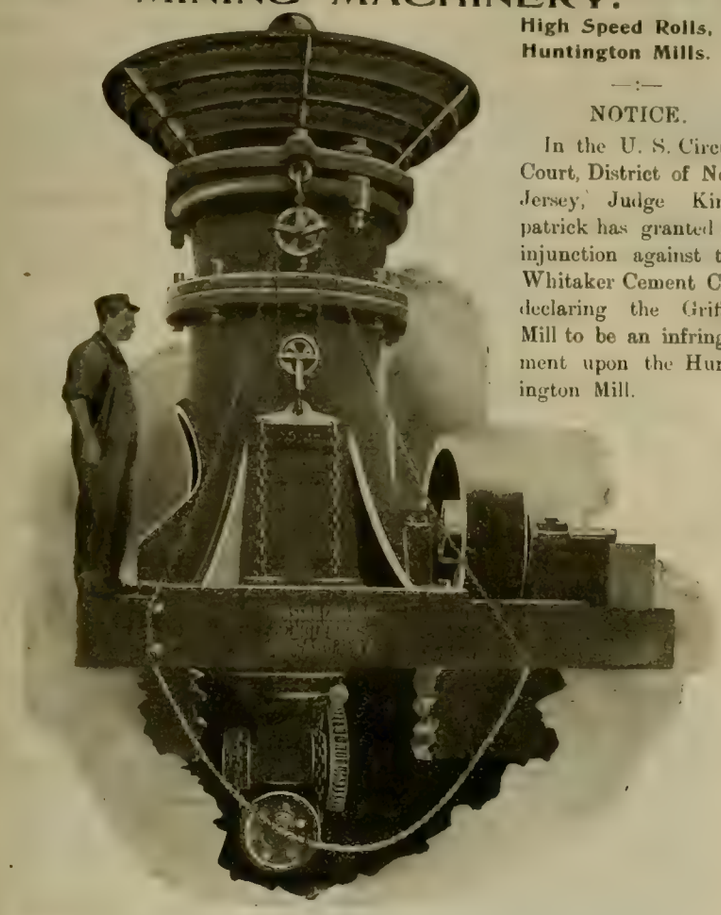

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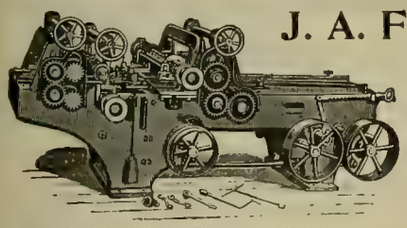

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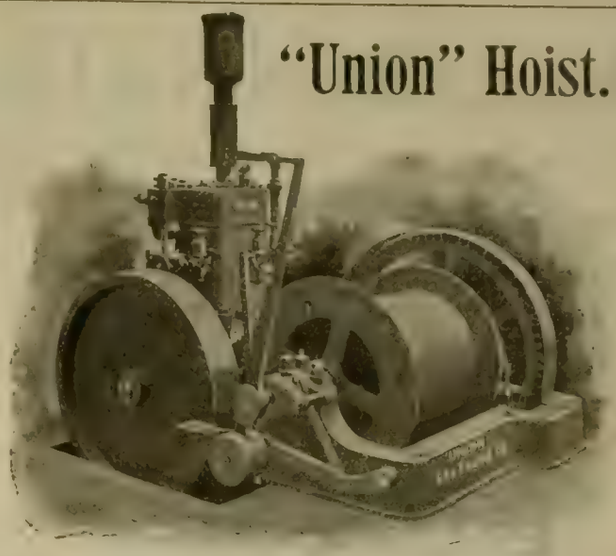

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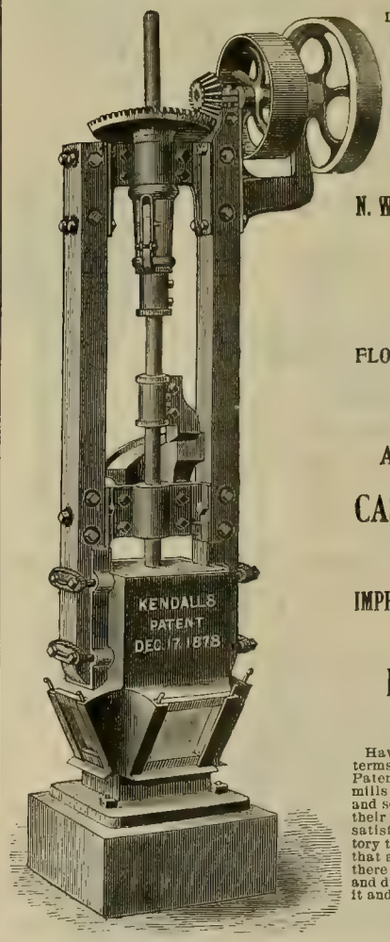

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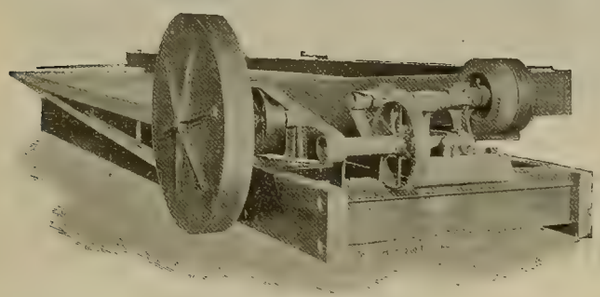

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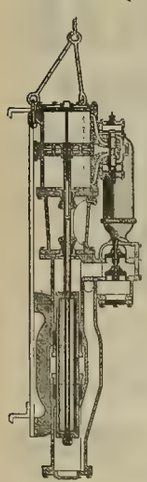

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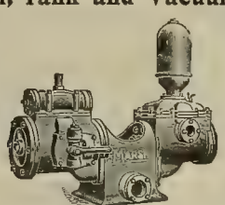

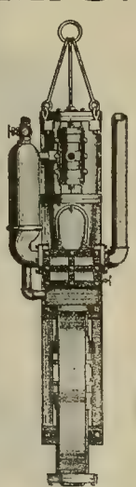

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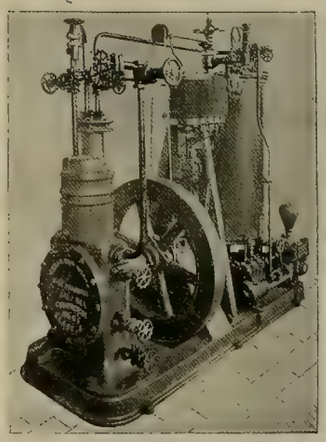

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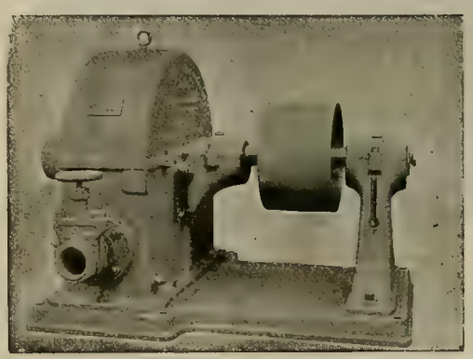

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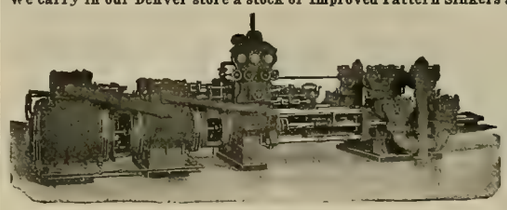

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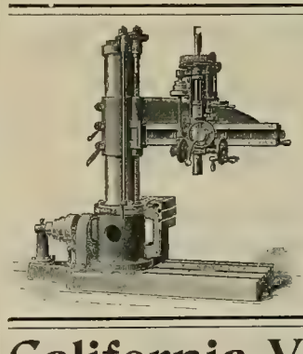

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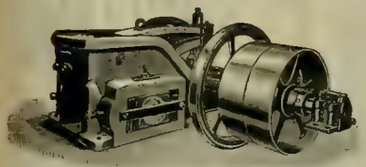

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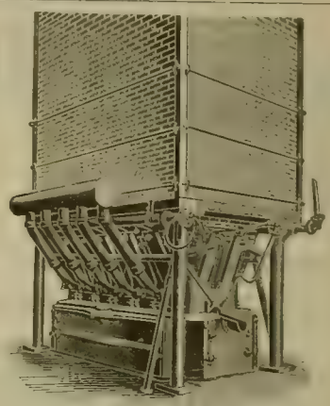

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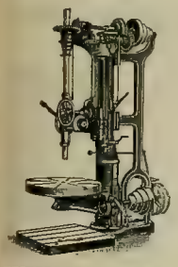

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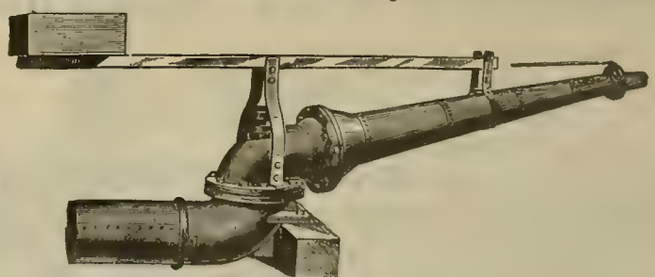

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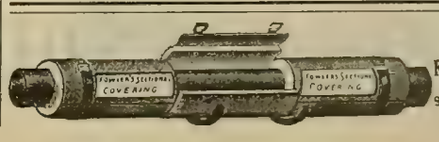

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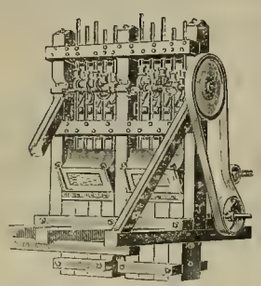

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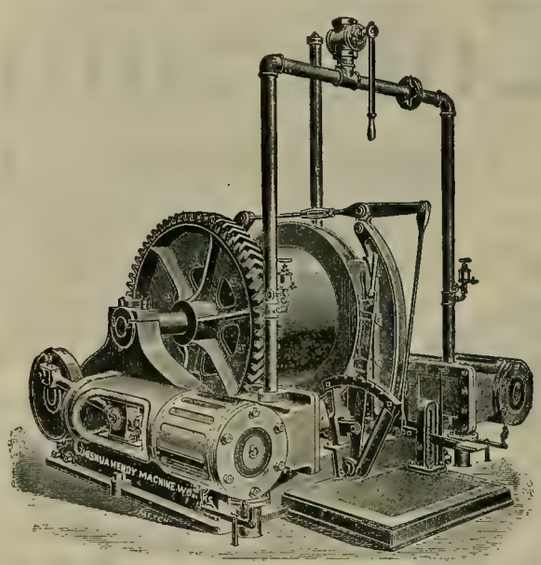

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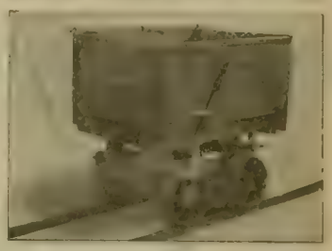

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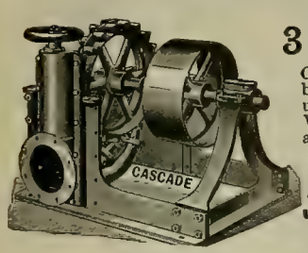

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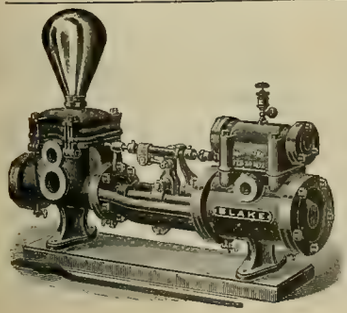

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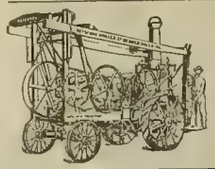

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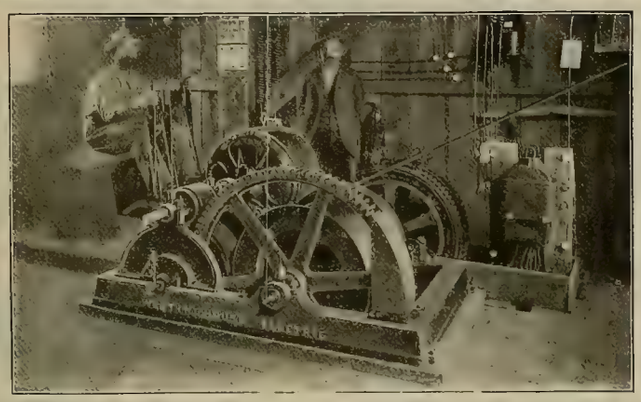

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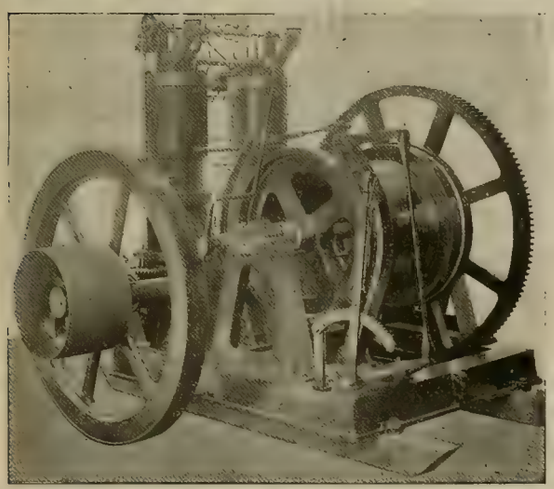

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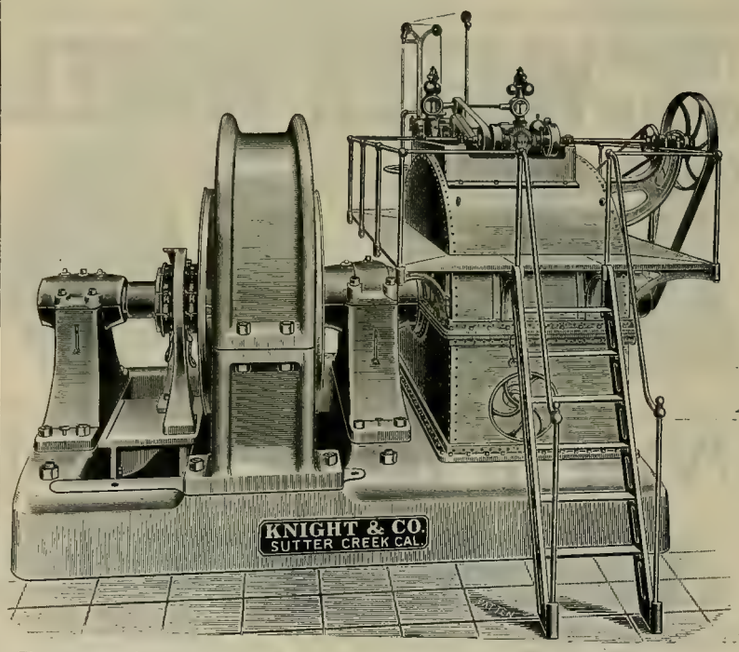

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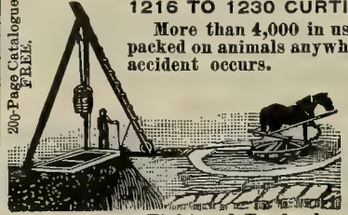

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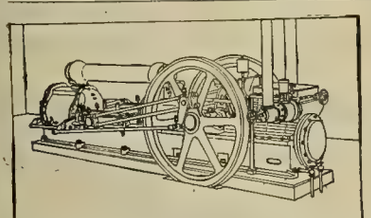

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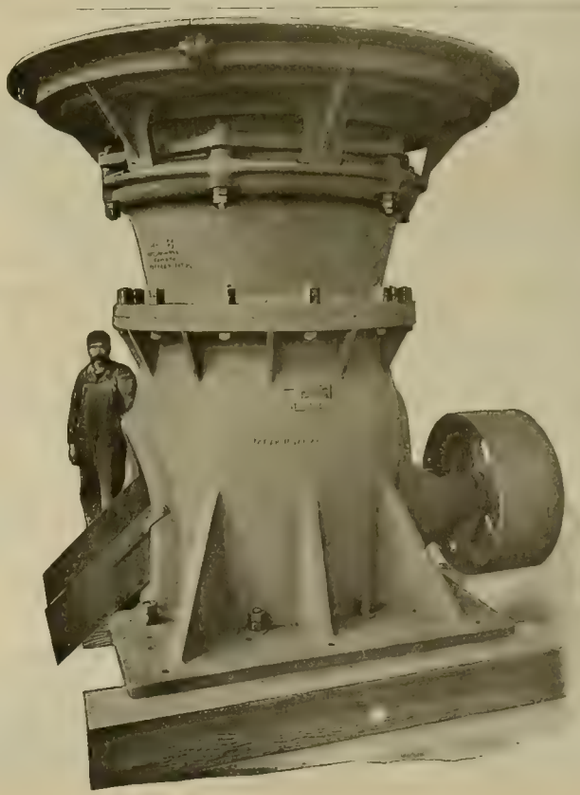

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Market Reports.

The Markets.

SAN FRANCISCO, Feb. 2, 1899.

SILVER.—London, 27¼d: New York, 59¼; San Francisco, 59¼; Mexican Dollars, 47½@48. New York exchange, sight, 17½; telegraphic, 20 cents premium.

LEAD.—Still on the rise: New York reports "strong" $4.65 bid, $4.75 asked. The firm naming the selling price for leading miners and smelters at the West quotes Lead at $4.60.

Local, pipe, 6@6¼c; sheet, 6½@7c; pig, 5¼c; bar, 6c.

COPPER.—Continues to advance: New York reports Lake "strong and higher," $17 old, $17.25 asked. Local, bar 20c per lb.

Boston says: The street is having lots of fun out of the new copper companies. They are not called "cats" or "dogs," but "rabbits," some of them "jack rabbits" and some of them just "rabbits," the brokers say, because they multiply so rapidly. Some of the more recent ones are classed under the heading of white mice. The active head of one of the big copper companies smiles sarcastically and denominates the new copper promotions as jackpots, because, he says, it takes two knaves to open one. But it is just these rabbits, white mice and jackpots that are liable to make the price of copper in the future, not this year or next; but some of them have chances of becoming great mines with good management. For twenty years the bane of the copper market has been the small copper producer who offered his 100,000 pounds of copper all over the world with such importance as to break the copper market without effecting a sale.

IRON.—American, soft, $21.75 and $23.75 per ton; Scotch, $24.25. Local, bar, 2¼c per lb.

SPELTER.—3c.

TIN.—Pig, 20c per lb.: Bar, 25c. New York reports further advance, $25 bid: $25.25 asked.

ANTIMONY.—15.

BABBITT METAL.—No. 3, 7½c.

QUICKSILVER.—Unchanged. Local, $42: export, $38.50@39.00: carload lots, special rates.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c: less than one ton, 17¼c. No. 1* 60%, carload lots, 13½c: less than one ton, 15¼c. No. 1** 50%, carload lots, 11¼c: less than one ton, 13½c. No. 2, 40%, carload lots, 10c: less than one ton, 12c. No. 2* 35%, carload lots, 9¼c: less than one ton, 11¼c. No. 2** 30%, carload lots, 9c: less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, $1.50 per keg: less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, bd	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 00

COKE.—Foreign, $13: domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 30@31c per lb.; carloads, 29c; in 10-lb. tins 37c; sulphuric acid, 2¼c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9½@10c; roll sulphur, 2¼c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10@2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 55c; bbl., 50c; Bazer's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case: Baker's Crystal, $1.40; China Nut, 50c: Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less. Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17¼c; Astral, 17½c; Star, 17½c; Eocene, 19¼c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11¼c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 29c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 19c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 62 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

CANDLES.—Electric Light Candles—6s, 16 oz., 7½c; 6s, 14 oz., 6¾c; 6s, 12 oz., 5¾c; 6s, 10 oz., 4¾c; Granite Mining Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $2.40: cut, $2.25: 10 to 20d, wire, $2.45: cut, $2.30; 8d, wire, $2.50; cut, $2.35; 6 and 7d, wire, $2.60; cut, $2.45; 4 and 5d, wire, $2.70: cut, $2.55; 3d, wire, $2.85; cut, $2.70; 2d, wire, $3.10; cut, $2.95. In carload lots, 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 2, 1899.

The dullness was dispelled to-day by a little activity and a spurt in prices, though, as compared with its former self, or with the volume of business elsewhere, there is very little done, in marked contrast to the present tremendous activity in New York and Boston stock exchanges. Writing from New York, a member says:

"There used to be a time when $2 brokers would follow you around the room in the hope of getting an order. They have now become haughty persons, who take orders for their friends only, and as a matter of personal favor. The specialists feel bound, as a matter of consistency, to take orders still, but they show you the orders on their books and tell you that no human being knows at what figure your order will be executed. The floor brokers of active houses are beginning to look a little like pedestrians in a six-day walking match. They have to answer calls from the office, but the language which they use is painful.

"Trading is taking a new form. We used to suppose that when one stock started up it was well to grab the one nearest at hand, under the belief that it would follow suit. If any pronounced activity occurred everybody went to that crowd and dealt in that stock, while the activity lasted. Now the crowds are comparatively small, because there are so many places where there is activity. Stocks go up two or three points and traders 40 feet away do not know of the advance. Everything has become so large as to become incomprehensible for purposes of quick trading. You hear that somebody has bought or sold 20,000 shares, but it has no effect outside of the stock to which this trading occurred.

The traders who have made the most money lately have been those who bought as much as they could afford to purchase and then sat still and watched their profits increase. Here, again, profits have been much smaller than they ought to have been, because, judging always by the past, we have not been able to stand prosperity."

9:30 A. M. SESSION.

400 Andes	15c	500 Potosi	21c
300 Best & Belcher	49c	100 Savage	12c
600 C. Cal. & Va	$1 70	1200 Sierra Nevada	35c
400 Gould & Curry	31c	100 Syndicate	10c
900 Mexican	44c	300 Union Con	41c
100 Occidental	23c	400 Utah	14c
200 Ophir	66c	700 Yellow Jacket	15c

2:30 P. M. SESSION.

300 Belcher	15c	600 Ophir	67c
400 Best & Belcher	50c	200 Occidental	24c
700 Con. Cal. & Va	$1 70	300 Potosi	20c
400 Gould & Curry	30c	500 Sierra Nevada	35c
100 Crown Point	15c	300 Savage	14c
100 Gould & Curry	32c	1100 Utah	17c
200 Hale & Norc's	10c	100 Union Con	44c
500 Mexican	44c	100 Yellow Jacket	15c

Acetylene Gas.

A handsome new illustrated catalogue will tell you where and by whom the new light is being used, and what the verdict is. Mailed upon application. PACIFIC ACETYLENE GAS CO., 115 New Montgomery St., San Francisco.

Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine.

REDINGTON & COMPANY, Wholesale Druggists, 123-25-27 Second Street, San Francisco.

ANTIMONY.

We buy Antimony Ore in any quantity and pay prompt CASH for same. Write us and let us know what you have.

Chapman Smelting Works Co.,
(INCORPORATED.)
422 Battery Street.....San Francisco, Cal.

Silver City Reduction Co.,
SILVER CITY, GRANT COUNTY, NEW MEXICO.
Purchasers and Smelters of Gold, Silver and Copper Ores.
This Plant is Owned and Operated by the Estate of the Late Senator George Hearst of California.

SPECIAL MEETING.—A special meeting of the stockholders of the Electric Placer Mining Co. will be held at the office of the company, 307 California St., San Francisco, Cal., on SATURDAY, February 11th, 1899, at 2:30 P. M. A. E. VINING, Secretary.

Mines of prospects operated on, either to purchase, MONEY loaned upon MINING properties, or and their property examined, financed and managed. Mines, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated. EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.
EDW. N. BREITUNG, Marquette, Mich.
Cable address Edbee. Code: Lieber's Business, McNeal's A. B. C. Universal Commercial. U. S. A.

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(Late Associate Justice Supreme Court.)
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Mining Law,
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A Valuable Gold Property for Sale.

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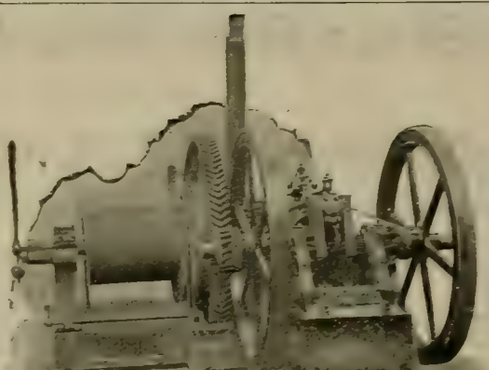
Mines—Dividend Paying and Investment Stock.
W. E. HUBBARD & CO., 15 W. 2d So. Street, SALT LAKE CITY.

Placer Miners' Attention
Is called to the fact that we are purchasers of
OSM-IRIDIUM
In lots of one ounce and upwards.
SELBY SMELTING & LEAD CO., 416 Montgomery Street, San Francisco.



FRESNO, June 25, 1898.

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San Francisco, Cal.

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Hercules Gas Engine Works,
305 MARKET STREET, SAN FRANCISCO, CAL.

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MANUFACTURERS OF DIRECT CURRENT MACHINERY
For Power and Lighting Purposes.
SPECIALTY
Direct Connected Electric Elevators.
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Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.
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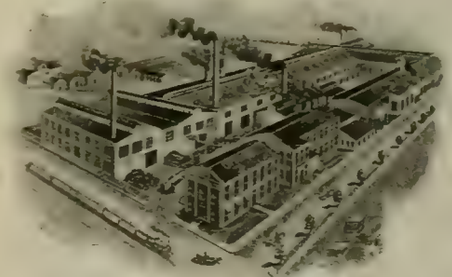

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Assessment Notices.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of January, 1899, an assessment (No. 12) of Ten Cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 257 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 6th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—257 12th street, San Francisco, California.

The Secretary will also receive payments from 12 to 3 P. M. at his business office, 225 Sansome street.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of January, 1899, an assessment (No. 30) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, Rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of February, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 21st day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, Rooms 15 and 17, San Francisco, California.

MARINA MARSICANO GOLD MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of January, 1899, an assessment (No. 17) of 4 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 13th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of January, 1899, an assessment (No. 115) of Twenty cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14 Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on TUESDAY, the 21st day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 13th day of March, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14 Nevada Block, No. 309 Montgomery street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1899, an assessment (No. 16) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of February, 1899, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on SATURDAY, the 11th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 5th day of December, 1898, the several amounts set opposite the names of the respective shareholders as follows:

	No. Cert.	No. Shares.	Amt.
G. Schmitt	46	1	$ 10
G. Schmitt	53	1000	100 00
G. Schmitt	57	500	50 00
G. Schmitt	60	500	50 00
G. Schmitt	126	100	10 00
G. Schmitt	132	25	2 50
G. Schmitt	147	119	11 90
G. Schmitt	175	100	10 00
G. Schmitt	167	4	40
G. Schmitt	211	50	5 00
G. Schmitt	220	500	50 00
K. Schmitt	6	500	50 00
K. Schmitt	7	500	50 00
E Fey	17	100	10 00
E Fey	74	200	20 00
E Fey	108	200	20 00
T. R. Squires	124	250	25 00
B Strueven	141	500	50 00
B. Strueven	184	500	50 00
W. I. Smith	173	300	30 00
W. I. Smith	217	300	30 00
N Frost	215	500	50 00
N Frost	216	500	50 00
C. Smyth	222	60	6 00

And in accordance with law, and an order from the Board of Directors, made on the 5th day of December, 1898, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, 773 Mission street, San Francisco, California, on WEDNESDAY, the 14th day of February, 1899, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

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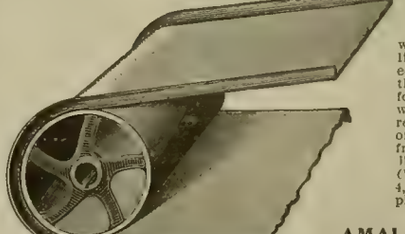

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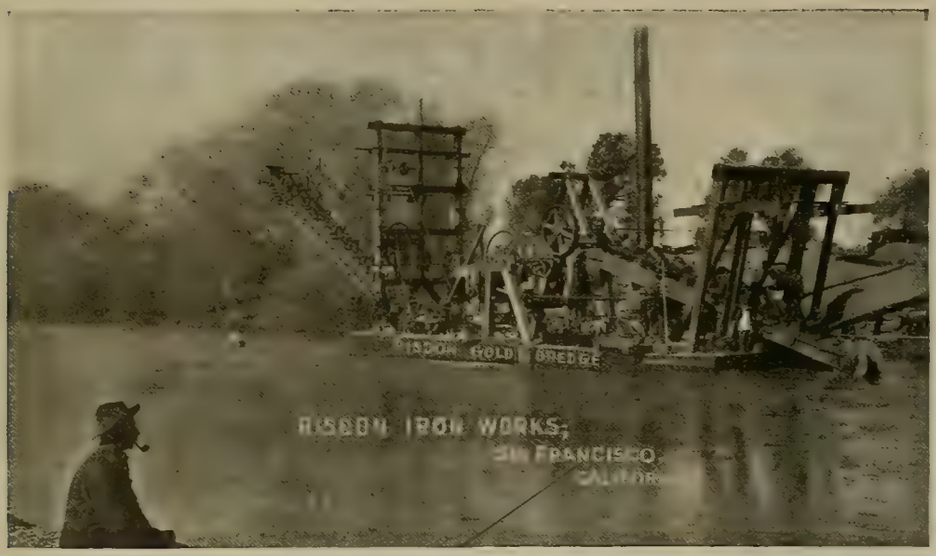

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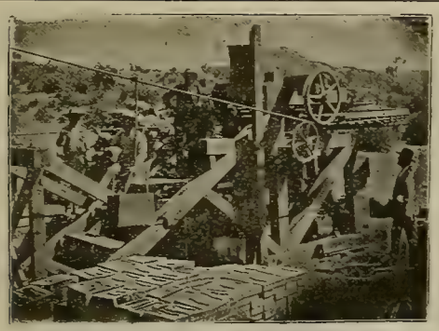

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FOR ROASTING, CHLORINATING AND DESULPHURIZING ORES.

Extracts from Letters Received from Mr. Philip Argall, Manager the Metallic Extraction Co., Cyanide, Colorado:

January 2, 1897.

"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.
"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The **ROPP FURNACE** is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace); The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal. (two furnaces); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); Broken Hill Proprietary Co., Broken Hill, New South Wales (four furnaces); Puget Sound Reduction Co., Everett, Washington; Colorado Ore Sampling & Reduction Co., Cripple Creek, Colo.; Consolidated Kansas City Smelting & Refining Co., for the Arkansas Valley Smelting Works, Leadville, Colo.; Robert Lanyon's Son's Spelter Co., Iola, Kansas (two furnaces); Mountain Copper Co., Ltd., Keswick, Cal.

Catalogue on Application.

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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

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Increasing Mexican Gold Output.

Since silver's decline, gold mining in Mexico shows as rapid advance, proportionately, as in the State of Colorado, where it has risen from $5,000,000 in '92 to $22,000,000 in '98. Till within the last few years, Mexican gold production was a by-product of its silver mining industry. Since the fall in silver practically reduced the cost of gold mining in Mexico 50% as compared with the cost in other gold-producing countries, Mexico has realized its position and also that better transportation facilities must precede development of its gold resources. Accordingly, the Mexican Government is inviting the investment of capital by liberal concessions to corporations or individuals organized to develop lode and placer mines in that Republic, at the same time extending the country's railway system as rapidly as practicable. The gold yield of Mexico has increased from $1,224,621 in '93 to $7,584,182 in '98. Taking the silver yield of that country for the same years, it is noted that in '93 the silver production as compared with the gold yield was as 44 to 1, while during the past year it was as 9 to 1. As elsewhere the new effort tends to eliminate the speculative element and raise it to the dignity of a legitimate industry. It will also be found that gold mining requires greater outlay and more working capital for its successful prosecution.

Nevada Co., Cal., Mine.

On this page appears one of our specially engraved portrayals of a Nevada Co., Cal., gold mine, the Texas, giving a good general idea of the outs[illegible] appearance. The photograph from which the [illegible] panying engraving was made is one of the best of the kind ever received in this offie.

The Texas mine, near Nevada City, Cal., which had been idle nearly fifteen years, resumed work under a new ownership in September, '97. The present operators are principally a San Francisco company. The property comprises 120 acres and has a U. S. patent title. Under the previous operators several tunnels and a 140-foot shaft had been run and considerable ore taken out. The present company have sunk a perpendicular shaft 250 feet, run 608 feet of tunnels and cut four ledges, upon which they have run 812 feet of drifts.

Hoisting and pumping machinery, with large power drills in the drifts and small ones in the stopes, are in operation. A 10-stamp mill has recently been completed, to which ten stamps will be added.

The formation is granodiorite. The ledges on the 250 level are from 1 to 8 feet thick, carrying a high percentage of sulphurets and galena. Mill tests of the ore gave such results as warranted the erection of the present milling plant.

Within the comparatively brief period of eighteen months, the Texas Mining Co. has done the systematic development work herein enumerated, and, in their businesslike manner, they prospected the mine before building a mill, something which, though not always done, is always commendable.

The company employs thirty men. It is incorporated under the laws of California as the Texas Gold Mining Co. A. Korbel is president and K. Ruiz secretary. It is not a stock selling proposition.

THE TEXAS MINE, NEVADA COUNTY, [illegible].

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Oldest Mining Journal on the American Continent

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J. F. HALLORAN.....Publisher

San Francisco, February 11, 1899.

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IN iron, as in other metals, advancing prices and prospective demand occasion a wholesale "dealing in futures" on a scale unequaled by sales or options in any stock market. During last week at Cleveland, Ohio, the entire Lake output of iron ore for 1899 has been placed, the only deterrent clause being "unless labor troubles interfere." The amount thus sold for delivery is upwards of 14,000,000 tons.

TAX on mine products in Colorado, as everywhere else—if at all—should be on the net and not the gross products. It is hard enough for a miner to be taxed by class legislation on what is left him after he pays all expenses; but to be taxed on the gross output which to have produced may have run him in debt, is to put a burden on the mining industry that any State Legislature cannot in justice afford to attempt or continue.

OCCASIONALLY exaggerated reports are made of fortunate inventors paid most enormous sums for some clever devices, so simple that all wonder "why no one thought of it before." These are mostly fairy tales. As such may be classed the most recent, to the effect that a Thompsonville, Conn., watchmaker —H. M. Buck—is to be paid $28,000,000 by the British Government "for a rotary cylinder which increases the speed of steamships 50%, and at the same time does away entirely with the vibration of vessels." As explained, his method concerning the first proposition is to utilize all the expansion of steam for driving power; regarding the second, the cylinder is alleged to be so additionally devised as to do away with the condition that causes the piston rod to come to a dead stop in the cylinder.

AN Anaconda, Montana, miner writes, illustrating in a striking way how miners and all connected with the mining industry in this west half of America contribute to the prosperity of the East. He goes on through a column of space detailing in what way the Montana miner, from the time he rises till he goes to rest, uses the products of Eastern manufacture, everything he eats, drinks, wears or works with coming from an Eastern producer, the writer finally following him into an Eastern-made shroud, in an Eastern-made coffin, with a gravestone of New Hampshire product. It is a condition that time alone can cure. The East will never have the splendid source of mineral wealth possessed by the region west of the 100th meridian, but in time the latter section will be more industrially independent and be able to retain a large share of the wealth produced from the field, the forest and the mine.

A Needed Government Institution.

What is said by C. D. Walcott, Director of the U. S. Geological Survey, is usually deserving of consideration. In a recent letter he suggests that the U. S. Government establish a museum of practical geology, in which he points out that the Geological Survey has 40,000 correspondents, who furnish information regarding the country's mineral resources, and that the proposed plan would doubtless meet with co-operation by mineral producers everywhere, believing that a collection of a representative display of economic minerals and quarry products could be secured at little cost. He shows that such a collection would be useful in the work of the Survey and possess value for any person interested in any mineral product who may want statistical information and see specimens of all products pertaining to the special line in which he is interested. "For example, a person wishing to obtain information in relation to marble, either as a producer or a consumer, should be able to personally examine specimens of marble from the principal quarries of the United States, and, by inquiry, to learn all that is known of any particular marble in which he may be interested."

The commercial value to each locality of such a display of its mineral resources is manifest. Director Walcott is further of the belief that: "In addition to the series of rocks and fossils illustrating stratigraphy in succession of the sedimentary rocks, and the systematic collection of minerals and ores, an exhibit showing how geological work benefits the daily life of the people should be developed. An illustration of this would be a representation of the artesian water supply of the semi-arid region, showing the stratigraphy and structure of the sedimentary rocks, and how hydraulic and geologic investigations clearly indicate the region in which artesian water development may be carried on successfully. Mining and areal geology should also be illustrated in such a manner as to place before the student and intelligent observer the import and value of such work. There exists at the present time at the national museum a geological collection of great value, but it is not as complete as it is desirable to have it, and it cannot be kept up to date with the present force and space. There should be provided within a few years a building that could accommodate all the geological collections of the Government. It is not proposed that these collections should be removed from the custody of the national museum, but that they should be properly installed and cared for independently of the general collections of the museum."

Commenting further on mining and economic geology he says: "In creating the United States Geological Survey, Congress and the people whom it represents expected that its energies would be largely devoted to the development of the mineral resources of the country. How this method should be accomplished was left to the director and his principal assistants, who, by scientific training and long practical experience, were the best qualified to judge what could and what could not be done by such a corps of specialists as the Survey must necessarily consist of—men whose whole life is devoted to the abstract side of geology, and whom neither the regulations of the Survey as defined by law nor the exigencies of their official duties would permit to participate in the practical or commercial development of these resources. It was evident that these specialists could not take the place of either the prospector or the mining engineer, as a somewhat superficial view of the subject had led some to think they might. They should, of course, understand the principles which underlie the work of either of these classes of men, but they cannot be expected to possess that expertness of instinctive second sense in each of these professions which can be acquired only by lifelong practice. The Survey should furnish an accurate basis upon which the work of each of these experts, so indispensable in the development of the mineral resources of the country, may be founded. The Survey stands, so to speak, between them and nature. It should endeavor to tell the prospector where he may and where he may not prospect to advantage for this or that valuable mineral."

Director Walcott's suggestions deserve commendation and active support. They are direct, practical and timely, and their value to the prospector, miner and mining engineer is clearly indicated in the last paragraph quoted.

"HAS chloride of gold ever been discovered in a natural state?" asks a Bishop, Cal., reader. So far as the writer knows, No. It has been argued that three salts of gold have existed and may still be found "in nature"—silicate, sulphide and chloride, all being soluble, and "in the presence of certain reagents, also existing naturally, can be deposited in metallic form." To those who make a specialty of speculation and theory concerning the origin of gold, etc., the subject is an interesting one. T. Atherton asserts that in '91 in the Deep Creek mines, Nambueca, N. S. W., he found what he believes to be gold existing as a natural sulphide. He says: "Taking 200 grains of ore from a sample assaying seventeen ounces fine gold per ton, grinding it finely and heating for some hours with yellow soduim sulphide, on decomposing the filtrate and treating for gold I got a result at the rate of twelve ounces per ton. This was repeated several times with the same result. It would appear that all the gold in the pyrites (and I have never found any gold existing apart from the pyrites) has originally taken its place there as a sulphide." It is known that chloride of gold will deposit its metal on a metallic base in the presence of any other organic substance. On this subject Chas. Wilkinson shows in his experiments the artificial production of the nucleus of a nugget from deposition of chloride of gold on iron pyrites, and found that when the solution of gold chloride was four grains to the ounce of water that the pyrites or other base began to decompose, the iron sulphide changing to yellow oxide. Our Bishop correspondent speaks of an alkaline formation there that has an indication of chloride of gold." Prof. Jos. Le Conte says: "Ore deposits, using the term in its widest sense, may take place from any kinds of waters, but especially from alkaline solutions, for these are the natural solvents of metallic sulphides, and metallic sulphides are usually the original form of such deposits."

THE idea is now advanced that the present commercial activity is the result of the increased gold output and the unusual development in that direction. There is much of sound reasoning in such an idea. Development of the mining industry, whether for gold or anything else, always occasions a demand for so many things that any undue activity therein is always followed by a "business boom" such as the present one. More especially is this the result in the case of gold mining. Besides the ordinary sequence of increased trade requirements occasioned thereby, the production of gold in such quantities as those of '96, '97 and '98, coupled with the promise of similar continuation, has aroused public interest, recreated confidence, appealed to the imagination and excited hopes and ideas that find practical operation in a variety of industrial investments. Then, too, the late war with Spain has tended to enliven and enlarge the business outlook. There is abroad a big stir that makes for larger action throughout, and the horizon broadens. The revival in mining is accompanied by a revival in business and the profits and prospects resultant from general production. That the output of gold is at the base of the present world-wide activity is perhaps best evinced by the general feeling that while there is a possibility that the present advance in metals, lead, tin, copper, etc., may be followed by a reaction in prices, yet, in the case of gold, that its price or value will not decline, no matter what the total output may become.

THE California statements regarding alleged railroad combinations which would result in "a Vanderbilt line from ocean to ocean," are not in accord with existing facts, nor with a situation and intent likely to obtain. The stated idea is to consolidate the N. Y. Central, the Chicago & Northwestern and the Union Pacific Railways with view to ocean terminus at San Francisco. Owners of the Vanderbilt railroad lines act on a settled formula, viz.: "no investment west of Chicago." They will carry freight that far west but want nothing more responsible or entangling than ordinary railroad freight and passenger alliance further this way than 86° W. longitude.

Concentrates.

AT Mercur, Utah, miners work eight hours, are paid $2.50 per day; board and lodging, $24 per month. The mines are dry.

"ELECTRIC BELTS" and kindred health devices into which such appliances enter, are frauds and unworthy serious attention.

A DANIELL'S CELL is a zinc-copper couple immersed, the zinc in dilute sulphuric acid and the copper in a sulphate of copper solution.

THE highest London quotation for silver during the last half of this century was in '64, 62¼d per oz., British standard, .925 fine, equivalent to $1.40, 1000 fine.

THE Payne mine at Sandon, B. C., a silver-lead property, is locally credited with having paid its owners in net profits $1,200,000 in 1898. Its capitalization is $1,000,000.

THE Sandon, B. C., Miners' Union is the first labor union to receive a charter from the provincial government. Special legislation was required before the union could be incorporated.

HON. R. C. CHAMBERS, Utah's resident director of the Bimetallic Union, has issued a call for those interested in the protection of lead, that the movement in Canada to overthrow the tariff may be resisted.

CONSIDERABLE present mining legislation is being enacted by the several State and Territorial Legislatures. Arizona is trying to secure, in addition, a mine inspector. A similar bill was introduced in the California Legislature this week.

THE Comstock's year of largest yield was '77, when its output was, gold $14,520,614 68, silver $21,780,922.02—a total of $36,301,536.70. This is exclusive of the mill tailings for that year of which 129,639 tons were treated, yielding $1,169,265.28.

TWO THINGS determine the value of circulation to advertisers—its character and its extent. The character of circulation can be judged by examining the publication itself. Its table of contents, or the contents themselves, is a sure index of the kind of people who read it.

RED BRASS is composed of 90 parts copper, 10 zinc; white brass, copper 65, zinc 35. Bell metal is an alloy of 78 parts copper and 22 zinc; German silver, copper 50, zinc 25, nickel 25. W. T. Garratt & Co., Fremont & Natoma Sts., San Francisco, furnish such manufactured alloys in any quantity.

THE most recent award of the Longstreth medal by the Franklin Institute of Philadelphia was to T. B. Doolittle, the inventor or discoverer of hard-drawn copper wire, it being of added commercial value, such wire, while retaining its full percentage of conductivity, having additional tensile strength.

THE velocity of a fluid flowing from an aperture is as the square root of the height of the head of the fluid. The theoretical velocity, therefore, in feet per second is as the square root of the space fallen through in feet and 64.333; so that for one foot it is 8.02 feet. The mean velocity is about 5.4 feet, or 0.673.

WHEN wrought iron is subjected to a tensile strain before rupture takes place it increases in length from 15% to 20% and contracts in area at the fractured section about 25%. Its tenacity ranges in value from 50,000 to 65,000 pounds per square inch; wrought iron diminishes in tensile strength when rolled into sheets.

THE altitude of Mt. Diablo, Cal., is 3850 feet; of Mt. Shasta, 14,440 feet; of Mt. Whitney, 14,522 feet. From Diablo to Shasta, in an air line, is 244 miles north; to Whitney, 222 miles southeast. Prof. Geo. Davidson thinks that he saw Shasta and Whitney from Diablo about seven years ago, under certain unusually favorable conditions—466 miles.

AT Black Hawk, Colorado, are now in operation 882 stamps, of which 220 are rapid-drop and 662 slow-drop. The former are still locally regarded as an innovation. Those at the N. Y. mill weigh 1000 lbs. each. They go ninety drops per minute, and crush four tons each every twenty-four hours, about three times the amount crushed by the slow-drop. The amalgamation results are satisfactory.

AN Eastern copper broker says: "Last May I figured that all of Boston's copper stocks were selling in the aggregate for $125,000,000, and came to the conclusion that they were selling high enough. They have since doubled in selling price. In 1894 Boston's copper properties at the highest quotations of the year sold for $54,000,000; in 1895 at $80,000,000; in 1896 at $75,000,000 and in 1897 at $110,000,000. To-day they are selling for about $250,000,000."

IN '50 the United States produced 650 tons of copper; in '60, 7200 tons; in '70, 12,600 tons; in '80, 27,000 tons; in '90, 115,966; in '96, 202,235; in '97, 219,481; in '98, 235,790 tons. The estimated home consumption last year was 114,000 tons; exports, about 235,790 tons; net imports foreign copper, 12,900 tons. In '50 the United States produced 12,000 tons of refined lead; in '60, 14,000; in '70, 16,000; '80, 87,000; '90, 128,000; '96, 168,000; '97, 186,000; '98, 200,000 tons.

"FLOURING" of quicksilver is its coating with what appears to be a thin film of some sulphides, so that when it is separated into globules they refuse to unite. The same trouble is also called "sickening." Water colder than 50° F. has a tendency to cause "flouring." Floured quicksilver can be readily collected by adding minute quantities of sodium and stirring it about. A weak solution of cyanide is also of avail, though, if from connection with base ores, the mercury becomes foul, the best way to restore it is by retorting.

TOWNSITE entries may be made by incorporated towns and cities on the mineral lands of the United States, but no title can be acquired by such towns or cities to any vein of gold, silver, cinnabar, copper or lead, or to any valid mining claim or possession held under existing law. When mineral veins are possessed within the limits of an incorporated town or city, and such possession is recognized by local authority or by the laws of the United States, the title to town lots is subject to such recognized possession and the necessary use thereof, and when entry has been made or patent issued for such townsites to such incorporated town or city, the possessor of such mineral vein may enter and receive patent for such mineral vein, and the surface ground appertaining thereto: *Provided*, That no entry shall be made by such mineral-vein claimant for surface ground where the owner or occupier of the surface ground shall have had possession of the same before the inception of the title of the mineral-vein applicant.

TO FIND the h. p. necessary for a battery of stamps, multiply the weight of one stamp by the number of stamps in the battery; the height of lift in feet by the number of lifts per minute; add one-third of the product for friction; the result will be the number of feet-pounds per minute; divide by 33,000; the result will be the h. p. required. A 900-pound stamp in a 5-stamp mill, with a 9-in. lift, 90 drops to the minute, would thus figure out: 900 × 5 = 4500 × ¾ = 3375 × 90 = 303,750; one-third of 303,750 = 101,250, which added to 303,750 = 405,000 ÷ 33,000 = 12.272 h. p., or about 2½ h. p. for each stamp.

G. W. MILTON, in a communication to the Denver *News*, says of altitude and ores: "As a matter of fact, there is not a single lode mine, either gold or silver, in the State of Colorado, below an altitude of 7500 feet, and there are very few, if any, below 8000 feet. Why this is so I am unable to say. Yet it is a matter of fact, notwithstanding there has been millions of dollars expended in prospecting and developing properties below 7500 feet in Colorado. Yet there is not a single mine to show for the outlay. Hence, in my judgment, prospectors and investors will do well in future to consider altitude as well as indications."

WHILE undoubtedly cyanide is deadly poisonous, yet the fact that notwithstanding its general use there are very few cases of loss of life goes far to argue that ordinary care, the same that is practiced in any department of mining or metallurgy, insures immunity from danger. Of the many thousands of men using it for so many years it is believed there have not been more than a dozen fatal accidents recorded as resultant therefrom. Hydrogen peroxide is recommended as an antidote, applied as a 2½% solution, given as a hypodermic injection every three or four minutes in different parts of the body, the stomach being simultaneously washed out with a 2% solution of the peroxide.

THE report of the mining industry of the South African Republic for 1897 in the Transvaal shows that the capital of the 198 gold mines working at the end of 1897 was $363,863,750. Of these, twenty-eight mines with a capital of about $50,000,000 paid $14,750,000 in dividends, or nearly 30%. Sixty-four other mines were producing gold, but paying no dividends, and some could not pay without a considerable reduction in working expenses. The other 106 mines were in course of being opened up. The total value of the gold yield in 1897 was $58,250,000, or $15,000,000 more than in 1896. Of this 66% was from crushing mills and 34% by chemical extraction. The quantity of ore worked was 5,741,311 tons, which gave a yield of a little over $10 to the ton. Working expenses were about $6.62 per ton, leaving a net profit of $3.38 per ton.

IN Japan some specialities in metallic alloys are in use, of whose composition the following details are supplied: Shadke consists of copper with 1% to 10% of gold. Articles made from this alloy are laid in a pickle of blue vitriol, alum, and verdigris, until they acquire a bluish-back color. Gui-shibu-ichi is an alloy of copper containing 30% to 50% of silver. It possesses a peculiar grey shade. Mokume consists of several compositions. Thus, about thirty gold leaves (genuine) are welded together with shadke, copper, silver, and gui-shibu-ichi, and pierced. The pierced holes are, after firm hammering together of the plates, filled up with the above named pickle. The finest Japanese brass consists of 10 parts copper and 8 parts zinc, and is called "siachu." The bell-metal, "karakane," is composed of copper, 10 parts; tin, 10 parts; iron, 0.5 part; and zinc, 1.5 parts. The copper is first fused, then the remaining metals are added in rotation.

THE indicated power of a steam engine is equal to the product of the area of the piston in inches, the pounds pressure of the steam per square inch and the distance traveled by the piston in one minute. The effective power in excess of back pressure, loss and condensation in well constructed engines is usually about .84 of the indicated or theoretical power. The nominal power bears no fixed relation to the indicated, nor to the effective power. In calculating the nominal power, the mean effective pressure in low pressure engines is assumed to be seven pounds and in high pressure engines twenty-one pounds. The nominal velocity of the piston, whether in high or low pressure engines, is 128 times the cube root of the stroke in feet. The range is from 120 to 300 feet per minute. In practice the piston not unfrequently is made to travel 900 feet and upwards a minute. Experience has determined no limit beyond which it cannot be run with advantage.

THE reservoir site question asked by a Mountain Ranch, Calaveras Co., Cal., a Grant's Pass, Or., and a Cherry Creek, Arizona, correspondent may be answered as follows: Reservoir sites located or selected and to be located and selected under the provisions of "An Act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and eighty-nine, and for other purposes," and amendments thereto, are restricted to and contain only so much land as is actually necessary for the construction and maintenance of reservoirs, excluding, so far as practicable, lands occupied by actual settlers at the date of the location of said reservoirs, and the provisions of "An Act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and ninety-one, and for other purposes," which reads as follows, viz.: "No person who shall after the passage of this Act enter upon any of the public lands with a view to occupation, entry or settlement under any of the land laws shall be permitted to acquire title to more than three hundred and twenty acres in the aggregate under all said laws," is construed to include in the maximum amount of lands the title to which is permitted to be acquired by one person only agricultural lands, and not include lands entered or sought to be entered under mineral land laws. Further detailed information can be had from the California Surveyor-General, whose office is at 610 Commercial street, San Francisco.

THE "patio process" was invented in 1557, and is so called because a patio or yard is required for its operation, and the ore is crushed and ground fine in arrastras. If there is any gold in the ore 50% or 60% of it may be saved by putting silver or copper amalgam into the arrastras. Some of the Mexican ores have to be roasted to remove certain chemicals which they contain, but this is not the case with all of them. The paste from the arrastras is spread in heaps upon the floor of the patio, and after it has hardened somewhat by the evaporation of a part of the water it contains, it receives a quantity of salt in proportion to the amount of silver in the ore. Then it is mixed by men with shovels and by the tread of horses or mules, and a day or two later a mixture of copper, vitriol and salt is added. Then follows more treading and mixing, then quicksilver is spread over the mass and trodden in, and the next day there is another mixing and treading. These performances are repeated on alternate days, quicksilver being added one day and the mass being trodden the next, until the treading has been repeated seven or eight times. The quicksilver unites with the silver and forms an amalgam. The formation is carefully watched, and when it has reached the proper condition the amalgam is gathered up into hide or canvas bags. Some of the quicksilver is squeezed out and the rest is driven off by evaporation and condensed in a pipe that runs into a tub of water. Hundreds of horses and mules are worn out annually in treading the ores. Sometimes loaded barrels or heavy stone wheels are used for mingling the ore and chemicals, and they do it as well as the horses' feet could do it, and the injury to the horses' hoofs by the chemicals is thereby avoided. The reduction of a mass takes from twenty to thirty days.

MANY substances held in solution or suspension in hot water are deleterious to the metal of the boiler. Some are actually corrosive; some are merely productive of scale, which may hide corrosion, or may, if of sufficient thickness, cause the metal of the boiler to become overheated. Some substances which are soluble in water at ordinary temperatures, and even at 212° F., are insoluble in water at higher temperatures and are, of course, precipitated in fine powder. This powder falls to the bottom in quiet water, but is kept in suspension and rises to the surface in places where it is sufficiently agitated. New combinations are often formed with the mere dirt which has been there all the time in mechanical suspension. Oil and grease returned from the engines by an open-heater or a condenser is a new element, especially at high temperatures. Sulphate of lime is less soluble in water of high temperature, and at fifty pounds pressure above the atmosphere is entirely insoluble. Carbonate of lime held in solution in water containing carbonic acid and bicarbonate of lime, deposit carbonate of lime as the temperature of the water rises by driving out the carbonic acid and by separating into carbonate of lime. These two substances form the basis of most kinds of scale, a third being simply earthy or sandy matter in the water. If the ebullition be strong enough to keep most of this deposit in suspension at or near the top of the water, it may be removed by a surface blower; or, if a closed feed heater be used, the feed water may be raised by the use of live steam nearly to the temperature of the boiler and the deposit allowed to settle to the bottom or other surface of the heater and removed by blowing or washing out. Care should be taken to wash out with warm water, if possible.

BROADLY speaking, the Coast Range of California consists of Tertiary and Cretaceous, mostly sandstones and calcareous clay slates, almost everywhere greatly disturbed, folded, and frequently highly metamorphosed, and traversed by dikes of eruptive rocks and upheaval axes. In the portion north of San Francisco these are frequently caused by tufaceous and scoriaceous or crystalline lava flows, emanating from distinct volcanic vents now extinct. In contrast to the Coast Range, the Sierra Nevada has in general a central axis of granite or other rocks, occasionally traversed by volcanic vents, on the flanks of which lie more or less crystalline and metamorphic slates or schists of Palæozoic, Triassic and Jurassic age, with edges upturned at a high angle or sometimes vertical. Abutting against this, the proverbial bedrock of the California miner, there lie on the border of the great valley strata of marine deposits, mostly of the Tertiary, but northward also of the Cretaceous age, which are but slightly disturbed, and into which the rivers flowing from the canyons of the Sierra have cut their immediate valleys, flanked by bluffs from 40 to 70 feet high. From opposite San Francisco northward, on the lower foothills, appear immense gravel beds, mostly gold-bearing, and these are partly overlaid by eruptive or volcanic outflows and tufaceous rocks, also accounted as belonging to the Tertiary age. In the northern portion of the Sierra region the eruptive rocks become more and more prominent, covering an enormous area called the lava bed in the northeastern part of the State, and, as in the Cascade Range in Oregon, forming the body of the comparatively low range upon which the volcanic cone of Mount Shasta is superimposed.

IN the construction of a canal where the natural slope of the country is greater than is permissible for the grade of the canal, the excess of the natural slope of the ground over the desired grade may be concentrated at falls introduced in the canal, and thus a direct course and any desired grade may be maintained. The bottom of such a canal will form a series of steps over which the water falls into an overfall pit or water cushion below. If is observed the natural fall on natural water courses it will be seen that the channel bed is much deeper and wider under the fall than elsewhere, and is formed in the shape of a heart, with the small end down stream. This may be copied from nature in constructing artificial channels. The bottom of the overfall pit should be from 4 to 6 feet below grade and should be well paved or timbered. The introduction of such falls will greatly increase the inclination of the water surface for a distance in the canal above the fall proportional to the depth of flow in the canal. It is similar to taking away the vertical retaining wall which is supporting a level bank of very loose sand, and leaving no obstacle to its assuming its natural slope. Because of this increased inclination of the water surface the velocity of flow just above the fall, for several feet, will be greatly increased, and the bottom and sides of the canal must be paved or timbered from the fall to a distance of 12 to 20 feet above the fall to prevent erosion by this increased velocity. Sometimes steep, wooden chutes are adopted instead of vertical falls. It is customary in such cases to erect a vertical bulkhead for the chute to discharge against, and thus break the force and velocity of the falling water. If the velocity is too great after passing the bulkhead, it may be checked by inserting wooden bars into the water, reaching from the bottom to above the surface. The tops of the bars should incline down stream. The effect of this will be to make the velocity uniform, or nearly so, from the canal floor to the water surface, and it will also make the depth greater. It would be better still to widen the penstock into which the water discharges and reduce the grade for a short distance below.

The Dow Engine.

The structure, theory, design, construction and operation of the steam engine are of constant interest, comprising as many advances, modifications and changes as are manifest in other forms of power producers. In this regard valves and valve gear are prominent. The limitations of the plain slide valve, the governor regulated cut-off of the Corliss and other proposed or proved systems have in turn had full discussion. The Dow engine is the latest candidate for interest in this line. It has but one valve at each end of each cylinder, where the Corliss has two, the drop and dash-pot is left out, and, in general, the valve gear is simplified.

Josiah Dow, the inventor, gives some details of his engine. It is a double vertical compound, the present construction using steam of 125 to 130 pounds boiler pressure, and intended to run at about 150 revolutions per minute. The cylinders are placed close together, side by side, only room enough between them to provide for the valves, with their passages, and non-conducting spaces to prevent loss of heat, the whole being surrounded by a space filled with a non-conductor and covered by lagging, preferably of wood. All the valves and steam passages have their positions between the cylinders to facilitate the transfer of steam from one cylinder to the other and for compactness' sake, with the use of a simple operation of the valves. The final exhaust passage is, however, completely separated not only from its cylinder but from the steam passages by non-conducting spaces. The first cylinder exhausts through very short passages at either end—merely continuations of the ports—directly into the second, the up stroke of the first coinciding with the down stroke of the second. The vertical arrangement of cylinders and connections is chosen to aid compactness and to facilitate the desired balance. The vertical form also permits the base and foundation to be compact. The valves (see Fig. 1) are placed

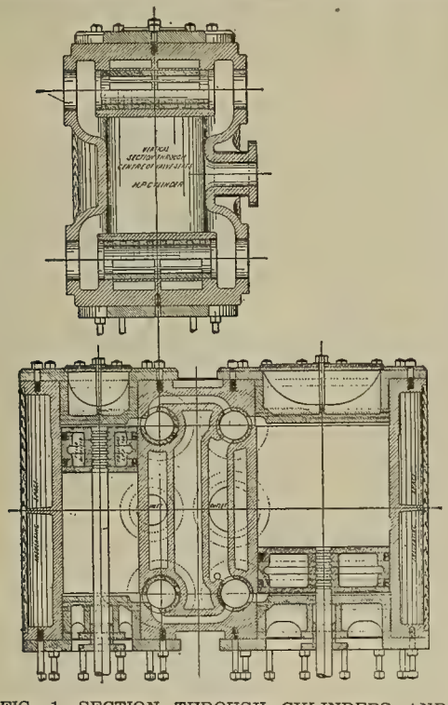


FIG. 1.—SECTION THROUGH CYLINDERS AND VALVE GEAR.

as closely as possible to the interior of the cylinders, as with the Corliss engine, but there are only two to each cylinder, the induction and eduction for each end being combined in one; the passages for the full steam and the exhaust are completely separated in position and by non-conducting spaces. There are but four valves for the two cylinders. The events of the valves are so arranged that the beginning of exhaust from the high-pressure cylinder becomes directly the initial steam for the low-pressure, the lead for both coinciding and in control of the valve at the first cylinder, the valve at the second cylinder being always open in time to permit its free passage. The work in each cylinder at normal load and pressure is exactly the same, and the weights of the reciprocating parts are balanced against each other by means of the pistons being cast hollow, that the smaller one may be filled with sufficient lead to make its weight equal to that of the larger. The high-pressure valves (see Fig. 2) are cylindric in shape and so constructed that the induction steam passes entirely through them from end to end.

The steam chamber is placed directly against the high-pressure cylinder, and at the top and bottom is connected with the valves by means of passages in the casting which lead around both their ends, from which steam enters; to the outside of the body of the valves no steam can obtain access from this chamber, being prevented by packing rings which

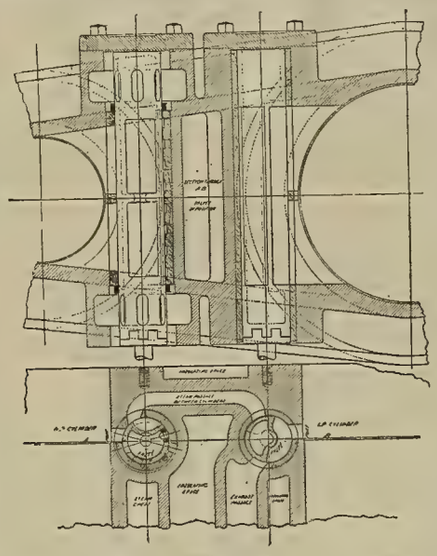


FIG. 2.—DETAIL SECTIONS OF VALVES.

have their bearings upon seats at either end of the main portion of the valve. In this manner pressure, acting upon the valve is claimed to be regulated from its own interior through means of the steam port at one side, and at the opposite side the balance port, arranged with steam-tight packing strips, and with sufficient area to secure a firm seat against both cylinder and exhaust ports, while passages outside the bushing into which the valve fits, communicating with the cylinder ports, complete the balance against the changing pressure within the cylinder. The valve receives always the same degree of movement, regardless of the point of cut-off, and, consequently, says the inventor, no ridges can form in the seat, where a smooth, perfect contact is maintained, improving with wear, while but little force is required for actuation. Exhaust is effected by this valve through a depression in its side formed to complete the passage, which connects the cylinders at the proper time.

The valves in the second cylinder need no cut-off, its steam expansion being a continuation of that begun in the first. They open the connecting passage just before the high-pressure valve releases the steam, and close it with enough time before expansion is completed to leave the steam within it of higher pressure than the terminal of the second cylinder. The passage is opened again when compression has brought the pressure in this cylinder back to the same degree and the completed compression is reached with a pressure about equal to the terminal of the first cylinder. The valves also control the exhaust and compression of their own cylinder.

The single wristplate, shown in Fig. 3, controlling

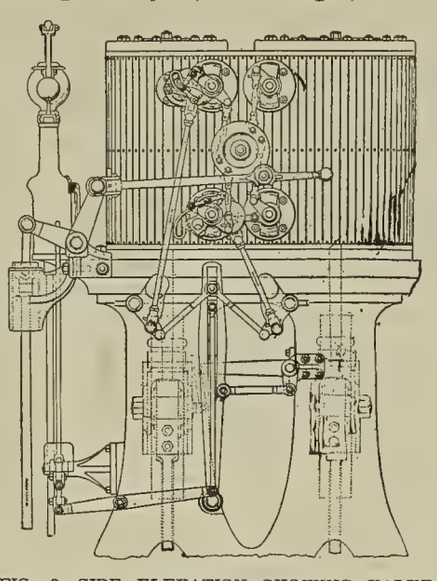


FIG. 3.—SIDE ELEVATION SHOWING VALVE MECHANISM.

the main movements of these valves, is intended to devote its quickening action just when most needed, while giving rest to the valve during the ingress and egress of steam. The cut-off movement is taken from the crosshead, that it may be simple in connection and accomplished at identical positions of the piston for both directions of its movement with its own angular advance. This movement is communicated to a vertical lever which has a slot through its upper limits, in which is carried a sliding block, having connection with the governor, from the center of which links are attached leading off at either side to rocker arms, which also carry connecting rods leading on one side to the upper, and on the other side to the lower valve gear. Cut-off is always completed at an identical position of these rockers, and they are intended to be so arranged that, if the block is down in the slot, the cut-off will come much sooner than if it be up, the range following such part of the whole stroke as may be desired, from no admission of steam at all to a coincidence with the closing effected by the main gearing at about seven-eighths stroke.

FIG. 4.—CARDS WITH AND WITHOUT AN INTERMEDIATE RECEIVER.

The connecting mechanism from the cut-off lever through to the valve gear is in intent so that only just such a part of the whole movement of the lever reaches the valve as is necessary to effect the cut-off, the remainder being lost motion, taken from one limit or the other, according to the position of the block in its slot. This is effected by the rods, which convey this movement to the valve gear, having certain parts of their movement, when the sliding block is downward through an arc, in movement of the rocker, at the lower end, with a fixed or nearly fixed center at the other end. This afterward changes into direct and accelerated movement through the use, in connecting to the cut-off plates at the valves, of toggle links which also have the effect of absorbing excess of movement, when the block is upward, to a longer cut-off, with the intended effect of making the action of the cut-off quick and of the right de-

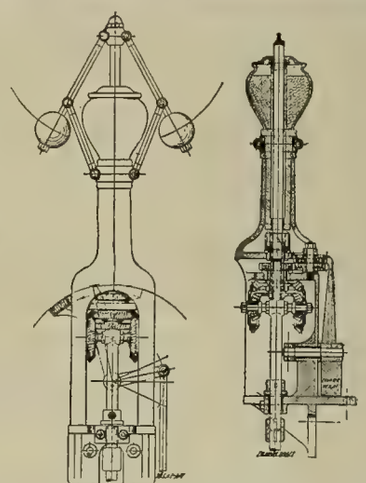


FIG. 5.—ELEVATION AND SECTION OF CHRONOMETRIC GOVERNOR.

gree, yet with smoothness and absence of shock when brought to rest in either direction. The block is moved up and down in its slot by the regulating efforts of the governor and is, with its connections, balanced to reduce its resistance to movements in either direction. As the movement on one side of the lever is effecting a cut-off, that on the other side is restoring the cut-off mechanism to its original position, one action pressing upward upon the block while the other draws downward. Thus, with such correction for balance in the rocker-arms on either side of the lever as is necessary to emphasize their action, they leave the block free to regulation from the governor.

The immediate valve gear, Fig. 3, is set upon a bonnet, as with the Corliss engine. It comprises a crank having a collar keyed to the protruding end of the valve stem, immediately behind which is another collar, mounted and revolving upon a bearing at the end of the bonnet. This collar receives movement through a crank cast upon it, with connection to the wristplate; it also has cast upon it an arm set in line with the valve-stem crank, to which it is connected by means of two links jointed to each other, to the arm and to the crank, as in the construction of a toggle. The center joint of these links carries a strong pin, on which revolves an anti-friction roller, which rests within and follows a groove in a plate set immediately behind the links. This is the cut-off plate, Figs. 7 and 9, and has its arc of movement upon another bearing formed on the bonnet end behind the first. The axis of movement, of this plate, the arm with its actuating crank and the crank upon the valve stem are identical with that of the valve itself. The arc-shaped groove in the cut-off plate through which the anti-friction rollers run is also concentric with the axis of the valve through the

greater part of its length. So long as the roller is held here, the crank which receives movement from the wristplate, and that on the stem of the valve, must move exactly together, the valve being thus revolved to the opening of exhaust, back again to its closing and on to the opening of the steam port, directly from the action of the wristplate. It will also

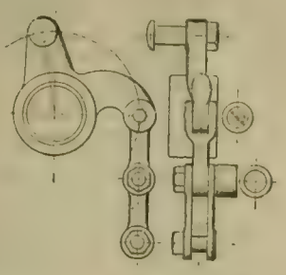


FIG. 6.—DETAILS OF GEAR UPON VALVE STEM.

in emergency close the steam port; but the groove in the cut-off plate is so arranged that when the steam port is just fully open, the roller has passed by easy transition into another portion of the groove, being another arc, which is concentric, not with the axis of the valve stem, but with the center of the pin

FIG. 7.—CUT-OFF EFFECTED WITH LAP.—MOVEMENT STILL CONTINUING IN DIRECTION OF ARROW.

in the end of its crank, and which has a radius of construction just equal to the length of the link between the crank and the roller. On reaching this changed arc, the roller is carried through it with ready expansion, and as the pin end of the valve crank is now in the exact center from which the arc is struck—the link having the exact length of its radius—the valve can no longer move, notwithstanding a forward movement of the arm to which the second link is pivoted. The end of the valve-stem crank

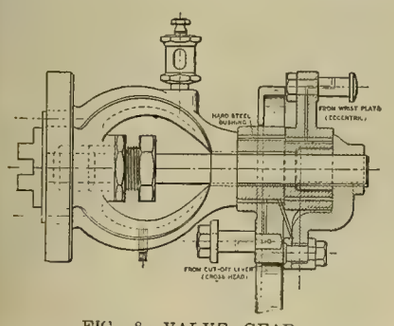


FIG. 8.—VALVE GEAR.

necessarily keeps its position in relation to the center of the arc in which the roller end of its connecting link is moving, and if the plate is moved the crank will move with it, only changing the position of the roller in the groove. A leather-covered buffer, however, is in position upon a spur raised from the plate before the valve-stem crank, where it

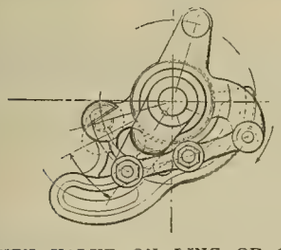


FIG. 9.—WITH VALVE ON LINE OF OPENING BY MAIN MOVEMENT.

comes to rest quietly through the gradually decreasing motion, controlled by a reverse arc in the groove, which joins the concentric and eccentric portions.

The engine is governed by the Dow chronometric governor shown in Fig. 5. This differs radically in principle from the ordinary fly-ball governor, although resembling it somewhat in appearance. The position of the valves is not dependent on the position of the fly-balls, which here act, not as centrifugal weights, but as a rotating pendulum, tending to maintain an isochronous speed. This pendulum is driven by an elaborate differential bevel-gear train, the difference in speed between the shaft of the engine and the rotating pendulum being taken up in a sector-shaped gear operating the valve cut-off mechanism. Thus, so long as the work done on the pistons is not exactly balanced by the load and there is a tendency toward acceleration or retardation of the speed, this acceleration or retardation itself continues to move the valve mechanism toward a shorter or longer cut-off position, respectively, until the two speeds are equal.

The Genesis of Petroleum and Asphaltum in California.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

Distillation.—The maximum quantity of liquid hydrocarbons is obtained from the solids by a process of distillation under high pressure and low temperature, combined with rapid condensation.

Temperature and pressure exercise a considerable influence on the nature of the products of distillation. The method of cooling also exercises great influence in the rearranging of the molecules and upon the nature of product of distillation.

Slow cooling or quick cooling make no difference on some substances, but the difference between slow and rapid cooling has a marked effect on others.

If we reduce the heat of water from a high to a low temperature it will not affect the constitution of the water; whether we lower the temperature slowly or quickly, the result will be the same. Water that is slowly cooled from the boiling point down to the freezing point will have the same properties as water that is rapidly cooled down from 212° to 32° F., but that does not hold good with all substances, for example, if we take three bars of steel of equal dimensions and make them all red hot; then if we slowly cool one bar down to say 50° in the air, and if we cool the second bar by slipping it slowly into cold water, and if the third bar be suddenly cooled by plunging it into cold water, the effect of cooling these three bars of steel will produce a different effect in each bar. The bar that is slowly cooled in the air will remain comparatively soft and be of fibrous texture, malleable and ductile, capable of being bent double without breaking. The second bar will be harder and more elastic and can only be bent a small degree without breaking. The third bar will be very hard and brittle and cannot be bent, and if struck with a hammer will fly to pieces, the fracture showing a crystalline structure. Now these three bars were simply deprived of the same number of degrees of heat. They were reduced from an equally high degree of heat to an equally low temperature but we find that the difference in time occupied in cooling makes a vast difference in the molecular structure and properties of the metal.

These facts are well known to all workers in metal, but it is not so well known that in cooling mixed gases, especially the hydrocarbons, from a high to a low temperature, the effect on the constitution of the gases varies with the time occupied in cooling, and that difference between quiescence and agitation during cooling has different effects on the molecular constitution of mixed gases, especially with mixed hydrocarbons.

Place two retorts of the kind used for making illuminating gas from coal in one oven, so that they will get equally heated up to a bright red heat, and let us charge each retort with one hundred weight of good coal, which will make 500 feet of gas. Now let us cool the gas from retort number one slowly by passing the gas slowly through a number of pipes placed vertically in the open air in the manner usually done in gas works; let us cool the gas from number two retort rapidly by passing the gas through a multitubular condenser surrounded with a freezing mixture and we will find the result to be that 500 feet of permanent gas and five pounds of tar will be delivered by number one retort, and we shall get about 300 feet of permanent gas and thirteen pounds of tar from number two retort. There we find that rapid condensation reduce two-fifths of the gas to a liquid state; and if we were to distill under high pressure and low temperature we should with rapid condensation accompanied with agitation, reduce nine-tenths of the gas to a liquid state. To produce permanent gas from coal we should distill under low pressure and high temperature and cool the vapors rapidly under agitation.

When gas is violently agitated during the cooling process a greater quantity is condensed into the liquid state than when kept in a quiescent state during the cooling process.

When gas much cooled is passed through a coke tower down which heavy oil is trickling, this oil will absorb the light hydrocarbons of the gas.

The boiling points of the hydrocarbons of petroleum are altered very considerably by foreign, or even by the traces of foreign subtances, being present. The presence of different substances during distillation has an influence on the distillate. It has been found that when a mixture of chlorine with hydric chloric is passed through an ordinary charged gas retort it acts as a hydrogenating or dissociating agent producing a tar very rich in benzol. On the other hand zinc chloride in the presence of hydric chloride greatly increases the yield of heavy hydrocarbides from coal and can convert some of the lighter constituents of the tar when distilled therewith into heavy ones.

The nature of the product also depends on the material of the retort. A rough surface will facilitate chemical changes.

By repeated distillations solid paraffin can be gradually changed in liquid kinds and olefines.

Mineral tar by repeated distillation in the presence of superheated steam will be converted into gas if the united vapors of the steam and tar are decomposed by heat after each distillation.

Sulphur when present in a still with paraffin retards its ebullition. The introduction of sulphur into a paraffin boiling at 140°-150° C. may retard its boiling point as far as 180°-200° C. according as it may exist in a greater or less quantity. In consequence of the presence of the sulphur in the still retarding the ebullition, the vapors of the paraffin are heated to a point far above their boiling points; therefore they are decomposed to hydrogen and carbon. The liberated hydrogen combines with the sulphur vapors, forming sulphuretted hydrogen.

Shales containing $\frac{1}{10}$% of sulphur yield scarcely any paraffin on distillation.

YIELD OF GAS, OIL, ETC., FROM SHALES AND COALS AT HIGH AND LOW HEAT.

		Good Shales.		Boghead Coal.		Gas Coal.	
		High.	Low	High	Low.	High.	Low
Volatile.	Gas	13 65	2.54	37 32	4 83	20 49	6 49
	Ammonia water	3.65	6.47	2.43	3.23	3.09	7.24
	Tar or oil	11 01	17.65	20.65	50.29	17.08	26.45
	Sulphur	99	.....	.18	.....	.29	.....
	Water at 212° F	2.82	.....	.80	.....	4.15	.....
		32.15	26.66	61.38	58.35	45 10	40.18
Coke	Fixed carbons	4.16	10.81	9 01	12 40	45 00	49 93
	Sulphur	1.05	.....	.09	.....	.34	.....
	Ash	62.64	65.53	29 55	29 25	9 56	9.89
		100.00	100.00	100 00	100.00	100 00	100.00

What is known under the general name of petroleum includes a series of hydrocarbon oils varying widely in physical properties. Some are limpid fluids with many intermediate grades, others are found viscid and tar-like.

Hydrocarbons generally exist in three different conditions: First, the gaseous condition, wherein the equivalents of hydrogen are equal to or greater than the number of equivalents of carbon; second, in the liquid state where the equivalents of carbon exceed the equivalents of hydrogen; third, in the solid state where the carbon exceeds the hydrogen in still greater ratio than in the liquid state.

Their color by transmitted light ranges from a light yellow through orange and red to a reddish brown, so dense as to be translucent only in their films, while by reflected light it passes from a light dusky color to a dark green and to a black. They differ as markedly in odor and also in other properties, some having a very disagreeable smell, while others are considered even pleasant.

There is a wide range in their gravity. The greater the quantity of carbon in proportion to the hydrogen any one of them contains, the greater is its specific gravity, the higher its boiling point and density of vapor. In the same oil field, the same series of strata, and the same stratum there are differences of composition.

The following are the commercial names of the products of distillation of crude petroleum: Cymogene, rigolene, gasolene, naphtha, benzine, kerosene, maltha and paraffin. There is no well marked division line betweem any of the above named products, but they gradually merge one into the other.

Their division is simply one of caprice. These hydrocarbons are extremely complex and different in composition. The proportion of carbon and hydrogen is extremely variable. There seems to be no end to the different combinations of hydrogen and carbon.

The great diversity in the physical and chemical condition of the bitumens can be attributed:—First, to the organic remains from which it was distilled—different kinds of terrestrial vegetation and marine vegetation: by natural process these organic remains may have been changed into peat, lignite or coal before distillation; second, the degree of temperature to which organic remains are subjected during distillation; third, the pressure to which it is subjected during distillation; fourth, the time consumed in effecting distillation; fifth, the presence of different substances during distillation—sulphur, lime, water, oxygen, nitrogen, etc., which render their properties very different; sixth, the condensation of the bitumen after distillation whether rapid or slow, agitated or quiescent; seventh, the material of the still; eighth, to repeated distillations; ninth, evaporation; tenth; sulphuration, oxygenation, etc. Electricity may also play an important part.

(To be Continued.)

Latest Progress in the Application of Storage Batteries.*

By JOSEPH APPLETON.

The history of the storage battery in this country is curious, and probably comprises more trouble and trials than any other branch of the electrical industry. Until 1894 the use of storage batteries in this country proved most disastrous to all concerned. The reasons were many, but may be summed up briefly as follows:

1. The batteries were poorly designed.

2. No attention was paid to the mechanical features, the chief idea being to get the greatest capacity for the lightest weight.

3. The batteries were much over-rated, their full capacity being given as their normal working capacity.

In addition to this, the storage battery business generally was in an unsatisfactory and weakly condition. Litigation was the principal cause. Now the conditions are very different. All are familiar with the changes which have been made during the last five years in the commercial end of the business. All the disturbing elements have been removed, and the business has been put on a proper and substantial basis. These results are best seen from the following table, which gives the weight of plates alone. The figures for 1898 have not been tabulated, but they will show that the use of storage batteries is progressing more rapidly than ever:

Year.	*Pounds.*
1894	349,000
1895	1,112,800
1896	2,315,300
1897	3,607,300

Or, in 1897, ten times the business of 1894.

The storage battery is entirely different from any other piece of apparatus which is used for supplying electrical energy, being constructed and operated on the principle of chemical action instead of mechanical motion. There must, naturally, be a vast difference between these two principles.

In the mechanically operated apparatus, or generator, the output of electrical energy is the result of the conversion of the mechanical energy applied to it while in action, and the regularity of the output is dependent on the steadiness of the mechanical energy applied and the satisfactory running of the generator and motive power. The operation is purely mechanical and is subject to the interruptions to which all moving machinery is liable. Again, such apparatus, if overloaded to an excessive degree, will give visible signs of distress, and if the overloading is very great, or is continued, will probably give way in some mechanical feature.

In a storage battery hundreds of horse power can be silently stored, and thousands of horse power delivered for a short period, with no apparent action or change in the battery.

Any mechanically operated apparatus is liable to interruption through breakage or injury to one of its parts, but in a storage battery the chemical action will continue, and consequently the output of energy until all the material on the plates has been converted.

An overload has not the same effect on a storage battery as on a mechanically operated generator. For a short period an overload, even of great extent, does not injure a storage battery. It causes the chemical action to take place more rapidly, or, to be more exact, causes more material to be subjected to the chemical action; and this, if not continued too long, or repeated too often, does not affect a good storage battery.

One of the most valuable features of a storage battery is that it will safely take care of any sudden and momentary overload in the system, such as grounds or short circuits, and if operating in parallel with generators or rotary converters will relieve them of such overloads and consequent strain. I have frequently seen batteries burn out grounds and an underground system, discharging for a short time at an enormous rate. And in case of batteries operating on railway loads it is a common thing to see an occasional momentary discharge at a rate equal to twice the hour rate of the battery.

It may be well to consider before going further into our subject the question of the rates of charge and discharge of storage batteries and their capacity at different rates. Of course, this will vary somewhat with different types of battery, but not to a great extent. The more rapidly you discharge a battery the smaller is its available capacity. It is only within the last few years that a one-hour discharge rate has been possible with a storage battery, and it is very largely due to the fact that storage batteries can be discharged at such rapid rates that their use has been growing so rapidly.

Storage batteries are not free from trouble any more than other apparatus, but under favorable conditions the comparison is much in favor of the storage battery. As is the case with all machinery and apparatus which have to be operated continually for any length of time, the results obtained depend, not entirely on the design and construction, but on the care and judgment with which it is operated.

In the early days the storage battery manufacturers, in order to maintain a bare existence, had to jump at every opening for the use of a storage battery, whether the conditions warranted it or not. Now things are entirely different. The business is on a commercial basis, and it is not a question of getting an order at any price, but securing business which will prove satisfactory and permanent. Now storage battery manufacturers will insist on proper conditions for the operation of their batteries or refuse to put them in. This is as it should be, and I think I am perfectly safe in saying that during the last four or five years there has not been a storage battery installed in this country except under conditions which justified its use. Of course, some experimental applications have been made which may or may not prove satisfactory, but this does not come under the head of the general application of the storage battery.

It should be distinctly understood that all conditions of electrical distribution are not suitable for the use of storage batteries, and that it is more to the interest of the manufacturer than the purchaser to confine himself only to those situations which are suitable, for every failure which is recorded is heard of one hundred times to every success.

The trend of electrical engineering to-day is toward the concentration of generating machinery, the highest possible economy in operation and the utilization of motive power and generating machinery to the fullest extent so that the investment may produce the greatest return. These conditions make the storage battery indispensable, for without its aid it is impossible to maintain a constant load on the power house. Every application of electricity has its time of maximum output, or "peak," and no matter how many different applications are supplied from the same system their peaks will not fit in so as to even matters up; but, on the contrary, it is found that in many cases the peaks occur at about the same time. This is particularly noticeable with a railroad and a lighting load. Again, concentration of generating machinery means a larger area for distribution and the necessity of sub-stations, in order to keep down the investment in conductors, and experience shows that in the majority of cases storage batteries are cheaper than the copper alone, which would otherwise be necessary, leaving out the advantages at the power house.

It used to be customary to refer to European practice to show what could be done with storage batteries, and even now I believe that some people think that European batteries and methods are superior to ours in this country. In connection with this idea, there is one thing that I particularly wish to emphasize, and that is the difference between American and European conditions. In Europe storage batteries are not subjected to the severe work they have to stand here. They are looked upon more as a reserve, and are not expected to discharge at their maximum rate every day, and perhaps twice on some days. As an example of this, I will tell you what one of the Tudor Company experts from Germany said when he was over here last spring. He was attending the National Electric Light Convention at Chicago, and one of features of that convention was the large storage battery plant which the Chicago Edison Co. had recently installed. During one afternoon while the convention was being held a very heavy thunder storm came on, and the battery was called upon suddenly for its maximum rate of discharge, and the full rated capacity was talken out. The maximum rating of this battery was a complete discharge in one hour. Our German friend thought that was doing pretty well, but when we told him that this storage battery was installed under contract which allowed the battery to be discharged at this rate every day during the winter, he was horrified and said: "You must not let them work the battery in that way; tell them they must hold it as a reserve." We told him if we did that we should not be able to do any business. The installation is interesting as being the largest individual battery ever installed for a lighting station. They had their original power plant in Adams street, which is practically in the center of the down-town section of Chicago. This plant was abandoned in August, 1894, just six years after it was started up, and a large modern power house was erected on the river at Harrison street. Their maximum load in 1897 was 44,000 amperes or 8,000 electric H. P., and early in 1898 it was estimated that the maximum winter load for that year on the down-town system would be in neighborhood of 55,000. In fact, the point had been reached when new investment, either in generating capacity or battery, had to be made. The peak of their load during the winter occurs about 4:45 P. M., and lasts forty-five minutes to one hour and a half. Their method of operation is as follows:

The current from the Harrison street station is transmitted over the lines to the old Adams street building, being distributed over the network of mains from that point. The distance between Adams street and Harrison street is about 3,340 feet, and the tie lines between the two places have a capacity of 66,000,000 c. m. If additional generating capacity had been provided for the peak of 1898, it would have meant a corresponding increase in this tie line, but by installing batteries at Adams street, the center of distribution, not only was the saving in generating capacity effected, but also in the tie line. The battery installed at Adams street consists of 166 cells, arranged eighty-three on each side of the three-wire system, and each cell contains eighty-seven plates $15\frac{1}{2}'' \times 32''$. The containing cells or tanks are constructed of 2″ ash, lined with five-pound sheet lead. The dimensions of each cell are 9″ wide, 6′ 8″ long and 4′ high.

(*To be continued.*)

*Condensed.

New Things That Are Old.

TO THE EDITOR:—The old adage that "there is nothing new under the sun" may have been true in the time of Solomon, but is no longer true in these inventive and progressive days when almost every day brings something new in the way of invention or discovery. I will refer but to two instances to show that many inventions and discoveries considered new were long ago suggested and some put in practice. I note in the January 14th issue of your journal that the Union Iron Works have designed and patented a mode of increasing the yield of a stamp mill by using an intermediate crusher to do fine work, crushing the ore to ¼-inch dimensions before being fed to the mortar of the battery. It is an exceedingly simple arrangement, will prove very effective and is undoubtedly an improvement, for it throws the heavy work on the crushers and relieves the batteries, increasing their duty largely and therefore is a valuable addition to every mill.

Several years ago in my own mill I placed a pair of rolls between the crusher and the mortar. They were set ¼ inch apart and they gave an increase of 65 per cent in the yield of the mill. The use of rolls for this purpose I consider preferable to a second crusher for several reasons, which I think will readily occur to any one experienced in such work. To test the efficiency of rolls in connection with a crusher, I found that a pair of rolls, 20-inch diameter and 12-inch face, 100 revolutions per minute, would take the crushed ore from the crusher and supply a 20-stamp mill, none of the ore going into the mortar being larger than ¼ inch in size and this so fractured that the stamps made quick work of it.

To mention another illustration of the old adage quoted above: I have lately seen an extract from the London *Telegraph* in which it is stated that flat steel springs placed on each side and stern of a vessel, at a proper angle, will drive the vessel slowly ahead, two or three miles per hour, as the vessel rolls broadside or sinks deeply by the stern—in other words, that the action of the waves can be made a propelling power, to be used in calms found in all oceans and seas and especially in the "doldrums" or "horse latitudes" on or near the equator, where the vessel will often lie becalmed for weeks at great loss of time and expense. These springs are to be used only as necessity requires, and are detached as soon as the vessel is driven by her sail power.

This idea is not new. In 1855 Auguste Ionan, a Frenchman in San Francisco, suggested to me the same thing and we put it in successful practice experimentally, using a model 4 feet long, furnished with six flat finely tempered steel springs, three on each side. The model was placed in a 12-foot trough of water, and on a rolling motion being imparted to it the vessel moved readily and steadily forward. This was practical demonstration.

Sonora, Jan. 28th, '99. LOUIS BLANDING.

Of Usual Occurrence.

A leading machinery manufacturer of Chicago writes: "I wish to compliment the MINING AND SCIENTIFIC PRESS on the attention that an item in it attracts. A recent announcement has brought a snowstorm of replies. They come from every part of the country. We have had several responses from the East, New York, New Jersey, etc., the writers stating they saw the advertisement in your paper."

It is not, however, always usual to have our readers mention the source, for busy men rarely have time to say where they saw the advertisement that attracted their attention, the main point being with them to get what they want.

A prominent firm in San Francisco, large manufacturers of mining machinery, write: "Did our advertisement cost five times what we pay for it, we would consider it a good investment. It is a big business producer."

A Denver, Colorado, concern say: "Whatever else we drop we want our advertisement continuously in the MINING AND SCIENTIFIC PRESS. We are in constant receipt of letters from all parts of this State, Arizona, Utah and Mexico that we feel confident are the result of our announcement in your columns."

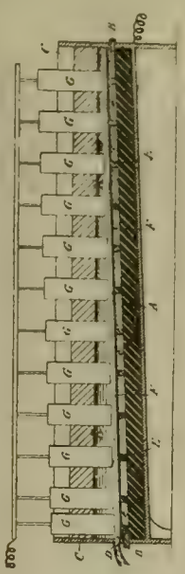
These three letters were received this month with several others similar in tone. It is perhaps, in order to say that this paper believes that its paid bona fide circulation west of the Missouri river exceeds that of any similar publication.

Latest Mining and Metallurgical Patents.

Patents Issued January 31, 1899.

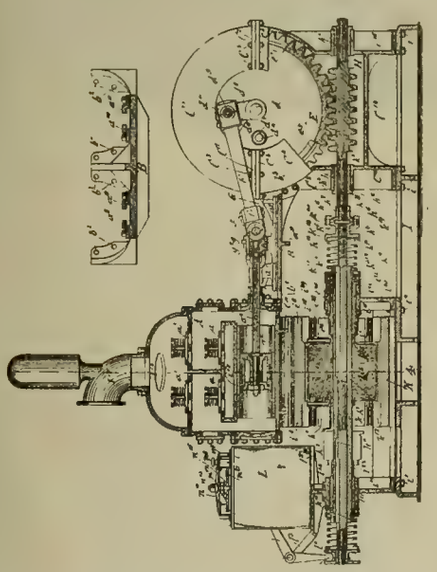
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ELECTRIC FURNACE.—No. 618 391; H. Bovy, Geneva, Switzerland.



An electric furnace with furnace body of conducting material, carbon blocks supported in upright position on body, each block forming a lower electrode, a filling of carbon powder between the blocks, carbon plates arranged between their upper ends and resting upon filling and additional electrodes arranged and supported above lower electrodes, the latter electrodes being of such size as to be rendered incandescent by the passage of the electric current.

ELECTRIC PUMP.—No. 618,404; C. Eickmeyer, Yonkers, N. Y.

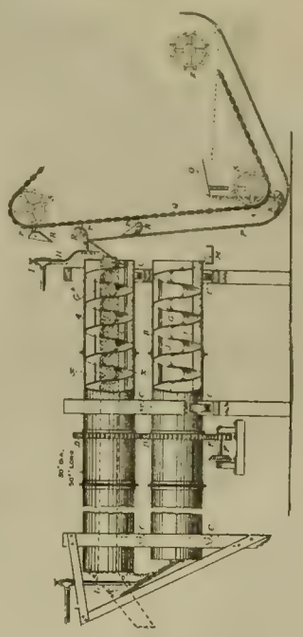


Combination with an electric motor and a sleeve-shaped shaft on which the armature of the motor is mounted, an auxiliary driving shaft on which the armature shaft is arranged; means for permitting the relative longitudinal movement of auxiliary shaft in armature shaft, for causing its rotation by the rotation of the armature shaft and means for resilienty and yieldingly supporting the auxiliary shaft in its longitudinal movement. Field coils are wound on the magnetic poles, so that the thickness of the coils on one side is in a fixed ratio to the thickness of the same coils on the opposite side; while the depth of the coils on one side is in a fixed universe ratio to the depth of the coils on the opposite side, there being a flat rectangular series of coils for magnetizing or demonetizing the armature field magnets by means of dynamometric regulation.

MECHANISM FOR OPERATING MINE DOORS.—No. 618,678; Humphreys & McGrew, Irwin, Pa.

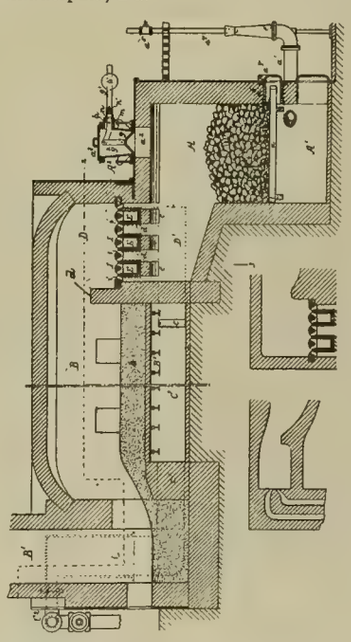
The combination with a mine door and a tramway running past the same, of two wheel bars extending longitudinally of the rails and located respectively at the sides of the door, a sliding connection bar coupling the two wheel bars to transmit movement from one to the other, means for supporting the bars so that they will move vertically under the influence of the wheels passing over the said bars, a rock shaft actuated by the wheel bars and a connection between the rock shaft and the door to operate the door.

APPARATUS FOR EXTRACTING METALS.—No. 618,622; Phillip Somerville, Bishop, Cal.



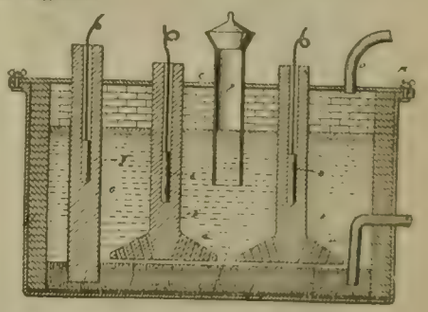
An apparatus for extracting metals consisting of parallel barrels having annular disks closing one end with central inlet openings for the material, a frame-work and roller support for the barrels, means whereby they are rotated in opposite directions, spiral flanges fixed to the interior of the barrels for advancing the material therethrough, devices for feeding material and fluid matter to the uppermost barrel, means for separating the coarse from the fine material and delivering them separately, and means for transferring material from the discharge end of one barrel into the inlet end of the barrel below. The rotatable barrel is mounted on the frame or support and the flange extends from one end to the other of its interior.

METALLURGICAL FURNACE.—No. 618,751; D. Townsend, Philadelphia, Pa.



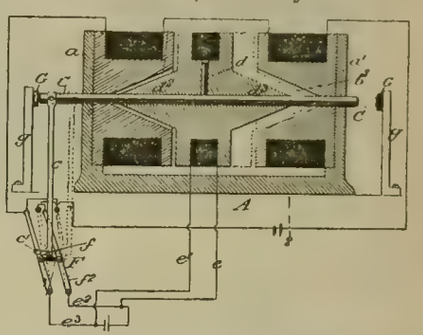
The combination of a metallurgical furnace, the gas-producing chamber *A* having the grate *a*, a blast pipe communicating with the space under the grate, a hopper in the upper portion of the producer, a passage *D'* for the gases generated, transverse air ducts spaced to form passages *d'* communicating with the passage *D'*, a perforated partition above the air ducts and passages, some of the perforations communicating with the ducts while others communicate with the passages, a combustion chamber *D* above the partition, a heating chamber *B* beyond the combustion chamber and with which the combustion chamber communicates, a stack, air passages in the stack and under the bed of the heating chamber, the air passages communicating with the ducts.

APPARATUS TO PRODUCE CHLORINE, ZINC, ETC., FROM MIXED ORES.—No. 618,575; F. M. Lyte, London, England.



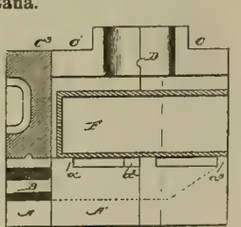
A conjoint process for the treatment of complex sulphide ores of zinc usually carrying lead and silver, such treatment consisting in grinding and calcining the ore at a low red heat to convert the zinc sulphide into zinc sulphate, in extracting the zinc sulphate formed by lixiviation; in converting the zinc sulphate into zinc chloride by treating it with an alkaline chloride and refrigerating; in concentrating the zinc chloride formed and rendering it anhydrous by heating it in the presence of metallic zinc, assisting the action of the zinc by electrolysis, in order to decompose the water of hydration, and in subsequently decomposing first the zinc oxide and then the zinc chloride by means of electrolysis with an anode of carbon and a cathode of fused metallic zinc for the production of chlorine and metallic zinc and in the case of complex sulphide ores recovering the lead and silver by smelting.

DIRECT-ACTING RECIPROCATING ELECTRIC MOTOR.—No. 618,702; J. H. Mason, N. Y. City.



A direct-acting reciprocating electric motor comprising two field magnets spaced apart, an armature arranged to reciprocate between them, one provided with centrally arranged conical recesses, the other with centrally arranged conical projections located at all times partially or wholly within the recesses, the pair of magnets and the armature being provided with adjacent vertical annular faces surrounding the projections and recesses, whereby the magnetic field is enlarged and is provided means for maintaining a constant electric current in one direction through the armature, means for energizing the field magnets and means under the control of the movement of the armature for changing the direction of the current through the field-magnet coils.

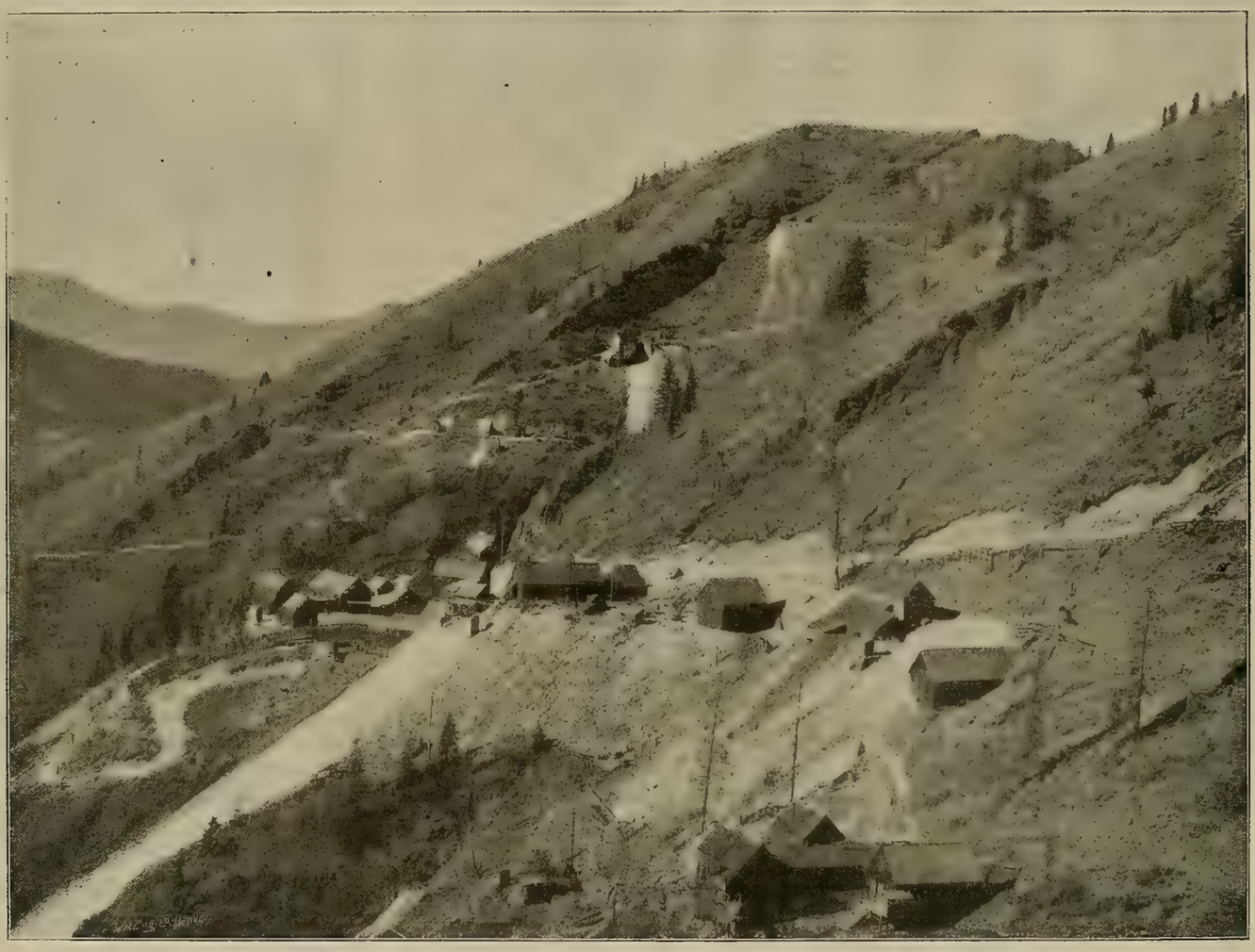
ASSAY FURNACE.—No. 618,768; J. R. Bapty, Helena, Montana.



An assay furnace with a base formed in sections with separate combustion chambers formed centrally therein, deflecting surfaces at the forward end of the combustion chambers, muffle-supporting blocks rising from between the combustion chambers and at each side thereof, arch sections resting on base sections and forming the muffle chamber whereby, when the muffle is removed, the combustion chambers are open and free of access, a muffle-chamber closing section at the rear end of the furnace and a base section upon which it rests, having an entrance aperture for the combustion chamber. The blocks at the forward end of the furnace extend the width of the muffle chamber, the muffle bridging the muffle chamber.

Mining Among Mountain Snows.

Colorado this week reports unusual snowfall, resulting in some cases in serious loss and inconvenience. Winter mining in Colorado requires a large degree of pluck, endurance and determination, as it is carried on at unusually high altitudes. Few mines in the State are less than at an elevation of over 8000 feet above sea level, and in several instances mining and milling are carried on the year round at an elevation of 12,000 feet. When with that is coupled a 5-foot snowfall and drifting winds, it will be partially realized what such steady prosecution of work means. Herewith is presented a view of the highest postoffice in the State—Smuggler, in San Miguel Co.—on one of the loftiest crests of the Rocky mountains, nearly 13,000 feet above the sea, the site of the famous Smuggler-Union mine, from which ore worth more than $15,000,000 has been extracted. Here over 250 men are employed the year round. Of course, in such heavy weather as the present, with so heavy a fall of snow on the levels, and deep drifts everywhere, the camp is totally isolated. Supplies of all kinds are provided in large quantities against such contingencies, and beyond being temporarily off from communication with the outside world, the regular underground workers pay little attention to the storm.



THE TOWN OF SMUGGLER, THE HIGHEST POSTOFFICE IN THE STATE OF COLORADO.
High up to the left is the terminal of the Smuggler-Union tramway, the postoffice and store.

TAKING HEAVY MACHINERY UP THE SMUGGLER TRAIL.
Some transportation problems in the mountains are difficult, but hard work and sticking to it always lands the heaviest load at the top.

On this page is also presented another cut showing the slow process of taking heavy machinery up the Smuggler trail. These pictures are from photographs taken last October for the enterprising Telluride *Journal*.

Minting Gold and Silver.

NUMBER II—CONCLUDED.

The next operation is designed to remove the silver; this is effected by boiling in nitric acid, when the silver dissolves, leaving the gold in a finely divided state. The plant used for this purpose consists of a number of large porcelain jars capable of holding about thirty-five gallons each,* arranged in a double row and heated by steam pipes; they are inclosed in a chamber provided with sliding doors to prevent the escape of the noxious fumes, which are carried into a tall chimney from which they issue in a yellowish cloud. The dissolved silver is drawn off by means of a large siphon made of native California gold (valued at $3000) and transferred to a vat made of wood (capacity 2000 gallons), resembling those used in breweries. The vat contains several hundred gallons of salt water, and the silver is precipitated by the chlorine, a workman facilitating the operation by agitating the liquid with a large paddle provided with a long handle.

The precipitated silver is drawn off into large filters placed on trucks and thoroughly washed by running water until the test of litmus paper shows that all trace of acid has been removed. The chloride of silver now resembles pure white cottage cheese. It is transferred to another vat lined with lead. Zinc (which has been previously granulated by pouring while melted into cold water) is added to the silver, together with a little sulphuric acid; the chlorine deserts the silver for the baser metal, forming a soluble salt of zinc. The solution is allowed to flow off, and the precipitated silver, after having been thoroughly washed, is pressed into round cakes, dried in an oven and melted in the furnace; it is finally cast into a bar, and is found to be uncontaminated with its former base associates, being usually 998 to 999 fine. The gold which remained in the porcelain jars is in the form of fine powder, and resembles sifted gravel. After thorough washing to remove the silver nitrate the gold sediment is placed in cast iron pots and boiled in strong sulphuric acid with a little niter added; it is then washed, dried, pressed into cakes and melted. The bars are nearly pure gold, about 999 fine.

The melter and refiner now weighs out the requisite amount of copper to form the coin standard, which is nine parts of gold or silver (as the case may be) and one part base metal, our coin standard being nine-tenths fine.

The alloy is melted in large crucibles made of plumbago, holding over 6000 ounces, and constantly stirred to render the mass homogeneous. The standard metal is cast into flat bars called ingots, 12 inches long, ¾ inch thick, and from 4 to 1½ inches wide; the ingots are filed to remove the ragged edges, and the rough tops cut off with large steam shears. Two samples from each melt are assayed, and if the ingots are found to be of the proper fineness and of uniform composition, they are delivered to the coiner, who transfers the ingots to the rolling mill, and when they have been sufficiently laminated by successive rolling and annealing, the strips are passed through the draw bench to reduce them to the exact thickness required for the coin. This operation is similar in principle to wire drawing, and consists in squeezing the flat strips of metal between two stationary steel cylinders set to the desired gauge. The strips are now passed to the cutting press, which consists essentially of a round punch, the size of the planchet or blank required for the coin, working up and down very rapidly into a hole on the steel bed plate. The strips are passed by hand through the press, and the blanks fall into a box below. The unused portion of the strips or clippings is returned to the melter and refiner and remelted. The planchets are next taken to the adjusting room, where employes are seated at a long table, each one provided with a little balance and a file. Each one is supplied with a pile of planchets, and weighs each planchet against a properly adjusted counter-weight. The planchets that are too light are thrown into a separate pile and returned to the melter and refiner, to be remelted with the clippings, while those that that are too heavy are adjusted by filing on the edge.

The next operation to which the blank pieces are subjected is to impart the raised edge, technically called milling. The blanks are fed by an attendant into a tube, and drawn horizontally, in single file, through a gradually narrowing channel formed by a groove in the periphery of a rapidly revolving disk on one side, and a stationary segment of corresponding curve on the other, keyed a little closer to the wheel at one end. The blanks are in this way compressed on the rim, acquiring the milled edge. This machine is capable of milling as many as 1200 pieces per minute. The blanks are now taken to the pickling vats, where they are immersed for a couple of minutes in weak sulphuric acid for the purpose of removing the black oxide of copper; they are then washed in pure water and placed in a rotating cage filled with sawdust. This rapidly dries the blanks, and when removed to the coining room they have acquired a fine surface.

The coining machine operates on the mechanical principle of the toggle joint; the blanks are placed in a vertical tube. A pair of feeders catch the bottom piece and carry it forward, where it rests in the collar between the upper and lower dies; the lever is now descending with the upper die while the lower die remains fixed; the pressure increases with perfect uniformity up to the maximum, which is equivalent to about ten tons for the dime, eighty tons for the double eagle and 120 tons for the silver dollar. The pressure gradually decreases again by reason of the relaxation of the upper joint, the lower die pushes the piece out of the collar into which it has expanded, and from which it acquires the reeded edge. Meanwhile, the feeders have provided another blank, and as they bring it forward they push the coined piece into a channel, through which it slides into a box beneath the machine. The coins are then inspected by the foreman, and any cracked or defective pieces set aside.

After the coins have been counted and weighed, they are tied up in linen bags and delivered to the treasurer in drafts of $5000 each. The accuracy of the adjustment of the weight is so nice that there is rarely a deviation from the true standard weight of as much as $\frac{1}{100}$ of an ounce in any delivery of either gold or silver coin.

As a final precaution, the assayer is required by law to select at random one coin from every lot of $20,000; these are sealed in envelopes, numbered, and placed in a strong box provided with two locks; the key of one is kept by the treasurer and the other by the assayer. These sample pieces are called the pyx. They remain sealed until the commissioners appointed by the President assemble at the annual assay in February of each year to test their purity and weight; and it has rarely happened that any piece has been found to exceed the small limit of tolerance allowed by law.

*The charge for each jar is usually 190 pounds of granulations and 175 pounds strong nitric acid.

Some Opinions on Mine Management, Etc.

TO THE EDITOR:—There is no hard-and-fast method of conducting a mining business that will apply under all circumstances; consequently, the organization of directive force must needs conform to actual individual requirements; but, beyond the question of having a manager, or resident director, there should be no considerable difference of opinion as to what constitutes a good mine organization and consequent management.

With your permission, I will present some impressions of what seems to me essential for the organization of an efficient mining force; but, before doing so, will notice one or two practices which experience has shown to be radically wrong.

I will first notice a practice, which is not uncommon with English companies, of sending to the mine a general director or manager, a superintendent, a secretary, a chemist, perhaps an engineer and foreman or foremen, all appointees of the home office. An organization of such individuality and ponderosity is too high-toned and top-heavy for almost any mine to carry, for it will necessarily be expensive, and the probabilities are that it will be extravagantly so, beside which, each being an independent appointee, there will be absence of harmony, and extravagance in detail. And, still further, each appointee will have some interested friend in the home management to whom he will be secretly reporting; the reports will be conflicting, and, if they ever encounter one another, there is liable to be a hot time in the old town, with a serious reaction. The promoters may say: "Whose business is this but ours?" The reply is: "The rank and file of investors, and the miners, who are injured whenever a mine is damned through knavery or folly, and not upon its merits."

A practice is sometimes indulged in by people of the Atlantic side, but not so frequently as formerly, of sending a man out to manage a mine simply because he was a good, pious citizen, reckoning that, even if he knew nothing about mining, he would conduct the business honorably.

People of the East do not know, as we of the mining regions do, that such ventures are very uncertain; that a supposedly moral man, of good habits, when removed from home influences, is quite as likely as not to become a shining example of total depravity.

It may be essential with foreign companies, and sometimes with Eastern companies, to send a resident director; in such event, the home provision should stop there. This director should select his own superintendent, the superintendent his clerk, and, generally, the chemist, if they are required, and his foremen of the different departments, and the foremen should select the employes under them.

This arrangement provides a responsible head all through. The director then controls everything, and becomes responsible to the home management for everything, each one under him being controlled by him and subject to his direction, which should be only general and exercised solely through the superintendent, who should have the sole direction and control of all detail to be observed or accomplished through his subordinates.

Of course, the magnitude of the business should determine the elaborateness of the corps of management.

With companies organized nearer home, there is no reason for a resident director. The board of control should appoint its superintendent, and the further organization should be completed as already indicated.

We now arrive at the question of management. The resident director should give only such directions to a superintendent as would be given by a board of management, and attend only to such outside business as does not fall within the scope of a superintendent's duties. If he goes beyond this, he is demoralizing the superintendent, thereby making him inefficient—in fact, had better dispense with him before he has accomplished general demoralization.

The superintendent should be reliable and an energetic, level-headed man of affairs, having a good, general practical knowledge of all departments of the business, and, preferably, a specialist at none, for, in such case, it is not infrequent that the general responsibility is lost sight of in following too closely the one hobby. He should spend time every day in careful observation about the mine and works, to make sure that everything is in good order, and to impress the employes that things are not occurring by chance. A mine, including the attendant works, that does not require the presence of a managing head right along and all the time, does not require one at any time.

A man who has obtained his mining knowledge at some school of mines is not necessarily competent, nor likely to be until he has served an apprenticeship at the business, and not then unless he has the necessary business qualifications. The same observation applies to technical graduates. The most that can be said for them is that they have acquired a foundation upon which they may become proficient through experience, provided they have the requisite natural ability.

Much of the success of an organization as above outlined is dependent upon a rigid adherence to the rule that each employe is responsible to his immediate employer, and that any and all directions given shall be through the proper channel, as, for instance, the superintendent shall not pass a foreman and assume a foreman's duties by giving orders to a foreman's employes. Such conduct demoralizes the force.

Some success, too, depends upon the estimate which the employes form of the ability of the superintendent, and the confidence they entertain of his watchful care of everything pertaining to the avoidance of accident. It requires but a very short time for old miners to closely determine his knowledge and ability. To emphasize this point, I will say I have known of hoisting rope being used upon shafts until so worn that individual pieces of wire in plenty in sections of 2 or 3 inch lengths, and sharp at both ends, could be picked out. Whenever such a condition is allowed to obtain, with attendant loss of life, the superintendent should be punished for murder, and the condition, without loss of life, should be punished as severely as assault to murder.

It is not infrequent that, where the business is not large, the superintendent does the assaying. In practice this is, generally, not good, for whenever it becomes known that he is devoting certain hours each day to restricted occupation, advantage will be taken of it to play.

Frequently, where the force is not large and the company pays its bills regularly and promptly each month, which obviates the necessity of opening an elaborate set of books, the superintendent can perform the clerical duties without detriment to the general interests, as the time required for its performance will not aggregate more than three or four days per month, and can be so sandwiched as not to interfere with other business.

Every mine organization should do business upon a cash basis and settle its indebtedness regularly every month, and when it cannot do that it should quit, and that, too, while there is money in the treasury to meet all liabilities.

One of the most trying experiences of a superintendent is the running of a mine upon wind, particularly if it is situated away out upon the frontier, where the only existing law is might, and where coolness and nerve will serve him as against the lawless element that keeps upon the borders of civilization. There may be but little of this element in employ, but recruits may come from God knows where. One thing is certain: whenever hell breaks loose the devil is in active control. When so situated, if an employe does not do his duty, or goes on a drunk, he is likely to be impertinent, perhaps abusive, if remonstrated with, realizing, as he does, that he cannot be discharged—would rather be than not—for then he would needs be paid. The whole force becomes indifferent and demoralized, as it fears it may be working for nothing, until there may occur, frequently does, open, general insubordination and sometimes destruction of property; when, if the superintendent is not very nervy and discreet, or very cowardly, the wind-up is likely to fall upon him, to his physical injury or total undoing. And all of this, which is outside of legitimate mining, is forced upon him by the home office without apparent care for the outcome.

When a mine is paying well, there is no inquiry as to how it is accomplishing it, and the superintendent is an excellent man, who knows his business; but let

the pay stop, there is mismanagement, he is an ignoramus, and always was.

Conditions are so varied and varying in mining, that results cannot be predicted except with some ifs; consequently, the best of effort and conduct of business frequently ends in failure, while the most slovenly attention to and direction of affairs frequently pays excellently well.

The method of keeping accounts, which I have mentioned, has been quite extensively adopted by San Francisco companies, and were you to devote a page to its illustration you would doubtless confer a favor upon many a mining company. It simplifies the superintendent's accounts to such a degree, each month's accounts closing into "cash balance," that any man, however ignorant of bookkeeping, can see at a glance just what the receipts have been, and from what source, what the expenses of the different departments have been, what for, and what balance is left to the superintendent's Dr. account after closing.

MINE SUPERINTENDENT.

The Bursting of Small Cast Iron Flywheels.

NUMBER II.—CONCLUDED.

The condition of the shaft and hub at the close of the experiment with wheel No. 15 is shown in Fig. 14: a discouraging feature of this sort of work.

The results are summarized in Table V. It will be noticed that the rim speed is about one-half that of a solid wheel, and therefore the centrifugal tension at the joint would be greater than that given in Table V on account of the weight of flanges and bolts. At a rim speed of 100 per second these wheels would have a factor of safety of about $3\frac{3}{10}$, which is altogether too small.

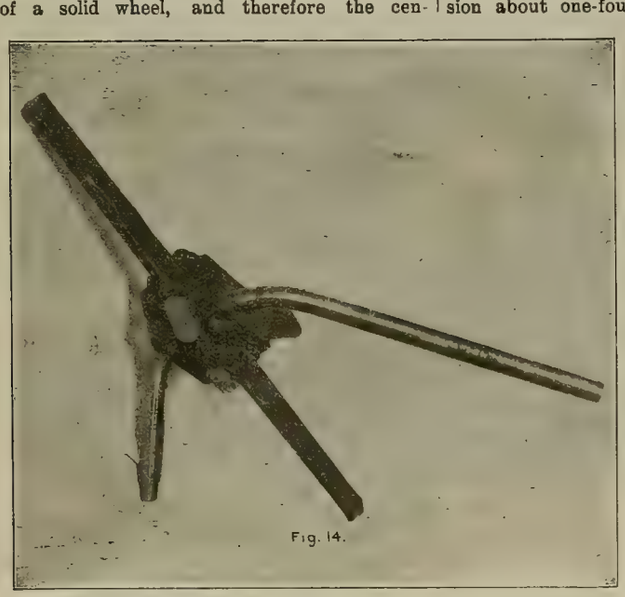


Fig. 14.

TABLE V.—FAILURE OF FLANGED JOINTS.

No.	Area of rim, sq. ins.	Effective area flanges, sq. ins.	Total strength bolts, lbs.	BURSTING SPEED. Revolutions per min.	BURSTING SPEED. Feet per sec. = v.	CENTRIFUGAL TENSION. Per sq. inch = $\frac{v^2}{10}$.	CENTRIFUGAL TENSION. Total lbs.	Remarks.
11	3.18	.....	.....	3,672	385	14,800	47,000	Solid rim.
12	3.85	1.92	16,000	.....	.....	.....	.....	Flange broke.
13	3.85	1.89	16,000	1,760	184	3,400	13,100	Flange broke.
14	3.85	2.58	16,000	1,875	196	3,850	14,800	Bolts broke.
15	3.85	2.34	20,000	1,810	190	3,610	13,900	Flange broke.

Linked Joints.—Wheels numbered 16 and 17 were of the familar rolling mill type, with the joints connected by steel links over cast iron lugs, as shown in Fig. 15, the links being heated and shrunk on. The dimensions of the lugs and links are given in Table VI.

TABLE VI.—LINKED JOINTS.

No.	LUGS. Breadth, ins.	LUGS. Length, ins.	LUGS. Area, sq. ins.	LINKS. Number used.	LINKS. Effective breadth, ins.	LINKS. Thickness, ins.	LINKS. Effective area, sq. ins.	RIM. Max. area, sq. ins.	RIM. Net area, sq. ins.
16	.45	1.0	.45	3	.57	.327	.186	2.45	1.98
17	.44	.98	.43	2	.54	.380	.205	2.45	1.98

BY TESTING MACHINE.
Tensile strength of cast iron = 19,600.
Transverse strength of cast iron = 40,400.
Average tensile strength of each link = 10,180.

Wheel No. 16 had three links to each joint, one on each face and one inside. This wheel burst at a speed of 3060 revolutions per minute, or 320 feet per second. Each joint broke on one side, through the rim, without shearing the lugs or breaking the links, as may be seen from Fig. 16.

In No. 17 the link was omitted from the inner lug, leaving but two links to each joint. This wheel burst trifugal tension about one-fourth. The joints in all the wheels were carefully made, and were at a speed of 2750 revolutions per minute, or 290 feet per second, in the manner shown in Fig. 17. On one side the rim broke as in No. 16; on the other side the lugs failed by breaking off. It is impossible to eay which joint failed first. It is thus seen that No. 16, with three links, broke at a speed 66% in excess, and No. 17, with two links, at a speed over 50% in excess of that of the two wheels with flanged joints.

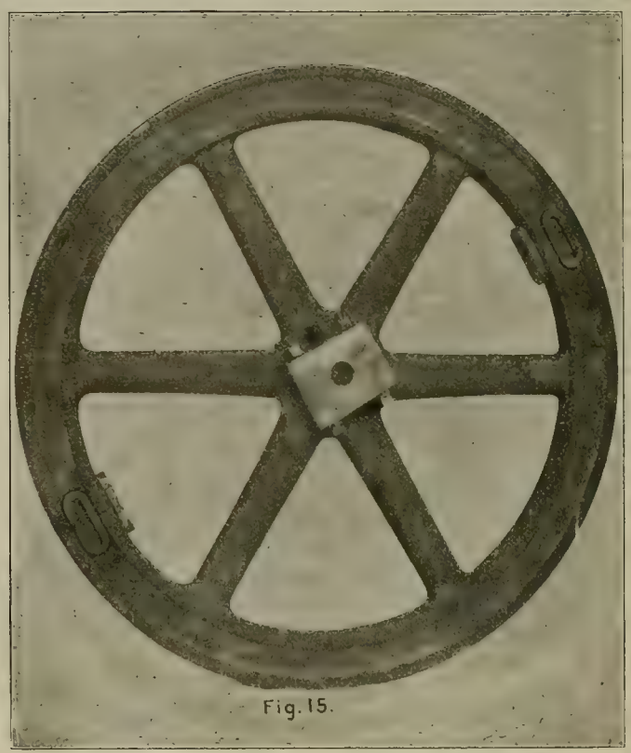


Fig. 15.

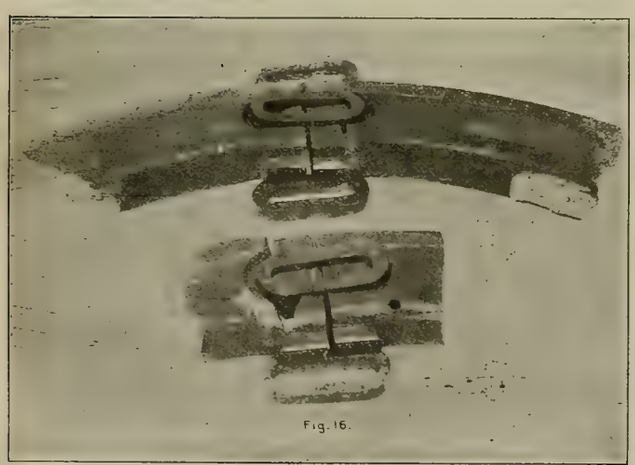


Fig. 16.

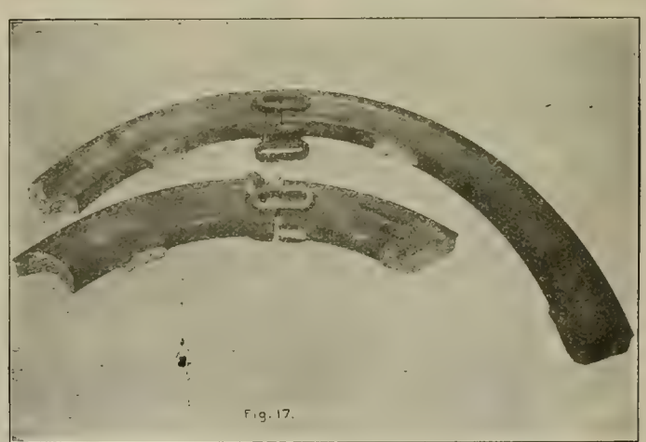


Fig. 17.

TABLE VII.—FAILURE OF LINKED JOINTS.

No.	Strength of links, lbs.	Strength of rim, lbs.	BURSTING SPEED. Revolutions per min.	BURSTING SPEED. Feet per sec. = v.	CENTRIFUGAL TENSION. Per sq. in. = $\frac{v^2}{10}$.	CENTRIFUGAL TENSION. Total.	Remarks.
16	30,540	38,800	3,060	320	10,240	25,100	Rim broke.
17	20,360	38,800	2,750	290	8,410	20,600	Lugs and rim broke.

From the summary in Table VII it will be noticed that the strength of the rim of the weakest section is apparently in excess of the strength of the links, whereas it was the rim that failed in each case. It must, however, be remembered that the links were under direct tension, while the rim was subjected to bending in addition.

At 100 feet per second the factors of safety for Nos. 16 and 17 would be $10\frac{1}{4}$ and $8\frac{4}{10}$, respectively.

Conclusions.—1. Flywheels with solid rims, of the proportions usual among engine builders and having the usual number of arms, have a sufficient factor of safety at a rim speed of 100 feet per second if the iron is of good quality and there are no serious cooling strains. In such wheels the bending due to centrifugal force is slight, and may safely be disregarded.

2. Rim joints midway between the arms are a serious defect and reduce the factor of safety very materially. Such joints are as serious mistakes in design as would be a joint in the middle of a girder under a heavy load.

3. Joints made in the ordinary manner, with internal flanges and bolts, are probably the worst relatively stronger than many joints in flywheels which are running to-day in our mills and shops. The centrifugal tension at the joint would be greater than that given in Table V on account of the weight of flanges and bolts. At a rim speed of 100 per second these wheels would have a factor of safety of about $3\frac{3}{10}$, which is altogether too small.

4. The type of joint exemplified in Nos. 16 and 17 is probably the best that could be devised for narrow-rimmed wheels not intended to carry belts, and possesses, when properly designed, a strength about two-thirds that of the solid rim.

It is gratifying to notice the fact that since the subject of joints in flywheel rims has been so thoroughly ventilated during the discussions before the society several of our prominent engine builders have changed the designs of their wheels by bringing the rim joints opposite the ends of the arms.

The experiments which have just been described, although at times a trifle too exciting, were interesting from first to last. The more this subject is agitated, the less shall we have occasion to mourn the destruction of life and property on account of faults in the design of this most necessary element of the steam engine.

Mining Summary.

ARIZONA.

Near Prescott, J. Berrie has a body of ore in his Lincoln mine in which the pay streak is 20 inches wide and horns about $25 per ton gold. The ore also carries silver. He also has considerable gravel piled up on his placer claim, which he will work when the snow waters come.

On the Kier mine, near Round valley, a shaft is being sunk on a new find of silver and considerable rich ore is being taken out. ——The Empire Copper M. Co., composed of Los Angeles cattlemen, is operating at Empire Flat. Good ledges and a fair grade of ore have been shown up.

In the Mammoth mine, near Tucson, a tramway system has been introduced, effecting a saving of over $100 per day over the former method of transporting the ore. One hundred men are listed on the payroll.——In the Oro mine development work has been pushed. A 600-foot tunnel has been completed and a 340-foot shaft sunk. There was paying ore from the surface, but improved with depth. Last year 4000 tons of the last ore crushed netted $8 per ton. Fifty men are employed.——P. Anderson shipped a carload of ore recently from his Lone Star mine, near Safford. He has a force at work and will make regular shipments.

Mohave *Miner*: C. Gracey is preparing to have erected a 40-stamp mill to treat the ores of El Dorado district. There is sufficient good milling ores ready to supply the new mill.—— At Globe the Old Dominion Copper M. & S. Co. loaded twenty cars with copper, twenty-five tons to the car, which amounts to 1,120,000 pounds, worth $230 per ton, or $115,000 for the entire shipment. This is thought to be the largest single shipment of copper ore ever made from Arizona.

Globe *Belt*: Near Globe, on a group of seven claims of the Beard mine, at a depth of 100 feet, some good ore was struck in a 225-foot tunnel, 15 feet wide, which is said to average from 10% to 15% copper.——In the Finletter claims a 120-foot tunnel is in ore its entire length and the dump averages 6% copper.

Yuma *Sun*: The Rattlesnake mine near Quartzite is yielding some high-grade ore.—— At Fool's Gulch, Yavapai county, in the Planet-Saturn mine a depth of 970 feet has been attained and the ledge, which has not changed for 300 feet, is 3½ feet in width. The ore ranges from $20 to $70. The prospects are that in a short time a 100-stamp mill will be installed.——T. Hamilton of Ehrenburg bonded three claims to H. C. Beaty of Los Angeles, who will pay $1000 in April and $9000 in September. These claims are near Ehrenburg and well developed. The ores, which exist in a large ledge, contain copper, gold and silver. The grade of the ore is said to be sufficiently high to stand shipment and yield a profit. The deepest shaft is 120 feet. Several other shafts have been sunk. The properties will soon be extensively worked.——At the Fortuna mine twenty stamps are propelled by a 90 H. P. engine and crush 100 tons or five tons per stamp per day. Each stamp weighs 1425 pounds, has a drop of 7 inches, at the rate of eighty-one strokes to the minute. As the ore is principally free, when crushed and passed over 100 square feet of amalgamating plate to each stamp, or a total of 2000 square feet, there is but little, if any, free gold left in the tailings. The four boilers which supply power to run the mill, compressor, hoist, pumps and other machinery consume eight cords of wood each twenty-four hours, at a cost of $3.50 per cord. The woods used are ironwood, mesquite, palo blanco and ocotilla. They have attained a depth of nearly 700 feet and have encountered water in such quantity as to require two force pumps to relieve the mine. A cyanide plant with a capacity of 150 tons a day is being constructed. There will be five tanks of thirty tons capacity. In the big bank of tailings are thousands of tons, from which approximately $2,000,000 was extracted during the original working. Preparations are being made for underground water storage and drainage, and when perfected further exploration of the mine will set in. The employes of the company constitute a payroll, amounting to about $9000 each month.——A. R. Fleischmann of Cleveland, O., has men at work repairing the old Senator mill in Lost Basin, Mohave county, and will soon make a trial run. Ore from the Senator mine will be worked and the property be developed to considerable extent.——G. Wores of Tucson sent two 10-mule teams to Red Rock to haul ore from the Doxology mine. He expects to load about a car daily. Several hundred tons of ore are on the dump.——At Mammoth in the Mammoth mine the 600-foot level has been reached and the mill and cyanide plant are in operation day and night.—— At the Mohawk preparations are being made to open up more ground.——The Commonwealth mine at Pearce has increased its large production. The shipments to the smelter continue and a 20-stamp mill has been added to the plant at the mine.——T. Ewing has bonded a group of mines on the Nevada side of the Colorado river, on which he put a force to work.——The Red Rock mine on Big Bug is being worked with three shifts with twelve men. T. Fleming is the owner of the property.——A body of ore has been uncovered in the Prosperity mine Todd basin. The Prosperity is an old producer.

Globe *Times*: The Goswell M. Co. of Tonto are prospecting their mine and have twenty-five men at work.——The Mammoth G. M. Co., on the San Pedro, are reducing 150 tons of ore daily and employ seventy-five men. The company will bring the mill to 100-stamp capacity. The cyanide works are giving satisfactory results. The improvement to be made is that of utilizing the Aravaipa stream for generating electric power for the mills, cyanide plant and hoists. This will be done by harnessing the water, fifteen miles from the works, which at its lowest supply exceeds 2000 miner's inches. It will be diverted from its channel two miles from the power plant and conducted by pipe or canal, whichever is more practical.

Prescott *Courier*: Upon the Shelton, one of the group known as the Clark properties, at Lynx Creek, the hoist is in position, and as soon as surface equipment is complete a start will be made to unwater the workings and begin extensive development of the entire group.——Trayler & Breslin have resumed work on the Star, and have already worked a profitable lot of mill ore.——Algert & Warren, who have a lease on the Pine Mountain, have developed a body of ore in the lower level and are also working over the old dumps.——It is locally reported that J. H. Costello has made a deal for the Milliken and Comer properties for $50,000, and that extensive development will be done on both groups.——A hoist is contemplated on the Amulet, with a view of sinking the shaft 500 feet.——The Favorite has started both levels from the 350-foot station, and also has at 300 feet a body of smelting ore carrying values near $100 a ton.——In the Pride of the West mine, in Washington camp, Pima county, thirty men are employed. The output is about fifteen tons daily. The average ore is 15% copper, 50 ounces silver and 1-10 ounce gold. Another mine in the group, a silver property, on which six men are employed, produces from thirty to forty tons per month. All the ore is shipped to reduction works. The Pride of the West has been a producer for twenty years.——One of the oldest mines of the county, the Belmont, is soon to start up after a shut-down for years. It is owned by the Bacon estate of San Francisco. ——F. Olesen is working the Double Standard and shipping a carload of copper ore a month. ——The Smuggler is operated by a small force. The ore runs about 15% copper.—— The Holland mine and mill, owned by Colorado men, has been temporarily suspended, but it is expected to be operated again shortly with a large force.

CALIFORNIA.

Butte.

Oroville *Mercury*: In the eastern portion of Oroville J. H. Leggett is operating a hydraulic elevator and hoisting gravel 8 feet into sluice boxes. The gravel is scraped into the elevator pit by horses and scrapers.——The dredger on the Mortenson place is nearing completion.

Oroville *Register*: The Gem M. Co. at Enterprise will soon resume operations.——A tunnel is being run on the Red Point mine. ——The Alm Bros. have finished a successful run in the Crystal Peak mine.——A small force is employed in the Denver mine.——In the Big Betsy mine there are men at work. ——In the Carlisle mine the pumps are kept running.

Calaveras.

Grading for the additional 40-stamp mill is completed at the Gwin mine, near Mokelumne Hill. The excavation is to be made large enough for the foundation of a 60-stamp mill, but only forty stamps will be added at present, making a total of eighty stamps.

Angels *Echo*: The Cherokee mine near Altaville, bonded recently to a San Francisco company, is being prospected by H. O. Potts, who has taken out several hundred dollars in specimens.——Improvements at the Gold Cliff mine at Angels continue. The sinking of the shaft goes on night and day, and the building of the car track to the Madison mill is completed.

San Andreas *Prospect*: At the Pine Log mine, near Copperopolis, work is pushed.—— At the Royal mine the shaft is between 700 and 800 feet, showing a ledge which varies in width from 5 to 20 feet.——With a sufficient amount of water, work is being prosecuted at the Green Mountain gravel mine on Tunnel Ridge, near Mokelumne Hill, under the superintendency of J. J. McSorley. To avoid the rim of lava a tunnel for the flume was run to the old works and an upraise run to the surface and the hydraulic plant installed. This gives a clear sweep of gravel, free from lava capping, for several thousand feet. The gravel pays well.——J. E. Burton has resumed drifting for crystals in another portion of the Green Mountain property.

San Andreas *Citizen*: The new mill has been completed at the Thorpe gold mine, near Fourth Crossing, and thirty stamps are dropping day and night. About sixty men are employed. W. L. Honnold is Supt.

El Dorado.

The Zentgraf mine, near Newcastle, is adding five stamps to the mill, making twenty-five in all. The shaft is down 900 feet, and the drifts from the 500 to the 900 levels are being extended.——Development work is in progress on the Francis mine, near Georgetown. A ledge has been struck which prospects well.

Placerville *Democrat*: At Slate Mountain, on the Independence mine, drifts have been run on the ledge, which is 24 inches wide and is said to yield $50 a ton.——J. C. Heald has commenced unwatering the old Montezuma mine at Nashville.——Wm. Lupold is running his mine at Brownsville steadily. The arrastra is going on high-grade ore.——J. Fuller, at Brownsville, has begun to rehabilitate the old Richmond and Syracuse mines. Men were put to work cleaning out and unwatering with a view to deeper workings.

Inyo.

The copper mine at Ubaheba has a tunnel 75 feet, all in ore. A shaft has been sunk 37 feet in the ledge. The ore is of good quality. Sufficient water can be had by piping.

Kern.

Randsburg *Miner*: The new mill on the Yellow Aster mine at Randsburg will be started up the 12th inst. The Yellow Aster people stopped shipping ore to Barstow on the 6th. More ore has been shipped this past month than any other previous one. The pipe line to carry the tailings from the new mill to the reservoir, 2700 feet, is being put in. It is a 5-inch, of capacity to perform the service of 100 stamps.——The Eureka mill made another cleanup of a month's run and shipped about $800 of bullion last week.——Bentley & Wynn bought a two-thirds interest in the Battle quartz mine at Randsburg and will soon erect machinery and develop the property. There are about 700 feet of development work, showing a large body of low-grade ore to pay expenses of development.——Last week a strike was made in the Annex mine of a 20-inch vein of $100 rock.

Madera.

In Coarse Gold district a good vein of quartz has been opened in the Washington mine, owned by Van Timmons & Lathrup. The ore carries gold in fair quantities and is free milling.——At Grub Gulch the Gambetta M. Co. have added to their force and are doing extensive work.

Mono.

At Bodie the Standard Con. Co.'s new mill was started last Thursday night and is working well.

Napa.

The quicksilver shipments from the local mines for January were: Napa, 601 flasks; Ætna, 300; Great Western, 89; Vallejo, 17; total, 1007—an increase of 46 over December.

Nevada.

The Cabbage Patch M. Co., composed principally of residents of Grass Valley, contemplate erecting a 10-stamp mill on their property soon.

Grass Valley *Union*: E. Creller will begin operations soon at the mine which he recently bought on Union Hill. He will thoroughly develop the property.

Nevada City *Transcript*: The dam being built to divert water into the Texas M. Co.'s ditch is nearly completed. It is built of rocks and logs and is 112 feet long and 8 feet high.

Placer.

The reservoir at the Big Dipper mine, in the Iowa Hill mining district, broke last Thursday night and carried away the mill, blacksmith shop and drying house. Five Chinamen and one white man, Joseph Farber, were killed. Their bodies were found several miles down the canyon. The loss to the mine will be $12,000.

Colfax *Sentinel*: At Dutch Flat the gravel in the Oak & Cedar tunnel, operated by S. C. Jordan, is showing some good prospects.—— The Polar Star mine, owned and operated by Wm. Nicholls Jr., started up last week with twenty-five men and two monitors with a capacity of 1000 inches of water each. The material washed is heavy and the dam in Bear river holds it all.——Work has begun on the Crandal mine near Auburn by Hartley & Freeman, and they expect to have a 5-stamp mill running March 1st.

Sacramento.

Near Walltown Mrs. Sinclair is developing a quartz claim in which the miners last week found some high-grade ore.—— The big dredger will be launched this week.——A. J. Smith has installed a pumping plant on Sacramento bar and is also sinking a number of prospect shafts. If the prospects prove favorable another dredger will be built by Colorado men.——Several hundred acres of gravel deposits have recently been bonded along the river, mostly on the Natoma grant, with the ultimate view of building dredgers thereon. It is locally reported that the entire Natoma vineyard has been bonded by a company with the ultimate intention of dredging the gravel deposits for gold.

San Bernardino.

The Anita M. & M. Co. at Ontario contemplates the installment of a stamp mill and other machinery on the company's property. (This company's property is in Sonora, Mexico.)

Los Angeles *Review*: Near Danby, A. W. Warwick is working ten men at his group of mines, developing water, preparatory to putting up a 10-stamp mill.——The Rosalind mine, owned by W. H. Gafford, has a 1½-foot ledge. He is developing the claim and has an 80-foot tunnel and a 40-foot shaft. Some good ore has been taken out.——The Brooklyn is owned by Sutter & McCarthy. It has a ledge 100 feet wide; the pay streak which is being worked is 2½ feet wide. The last assay of the rock was $42.50 in gold.——In the Pioneer mine, near Warwick's Camp, they are sinking. The ledge is 1½ feet wide and the ore assays $67.50 per ton.——The Chicago, at Sheep Camp, is having work pushed. The shaft is on an 18-inch ledge.——The Victoriales, owned by McGarry & Co., is worked by two shafts and a tunnel. Last week a pay streak was struck in one of the shafts which assayed $4.25 in silver and five ounces gold.——The Silver Wave, at Sheep Camp, owned by Smith & Jones, has four tunnels each over 100 feet long. The ledge is 3 feet wide. Considerable of its ore has been worked at Kingman, Arizona. Some picked ore from this mine ran 1200 ounces in silver and $60 in gold.——The Parowan mine, owned by R. McArdle, shipped three tons of ore which netted $300.——The Pandora, at Sheep Camp, owned by J. Huntsman, is now being worked. There is a shaft on it 30 feet deep. Two tons of ore shipped from this claim yielded $396 in silver and $97 in gold.——The Crystal Salt Co., which controls some 14,000 acres of a salt deposit on the salt marsh, thirty-three miles from Danby, has just finished assessment work on the property. The company has a macadamized road to the marsh on which they operate a traction engine, which hauls their output to Danby, their shipping point on the Santa Fe railroad.—— Shields, Burg & Jenkins are working the Goldstone group.——Work continues on the Winchester mine, at Gannous Camp.——The Daggett mine, in Bethune canyon, in Old Woman's mountains, is showing well.

San Diego.

The cyanide plant at the Stonewall mine is ready for work.—— Near Descanso G. W. Marsh and others are developing a vein of gold ore.——An option has been given English people on some of the Laguna property for $50,000.

Shasta.

Redding *Free Press*: Rich ore has been struck in the Sam Houston mine in Old Diggings district. It is owned by San Francisco people and is under the management of J. H. Morton.

Shasta *Courier*: At the Mt. Shasta mine, near Shasta, the station on the 200 foot level has been completed and drifts started north and south. Drifting and stoping are also being done on the 120-foot level. Sinking the shaft to the 300-foot level will be pushed and stopes opened on the 200-foot level. The last 50 feet of the shaft has been in 2 feet of high-grade ore, and the ledge at 14 feet from the 200-foot level shows 3 feet of ore. Six teams haul ten tons of sacked ore from the mine to the Keswick smelter. The property has recently been incorporated under the name of the Mt. Shasta Gold Mine, Ltd.

Sierra.

Downieville *Messenger*: The E. Lewis mine near Downieville has recently become free from all litigation and the company will begin development work with the opening of the season. The company owning this property was recently incorporated under the laws of Utah as the Otsego G. M. Co.

Siskiyou.

Yreka *News*: At the Eastlick & Wright mine at Oro Fino, owned by the Risdon Iron Works Co. of San Francisco, they are piping day and night.——The Blue Gravel mine at Greenhorn is running drifts.——The Salmon River Hydraulic M. Co. has fifteen men employed. They are piping night and day with two giants at the Kleine mine at Sawyer's Bar.——The Last Chance mine near Yreka will be unwatered within ten days.——The Montezuma river claim at Callahan's is being worked with a full force.——At the Hungry Hill mine twenty-five men are employed night and day.——Work is advancing on the Golden Star mine. The tunnel is in 600 feet.——The Aromas Co. has sixteen men employed.——Ten men are at work on the Knownothing mine at Forks of Salmon. Some fine ore is being stoped from the lower level. As a general average, the rock goes $40 a ton.

Yreka *Journal*: The Sheba M. Co. mill near Yreka was started last week and works well. The quartz is high grade.——A. Brokaw has started work in the old Campbell claim at Quartz valley with good success.——The Jillson & Co. quartz ledge near Henley continues to pay.——The Cherry Hill quartz mine at Cherry Creek, owned by Hunter & Co., is yielding high-grade quartz. The mill will be started soon.

Trinity.

Weaverville *Journal*: J. E. K. Lennox near Lewiston is developing a quartz ledge that is 6½ feet in width. The ore is free milling and also carries silver and copper, showing $31 in gold and $15 silver to the ton.

Tuolumne.

(Special Correspondence).—The Mack Con. G. M. Co., reported incorporated in your columns last week, is actively engaged in developing the old Mack and Wooten mines. The office of the company is Room 905, Claus Spreckels Bldg., S. F. Its attorney is Edgar D. Peixotto.

Boston information says that the San'a Ysabel mine near Quartz should earn $15,000 to $20,000 net per month, and after $100,000 has been accumulated in the treasury ($40,000 now on hand) dividends may be looked for.

Jamestown *Magnet*: Near Columbia, Smith & Jones purchased the Byer & Hastings claim and are pushing work.——Sinking continues on the Mountain Lily mine.——The Winnie claim, at Saw Mill Flat, has been bonded to Los Angeles people, who will begin work on it.——Dady & Harris, at Red Gulch, are developing a high-grade milling ore.——A tunnel is being run on the Standard mine and good ore taken out.——H. Gale is making good progress in his property on Union Hill, near Columbia.

Sonora *Democrat*: At the Big Oak No. 1 work is progressing, the heavily-sulphuretted vein holding its average width of 7 feet. The 10-stamp mill placed on this property recently is nearly ready to begin crushing. The old 5-stamp mill keeps at work, and soon the two, making the plant a 15-stamp affair, will be in operation. No. 2 is being developed by sinking, drifting and stoping.——At the Arbona work is confined to drifting at the 300 level, at which point the vein is large and a good body of ore in sight. In the bottom of the shaft, 335 feet deep, the rock looks well; sinking will be resumed shortly. Although having plenty of ore on hand, the company has decided not to start up the mill until certain of a full supply of water, so that the stamps can be kept dropping the entire year.——At the Lilian mine crosscutting is going on and considerable surface prospecting is being done. The rock mills satisfactorily, and in a few weeks drifting will begin. It has now a total length on the vein of 100 feet.——The Excelsior shaft is down over 180 feet.——At the Turner Flat gravel mine a full force is employed and the output is satisfactory.—— Driving the tunnel on the North Star will soon be resumed.

COLORADO.

CHAFFEE COUNTY.

From the Sedalia mine about ten tons of high-grade rock are sent daily to the Argo smelters and the same amount of lesser grade to the Buena Vista Smelting Co. Three new ore bodies recently discovered give employment to forty men.

CLEAR CREEK COUNTY.

W. P. Jennings, near Silver Plume, is developing a quartz property that carries high-grade values. Near Georgetown, B. C. Carton, Jr., expects to put in a plant of machinery on the Smuggler property and sink a shaft at the mouth of one of the adits. He has driven these levels on the vein for hun-

dreds of feet, and disclosed mineral bodies of 2 feet in width and entirely smelting ore. About 150 tons of the smelting ore is moved each month. He is also taking out 100 tons of smelting ore per month from the Dunderberg. The ores run in lead and silver.——The new ore strike in the Aliunde is 1000 feet below the surface. Shipments that are being made run $240 per ton, with 12% lead.

The Annetta Co. on the Griffith mine near Georgetown ships from 175 to 200 tons of ore a month. Four levels are being driven, three of which are in ore and the fourth soon will be. The ore body has been opened up 300 feet. It varies in width from 12 to 30 inches.

Idaho Springs *Gazette*: The 850 level on the Aliunde shows a vein 6 inches thick that is high grade. In addition there is a 3-foot vein carrying mineral, which is sorted. A recent millrun of the sortings returned over 400 ounces silver to the ton.——The Stevens mine is turning out galena that is seamed with ruby silver.——In the Dunderberg mine near Silver Plume the ore carries values in silver, gold and lead, the principal being silver. It is worked on the lease and contract system, the company paying to the lessee a certain amount of footage for driving the drifts, and then giving him a lease on the ground at a reasonable royalty. At present seventy-five men are at work, most of whom are on ore. The output will average 100 tons per month, all smelting ore.—— The Smuggler-Union, owned by B. C. Catren and B. C. Catren Jr., produces ore which carries gold, silver and lead, some ore having been mined that ran as high as eighty one-hundredths of an ounce in gold in a millrun of 10-ton lots. This is a new property. The owners are pushing development work and are opening up good bodies of ore. The present showing is sufficient to keep a force at work for several years. The owners intend, as soon as spring opens, to put a hoisting plant on the property and to sink below the present levels, which are all worked through a crosscut tunnel. They intend to put in a compressor and sink a shaft with power drills, from which levels will be run. They are working thirty-five men on the property. The output will average 150 tons per month. The ore is good grade.

EL PASO COUNTY.

At Cripple Creek it is stated that a local sampler last week paid the Isabella Co. $98,000 for ninety tons gold ore. Ninety tons were since sampled which will return practically the same values. None of the metallic gold found recently has yet been shipped.

The Pride of Cripple Creek mine, a full claim on Bull Hill, was sold to an Eastern company last week for $60,000, a partial cash payment being made. Several shipments of high-grade ore have been made from the property. It is fairly well developed. There is one shaft 300 feet and a number of smaller shafts, two of which have recently been started. It is the intention of the new owners to do a large amount of development.——A profit of $25,383.33 was earned during December by the Creston G. M. Co. of Cripple Creek from their lease on the Jack Pot.——The Vindicator mine will show a heavy increase both in tonnage as well as value in 1899 over 1898. The output last month from the company's workings and ore shipped by lessees averaged 100 tons a day, and this production will be increased. More ground is being opened up and the ore bodies are lengthening and widening. Keith & Grube are sending on an average of thirty tons per day from their block of ground, and when stoping is started in the second level the tonnage will be doubled.—— The output from the Last Dollar last month was twenty-three cars of cyanide ore and seven of smelting grade.——The Lillie is outputting at the rate of forty tons per day.

In January the Cripple Creek district's production was nearly 35,000 tons, with a bullion value of over $1,500,000. Returns from the smelters show that the output of $100 ore reached 8500 tons, making $850,000. The mills and reduction plants handling Cripple Creek ores treated 25,900 tons, with a bullion value of $658,000. The returns reported by the managers of these institutions are as follows: Gillett Reduction Co., chlorination process, treated 2600 tons of an average value of $30 to the ton; gross bullion value, $78,000. Colorado Ore Reduction Co., both chlorination and cyanide, treated 2300 tons of an average value of $25 a ton, representing gold values of $57,500. The El Paso Reduction Co. at Florence, chlorination, handled 3300 tons, with an average value of $25; total, $82,500. The Metallic Reduction Works, Florence, cyanide, treated 8000 tons, averaging $20 a ton; total, $160,000. The Brodie mill, cyanide, treated 2200 tons averaging $25; total, $55,000. Colorado-Philadelphia Reduction Co., Colorado City, chlorination, 7500 tons, averaging $30 a ton; total, $225,000. Stamp mills and small treatment plants in the district are put down for $15,000 in addition to the foregoing figures. Summarized, the production of the district is as follows:

	Tons.	*Value.*
District mills	7,100	$ 190,500
Florence mills	11,300	242,500
Colorado City mill	7,500	225,000
Smelters	8,500	850,000
Small treatment plants and stamp mills		15,000
Total	34,400	$1,523,000

Victor *Record*: C. Johnson, lessee on the Half Moon of the Matoa Co. at Victor, will produce ore from that property to the expiration of his lease, three months from Feb. 2nd, with an output of from thirty to fifty tons a day.——The Finn Leasing Co. sent out a 30-ton shipment last week from the Morning Glory No. 2, which ran from four to five ounces to the ton. The Boyd lease on the south end of the claim recently completed a 45-ton shipment of 2-ounce ore.——The May Queen Leasing Co. made a 15-ton shipment of 2½-ounce ore.——Graney & Cameron, leasing on the Blue Bird, shipped eleven tons of ore running thirteen ounces to the ton.——The Tanna lease on the Mary McKinnie marketed two cars of ore last week of two grades, seven and one-half and two and one-half ounces to the ton.——The Howard lease on the same property marketed two cars of 4-ounce ore this week.

FREMONT COUNTY.

The miners at Dawson City have formed a mining district called the Greenhorn Mining District, fixed the daily wage at $3, and agreed that no assessment work should be contracted under $25.

GILPIN COUNTY.

The Fisk mine, near Black Hawk, is giving employment to sixty men and continues to produce daily about fifty tons, which is nearly all milling ore. The mill ore runs a little over three ounces gold per cord, the concentrates netting from $15 to $20 per ton. The production of smelting ore from this property averages from thirty to fifty tons per month, of a desirable grade. The ore is taken out of the tenth and eleventh levels.——Sinking at the Cook mine has been stopped temporarily for want of water. The working force has been decreased to seventy-five men. Instead of twelve drills running, there are only four at work.—— For January the shipments of smelting ore and concentrates from the Black Hawk depot of the Colorado & Southern road were 276 cars, or 4868 tons—an increase of 36 tons over the same month last year.

GUNNISON COUNTY.

The Maid of Athens mine near Pitkin is but a year old, and with less than 1000 feet of development is said to have exposed a large body of ore. The vein is 7 to 24 feet wide, with 1 foot of the wall that is mineralized, which is shipped as ore, and all the crevice filling is shipped. Galena occurs running 60% lead and 700 to 1300 ounces of silver. The general run of the ore returns an average of $25 per ton, including a few dollars of gold. The property produces ten carloads a day.

The Lily and Silver Cord lodes, at Gunnison, are being operated under lease. About 300 tons of ore are on the dump which is being treated by the local custom mill.——The concentrating mill in Gunnison is treating about thirty tons daily. This mill has all it can do and saves most of the values in the low-grade ore of the camp.——The Lead King mine of Crystal River district was recently bonded to an English company for $100,000; $5000 was paid thereon last week.

The Denver *Record* says that the Venable M. Co. has begun operations on a group of claims in Goose Creek district. The ore runs from $13 to $37 in gold, and the company intends to develop to the depth of 500 feet.

LAKE COUNTY.

Leadville *Miner*: At the Moyer shaft of the Iron-Silver Co., Leadville, the station pump is making but fifteen strokes per minute. The January output of iron sulphides from the Moyer was above 6000 tons. One hundred men are on the payroll. The ore carries a heavy percentage of iron.——The recent discovery on the Hibernia mine shows indications of making a steady shipper. The output at present is twenty-five tons daily of high-grade silver-iron ore which carries thirty-four ounces silver and 45% iron excess, and the lessees are reaping their reward for their pluck and enterprise.

The Boreel and Marian deep sulphide mines, Leadville, worked through the R. A. M. shaft, will make an output this month of more than 6000 tons of iron sulphides. In addition to this a large amount of prospecting by drifting and diamond drilling is under way. Seventeen teams are employed moving this tonnage. The grade of the ore continues good, and the large iron excess in this material makes the smelter charges low.

MINERAL COUNTY.

Creede camp starts the new year by shipping 7580 tons of ore during January, and the mine owners predict that the month of February will see an increase over January.—— In the Bachelor mine, which is being worked in blocks by leasing companies, both the ore and employes are increasing.——The Nelson tunnel has been driven through the New York-Chance grounds and within 400 feet of the Last Chance shaft house, a distance of 6100 feet. The tunnel is being driven on the vein and will drain all of the large mines on Bachelor mountain without further connections. The water in the Last Chance is now sinking at the rate of 4 inches a day.

PARK COUNTY.

At Alma the Hill Top M. Co. recently bought the Fulton and Emily lode mining claims, which join their property, for $32,000. The money is to be paid at the rate of $1000 per month for thirteen payments, and the fourteenth payment of $19,000 is to be paid Jan. 1, 1900, or, if the Hill Top Co. fails in this, they are to have another year to finish paying an additional $8000. The first payment was made in December.

IDAHO.

Press dispatches state that a company headed by J. W. Mackay and E. J. Mathews have bought the White Knob copper claims. The capital of the company is $5,000,000, in shares of the par value of $100. The company is in operation and will push the sinking of the main shaft, which is down over 500 feet. The company is equipped with smelting facilities which can work fifty tons per day. During the summer there will be shipment of bullion from surface ores. The engineers' report shows this to be one of the finest prospects in the country. The outcroppings are large. They show 3% to 35% copper and carry gold and silver.

Press dispatches state that the Buffalo group of claims, in the Buffalo Hump camp, has been sold to F. L. Clark and C. Sweeny of Spokane for $650,000. The property is undeveloped.

W. H. Butters & Bros. have purchased the Red River meadows, near Elk City, and are putting in a chain-bucket dredge to handle the gravel.

At Hailey the agreement between H. C. Lewis and S. E. Rigg for the Crœsus group of mines is filed for record. Rigg paid $5000 cash and is to pay $10,000 June 1, 1899, $35,000 Oct. 1, 1899, and to make final payment of $30,000 May 1, 1900.——The Wildcat group of mines was leased last fall by Earhart & Co., who began work on a 500-foot tunnel to drain the workings and for cheaper development. This tunnel at 280 feet penetrated into quartz and tapped the lupper works. The shaft was free of water. At the bottom of the shaft they found a vein that assayed $90 in silver and 72½% lead per ton.

Wallace *Press*: C. Manley and associates, owners of the Black Horse mine, in the silver-lead belt near Murray, shipped two carloads of ore. They estimate that they have 900 tons of ore on the dump, mostly of a concentrating quality, which at the present price of lead will pay to ship without much sorting. ——The Standard M. Co. have begun the foundation for their new hoist, which will have a capacity of 2500 feet. The machinery cost $21,000.——A carload of ore was shipped from the Barton mine near Murray last week. ——Three pounds of gold dust were brought to Cœur d'Alene from Potosi last week.—— The Myrtle Co. will begin work as soon as the water starts this spring. The water will be plentiful for extensive placer mining.

Florence *Miner*: Two and a half feet of high-grade ore is reported in the Hiyu mine near Florence at a depth of 80 feet below the first level. The shaft is going down at the rate of a set of timbers for every two shifts, and is 100 feet below the first level. Sinking will continue to 200 feet below the first level.

MONTANA.

The Eclipse Con. M. & M. Co., operating near Saltese, is shipping ore of high grade. The company owns twelve claims. The depth reached is 165 feet. They have 38 feet of shipping ore which many tests have proved will average $45 per ton. The ledge is 180 feet wide on the surface, where it is iron-capped. The Northern Pacific is putting in a spur to accommodate the mines of the camp. The company is developing its properties with the proceeds of the sale of ore taken out in development.

The Bear Gulch M. Co. in Park county has been giving employment to fifty men all winter. It has been operating its 20 stamp mill and has arrangements completed to increase the number of stamps to sixty before spring opens. The company has been shipping concentrates to East Helena.——Mr. Schaeffer of Butte, who has a lease and bond on the Myhres mine in the Amazon district, has taken the water out of the 100-foot shaft and reports a 4-foot body of good ore, from which he expects to make shipments soon.

The tunnel on the Connon property is in 243 feet with the vein opened up for 92 feet. The vein is from 1 to 3 feet thick and gives assay values from $50 to $75 a ton in lead.

Burbach & Lueck, leasing on the Navahoe mine near Virginia City, recently encountered an 8-inch body of high-grade gold ore in the 90-foot level from which they are making a 12-ton shipment to Butte.

M. J. Miller of Chicago, has taken a lease on the Kennett mine near Ennis and proposes to do considerable development work. The Kennett is owned by W. B. Millard of Omaha, who constructed a 60-stamp mill and expended about $200,000 in development work. The Kennet has been worked from time to time for the past thirty years and is one of the oldest properties on the Tobacco Root Range.

Winston *Prospect*: D. Slavens made a shipment of two cars of ore last week from his recent strike on the Eclipse property near Winston. The mine is producing ore from a 14-inch vein at the rate of three tons a day.

Neihart *Herald*: At the Queen of the Hills mine near Neihart Supt. Nelson has been driving work for sixteen months, employing twenty-five men. They have averaged for 1898 about five cars of ore per month. A recent strike of good ore is reported in the 300 level of 18 inches.——After long idleness the Galt mine has opened up again. They are taking out ore, employing ten men.——The Moulton Co. at Barker owns four claims in one group. A tunnel 1232 feet in length has lately been completed on the Moulton, attaining a depth of 356 feet. This vein was last summer under lease by the United Smelting & Refining Co. of Great Falls, and over 3000 tons of ore were extracted. At places the ore body was solid galena 7 feet in width. About 900 feet from the entrance they found a ledge of oxidized iron 40 feet in width which contains some silver and gold.——The Wright & Edwards is working fourteen men. The shaft has been sunk 317 feet and at 300 feet a crosscut to the ledge is begun. This mine is under lease to the Great Falls smelter.

Philipsburg *Mail*: After several years of patient endurance, word has been received that operations will soon be resumed on the properties of the ill-fated Golden Scepter Co. J. R. McDonald, promoter of the Majestic M. Co., has been engaged for some time in an effort to float sufficient bonds to realize $300,000 —this being the amount required to complete and start the works—gives out the information that the necessary funds are secured and that work will resume not later than April 1st. It is believed that the mines at Quigley are among the valuable gold properties known, and, while the ore is of a low grade, it is free milling and exists in immense quantities, which permit operations on a large scale. The expense of mining the ore at the Jumbo mine is light, as it can be quarried without handling any waste. The entire works will be operated by electricity. The enterprise is among the largest undertaken in this State.

NEVADA.

Recently a force was put to work in the Star mine, at Cherry Creek, putting in place the air compressor and connections to work the power drills. When completed a big force will be put to work in the mines.——The total bullion output of the DeLamar mines in '98 was divided as follows: DeLamar, $6,141,834; April Fool, $517,968. The DeLamar property, from a prospect when bought by Capt. DeLamar up to the present time, has placed millions of pounds of machinery, building material and piping, which was hauled from the railway at Milford, 160 miles, for putting in the mill, which has a capacity of 350 to 400 tons a day, and for several pumping stations and pipe lines from ten to thirty or more miles each. Fuel has added great expense to the plant.

From the Golden Eagle mine, near Winnemucca, the hauling of ore, which had ceased because of bad roads, began last week. The mine has considerable shipping ore exposed, while ore of good milling quality has been followed all the way down the shaft. During the past ninety days over 300 tons of good milling ore has been added to the large amount already on the dumps.——The deal for the Ophir property, near Stateline, has been closed to B. Springer and associates of Salt Lake, who take possession immediately and put on a full force. It is stated that the purchasers propose to put in a mill to treat the ores of their property, as also the other silver ores of their camp.——The Young America, at Tuscarora, has passed to Heinrich, Brown & Dern. The estimated price is $60,000.

The bill fixing the State tax levy at $1 on the $100 for all taxable property, including mines and mining claims, has passed the Legislature.

The directors of the Con. Cal. & Va. M. Co. have authorized Supt. Kervin to start work to flood out the fire smouldering in the stope timbering on the 1650 level. He will lay a line of iron pipe to convey the water from the discharge column of the Risdon hydraulic plant to the seat of the fire and its ultimate conveyance to the drain flume in the north lateral branch of the Sutro tunnel. The Risdon plant will raise at least 10,000,000 gallons of water every twenty-four hours, in addition to the 100 inches required to operate the plant. The area to be flooded is 900 feet long by 200 or more in width, and extending 200 feet or more downward.

On the Comstock last Sunday the Risdon pump was lowered into the C. & C. shaft. The pump was attached to the hoist cable and lowered in that way, about 70 feet of the cable being doubled over to make the lowering safe.

The Risdon Iron Works now expect to start pumping the water into the drain flume of the north lateral branch of the Sutro tunnel by next Wednesday. The heavy valve part of the machinery is in place, the elevator has been lowered into the water and the discharge pipe leading up to the Sutro tunnel connection laid.

The following ore shipments were made from Eureka the week ending Feb. 3:

Mine.	*Pounds of Ore.*
Altoona Mining Co.	30,200
Diamond	34,750
Eureka Con.	89,530
Jackson	96,310
Richmond	38,180

At the Searchlight, Lincoln county, in the Hopkins group of mines fifteen men are employed; they have on the dump 500 tons of gold ore that will average $25 per ton in gold. It is the intention to put up a mill on the west side of the Colorado river, about ten miles from the mines; the haul is down hill. F. W. Dunn is Gen. Mgr.

The DeLamar *Lode* says that work on the Boston and DeLamar group, formerly owned by Nichols & Griffiths, embracing fifty-two acres in Ferguson mining district, will be carried on in an extensive manner.——A contract has been let to San Francisco people to resume work in the Numa mine, near Winnemucca. The shaft is down 220 feet and will be sunk to greater depth. At the same time a drift will be run above water level. When operations ceased twenty-five years ago it was claimed that the hanging wall contained an 8 inch streak of high-grade ore.

Winnemucca *Silver State*: H. H. Beck has sold the Reno Reduction Works to people of Boston, represented by C. Williams. The transfer is to be made as soon as the matter of detail can be arranged. The purchasers paid part cash. They will operate the reduction works in connection with a group of mines they own near Oreana, in Humboldt county. The shipment of ore will begin soon. The mines are gold, silver and lead.

NEW MEXICO.

At Santa Rita Gilchrist & Clark are working thirty miners on their leased ground at the Cortez mine, and large bodies of high-grade ore are extracted.——Jones & Dawson have ten miners employed on their leased ground on the Rita mine and are taking out good pay ore.——F. P. Jones has twenty-five men employed on his lease on the Romero mine. He is taking out good copper ore.—— H. W. Dawson, on the Iturbide, is working under lease. His ore runs 24% copper and 20% iron.——A. E. Dawson, Gen. Mgr. Santa Rita Copper & Iron Co.'s mines, is shipping five cars of iron ore per day to Pueblo, Colo.——At Central, in the Texas mine, the drifts on the 500-foot level are showing good bodies of ore, and the mill is turning out high-grade concentrates every day.——A. L. Shaw has bonded the St. Helena mine for ninety days for $25,000. This mine shows a vein of gold ore which yields $30 a ton.

The Garfield & Butler claims, at Hillsboro, are making regular ore shipments to the smelters. The property is operated through a 450-foot tunnel, which shows a vein varying from 4 to 7 feet in width, with a pay streak that yields $50 per ton.

At Kingston the Illinois mine is being worked by six sets of leasers, who are shipping ore.——The property shows 6000 feet of development.——The Kangaroo, which has been idle a number of years, will soon be reopened. It is developed by a 300-foot shaft. ——The Calamity is a constant producer and is being worked under two sets of leasers. The values range from 28 to 200 ounces in silver.——J. Hurst is working the Maplewood. The vein is 3 feet thick and the values run

25 ounces in silver, $3 in gold, 5% lead and 3% copper.——The Cumberland will soon resume work. Kansas City capitalists have the property under bond.——The Black Colt property is worked under lease and high-grade ore is being taken out. The mine shows 2000 feet of development.——The Gipsy group of seven claims is a silver property. It is a comparatively new mine and the development work consists of a 200-foot shaft and about 500 feet of drifts. The vein is 20 feet in width. The high-grade ore which is shipped returns 150 ounces in silver and from $8 to $10 in gold. The low-grade ore will be concentrated. It returns from 20 to 35 ounces in silver per ton. One car recently shipped ran 363 ounces in silver and $18 in gold.

OREGON.

(Special Correspondence).—A vein of lignite coal has been opened on Powder river, near Sparta, twenty miles from Baker City, and on the line of the Baker City & Seven Devils Railroad. The coal has been satisfactorily tried for heating and blacksmith work.

Baker City, Feb. 6th.

The Columbia mine, near Baker City, is employing twenty-eight men, doing extensive development work and shipping concentrates.

The Cable Cove properties, the Owl and Elephant claims, near Baker City, owned by K. P. Plowman, have been bonded to the Twin Springs M. Co. for $70,000, and extensive development of the mines has been arranged. The Twin Springs M. Co. is backed by the Stetson Hat Mfg. Co., and is the same company that recently purchased the Deer Lodge mine, Baker City, for $100,000, and upon which large development operations are under way.

Baker City *Democrat*: The Golconda mine at Susanville, in the 600-foot tunnel, has a pay streak ranging in width from 4 to 16 feet carrying values from $10 to $70 per ton.——A second run of thirty tons of ore from the Carroll B mine, in Pleasant Valley district, owned by Johns & Baisley of Baker City, will soon be made at the Virtue mill, preliminary to extensive development of the property and the early erection of a mill if ore values warrant.——In the North Pole mine has been found a ledge about 6 feet in width of high-grade ore. They are in on the tunnel 1300 feet. As they can only treat twenty-two tons per day, a larger plant is contemplated.——The Baisley-Elkhorn mine employs sixty men; most of the work is at the 500 and 600 foot levels and seventy-five tons of good ore is daily taken out.

Grant's Pass *Journal*: Near Cottage Grove a new strike has been made in the Helena mine, which is said to be of good values.——Near Grant's Pass, Mr. Sturgis has struck a quartz ledge 2½ feet wide that assays $24 a ton.——A. W. Sturgis, near Jacksonville, is piping off considerable ground.——The Black Butte quicksilver mines, near Bohemia, made their first shipment of quicksilver last week to New York. The shipment contained thirty flasks.——At Althouse the Hickox mine is running night and day.

Jacksonville *Times*: The Hansen mines in Althouse district will soon be in operation.——California people have taken charge of the Hammersly mine in Jump-off-Joe district and are unwatering the property.——The placer mines of Pleasant Creek precinct have a fair supply of water. About twelve mines are operated with hydraulic plants.——Four mines are operated with hydraulic plants on a large scale in Wolf Creek district.

SOUTH DAKOTA.

The Portland & Clinton M. Co., operating at Portland, is shipping eight cars of ore per day from the Portland mine, and the Clinton ships three cars every other day, making the daily output of the two mines nearly 100 tons. About fifty men are employed in the two mines.

UTAH.

The shipments of ore and concentrates from Park City last week were 2,291,150 pounds.——At Vernal, it is locally stated that negotiations are pending for the sale of the Bromide mine and smelter to New York capitalists who have secured an option on the property for $75,000.——At Tintic in the White Star mine quartz has made its appearance which is of good value in gold.

The report recently submitted by Mgr. Dern for the Mercur M. Co. shows the receipts from the sales of ore and all other sources for the year reached a total of $481-161.23, with the expenditures amounting to $280,766.97, leaving net earnings in the sum of $200,394.26. On Jan. 10th there was a balance of $178,972.10, making a total of $379,366.36. Of this amount $355,000 was distributed in dividends, leaving a balance on hand Jan. 12th of $24,366.66. The production during the year reached a total of 105,188 tons gross that, less the moisture, showed 90,461 net tons. The net saving was $5.31 per ton in gold, with the cost per ton of $2.23. Of this latter item $1.16 was expended for mining, $1.72 for milling, and 35 cents for transportation. —— In the strike in the Star Consolidated at Tintic last week over 5 feet of ore has been exposed, the samples from which show 38% copper, twenty-nine ounces silver and 80 cents in gold.—— The Mammoth at Tintic found ore that shows four ounces in gold in addition to other metals per ton. The find was made last week in the 700-foot level.

Tribune: The Monitor mine near Milford this week shipped 200 tons of gold-bearing ore to Salt Lake.——A new cave was opened in the old Cave mine at Minersville recently in which it is reported a body of high-grade carbonate ore is exposed.——In Beaver county more activity is visible in mining than has been in many years.——Near Park City, the Superior Con. groups, held under lease by E. P. Le Compte, are being developed by eight men. Before Le Compte took the property there had been driven a tunnel 1300 feet in length, which at 1000 feet cut a vein 5 feet in width, which was never prospected. The ore assays from twenty ounces silver, 32% lead, to ninety-eight ounces silver, 60% lead and $6 in gold.

Salt Lake *Tribune*: The shareholders of the Daly-West M. Co. last week agreed to the amendment looking to a consolidation of the long divorced interests. The property is at Park City. The number of shares are increased from 75,000 to 150,000; the capitalization from $1,500,000 to $3,000,000. Recent proceedings will now be followed by a meeting of the board of directors representing the parent company, which will pass on the title to the outstanding half of the property which proposes to come in. If the title proves sound the secretary will issue 75,000 shares of stock to J. B. Haggin et al. Upon the execution of deeds conveying to the company their one-half interest in the twenty-eight mining claims in the possessions of the Daly-West. In the meantime preparations all point to the active resumption of work by March 1st. It is reliably stated that within a few days of the start-up the property would be providing employment for 325 persons between the mine and the mill and that the value of the milling ore blocked out is $3,000,000 and of the shipping ores now in the bins and started in the drifts underground at $150,000.——Last week John Dern and associates acquired the Nora group of mining claims at Mercur. The purchasers will at once undertake its systematic exploration.——At Mammoth recently on the 500-foot level in the Lower Mammoth the ore chute that was encountered originally at a depth of 300 feet has been broken into which gives over 200 feet of stoping ground. The shipping of ore was resumed last week. ——The Red Wing mine of Bingham made another strike of ore that runs well in copper, with silver and gold.——At Diamond a strike in the Joe Bowers Extension shows an ore body off the 270-foot level, where 8 inches of galena is exposed.——Operations will be pushed on the properties of the Butler Co. at Bingham in which G. S. Peyton and S. L. Boggs have recently become heavily interested. The Butler has a tunnel 250 feet long and another 500 feet long. In one of these was encountered a vein 18 inches wide carrying gold, silver, copper and iron. Four hundred and fifty feet in the tunnel was struck a 4-foot vein of gold, silver and lead. These veins afford high-grade shipping ore and it is expected that shipments will soon be made. The 500-foot tunnel is to be extended.

In the Old Jordan separated from the silver-lead chute by a sheet of limestone is a ledge that will average 5% copper and $5 gold. The values contained in the galena ore will afford a margin 40% greater than is to be derived from the copper body.——The Petro M. Co. of Bingham will resume operation of the property. This is another of the number that were driven out of the business when the slump came in the metal market, and while the owners have since added largely to their ore reserves, practically nothing has been sent to market for years. The lead bodies are said to be among the largest that have been uncovered in the State.

The Malvern M. Co. will continue further development of its ground at Sunshine and work is to be resumed as soon as it is possible to organize a force and reach the camp with supplies.——Several carloads of first-class ore were last week shipped from the Saratoga, of the Boston Con. group at Bingham.——The Tiewaukee group of fourteen claims, having recently passed to the control of W. S. McCornick, was last Saturday leased to A. D. Beeman, who is now putting the property in shape preparatory to doing a large amount of development work in new ground.——Copper ore is being produced from the lower workings of the Maxwell group.——The Old Telegraph shipped eight carloads of ore last week from Roman Empire, Grecian Bend and Carpenter Shop tunnels, leasers' ore.——This week the Dewey mill handled about 200 tons of ore from the Red Wing.——Since the 13th, 600 tons of average grade lead ore has been marketed from the Spanish mine at Bingham.

The Northern Light mine at Mercur last week marketed ore showing 409.6 ounces silver, 12.5% lead and $8 in gold, amounting to $5100.——The Galena M. Co. of Fish Springs last week made a shipment of ore that showed 81 ounces silver, 48.5% lead and 60 cents in gold. Another car of similar quality is en route.——Lower Mammoth last week shipped a car of ore giving a percentage in copper in addition to the other metals, of which assays show 109 ounces silver. The output will be 100 tons a month.

WASHINGTON.

Illustrating the activity in the formation of mining companies, etc., the following list is published of the new mining incorporations at Olympia for last week, an average six days: Republic Giant G. M. Co., Spokane, $100,000; Karchers M. Co., Tacoma, $1,200,000; Elaine M. & M. Co., Spokane, $9000; Columbia M. Co., of Buffalo Hump, Spokane, $100,000; Northern Lode of Buffalo Hump Mines Co., Spokane, $100,000; Spokane Copper M. Co., Spokane, $100,000; Republic Iron Mask G. M. Co., Spokane, $100,000; Gold Crown and Gilt Edge Con. M. Co., Spokane, $25,000; Alpine G. M. Co., Spokane, $100,000; Buffalo Clearwater Con. M. & M. Co., Spokane, $75,000; Jubilee G. M. Co., Spokane, $100,000; Little Tom Thumb M. Co., Spokane, $50,000; Windfall G. M. & M. Co., Spokane, $100,000; The South Half M. Co., Spokane, $100,000; Cumberland G. M. Co., Spokane, $100,000.

A carload of ore shipped to the Selby smelter from the Sapphire, Slocan district, runs 160 ounces silver and 70% lead. Regular shipments will be made.

Wm. Pinnell, formerly an employe at the Everett smelter has been adjudged insane. He stole about $500 worth of silver and gold, combined in one brick of bullion. He had an idea that he knew a secret process by which he could separate the metals. He was arrested for grand larceny, but the officers became convinced that they had an insane man instead of a thief to deal with. One of his pet schemes is to build a smelter in Everett. He says he is going to be a rival of John D. Rockefeller.

The Twin and Lily K. claims on Pass creek near Grand Forks have been bonded to C. D. Porter and associates of Spokane for $50,000, upon which $ has been paid down. These claims have a large surface showing, the width of the ledge being from 80 to 100 feet. The pay chute, where uncovered by surface cuts, measures from 25 to 30 feet. The values run from $ to 10 copper, $4 to $10 in gold and some silver. Some assays have gone as high as $64 in gold per ton. Contracts for two 50-foot shafts have been let, one to be sunk on each claim. The price to be paid for these two claims, practically undeveloped, is on account of their surface showing. —Near Republic the Georgie Reed has a body of ore that assays $27 per ton. The ledge is 30 feet wide

At Republic the Republic mine last week in No. 3 tunnel found 4 feet of ore that assays $225 per ton. A drill on various properties for miles along the ridge is boring through the porphyry and country rock prospecting for ledges.— —The Mountain Lion tunnel has been driven 800 feet. At a distance of 750 feet the ledge was cut. The average assay runs $60. The ledge matter is about 43 feet wide.

At Republic the Butte & Boston tunnel is in 213 feet. The rate of progress is 3 feet per day of three shifts.——The Golden Harvest tunnel is in 456 feet. A winze has been started in the ore chute. The ore shows uniform values.

FOREIGN.

BRITISH COLUMBIA.

The Deer Park mine at Rossland has opened a large body of ore from which two carload shipments have been made. The dump of shipping ore contains over 1000 tons. This is being added to merely in the course of development. —— The Canadian Pacific is handling eight carloads of silver-lead ore a day from the mines of the Slocan.——Two concentrators will be built at Sandon in the spring, one for the Ruth and one for the Ivanhoe. —— The Vancouver M. Co. and the Waverley, both near Silverton are erecting concentrators. —— Shipments of ore from the mines of the Rossland camp for the week ending January 28th were: Le Roi, 1500; War Eagle, 600; Iron Mask, 20; total, 2120. —— The Darby M. Co. recently bought the Swansea property in East Kootenay for $30,000. The principal values are copper and gold. Work will be commenced as soon as conditions are favorable.

The Cariboo mine in Camp McKinney, head office at Toronto, owns a group of seven claims and is developed by a shaft 360 feet, with levels at 70, 175, 255 and 355 feet. Most of the stoping has been done between the second and third levels. The new company is driving development. The equipment consists of a new 10-drill compressor, two 60 H. P. boilers and a 60 H. P. hoist capable of sinking 1000 feet. The mill is of 20-stamp capacity and crushes forty tons a day, and the ore plates $17 in gold and yields $2 in sulphurets. The concentrates run on an average about $80 per ton, they have on hand over 200 tons of concentrates; the company employs fifty men. ——The Anarchist, Explosion, Dynamite and Success mines were recently bonded for $25,-000 to Toronto people. Numerous surface cuts on the lead expose it for 4000 feet. The ledge shows a width of 6½ feet and at the bottom 5¾ feet. The values run $16 a ton.

The Porto Rico mill, near Nelson, is turning out $20,000 a month, and it is locally stated that the capacity of the mill will be doubled.

The Gertrude mine at Rossland is to be equipped with a new power plant. Work in shaft has been hindered by the rapid flow of water and to carry on development without delay the management has decided to install machinery. A pump and a hoist will be utilized and perhaps drills. The shaft on the Gertrude is down about 150 feet and it is to be carried to 200 feet, when crosscutting in both directions across the claim will be undertaken.

The deepest shaft ever sunk in Caribco for placer mines was put down last summer by R. H. Campbell of California in what is supposed to be the old ancient channel of Horsefly river at the head of Beaver Lake valley. This shaft was bottomed on rim rock at a depth of 450 feet with good prospects, $2 and upwards to the pan. The company is now sinking a three-compartment shaft, 5x15 feet, more in the center of the channel.——The Cariboo Con. Hydraulic Co., Ltd., did some more ditch work last year, constructing another one ten miles in length from Morehead creek at a cost of $125,000. The company has now about thirty miles of ditching to its mine which will give in the future sufficient water to last the season. This company cleaned up for a short season's run last year $110,000, and expects to double that in '99.——The Golden River Dam Co. on the south fork of Quesnelle river completed its dam to hold back the water of the South Fork lake.

On the Molly Gibson property in the Slocan a body of ore at 150 feet depth, from 1 to 6 feet wide, said to average 550 ounces silver and 50% lead per ton, has been struck. Six carloads of Molly Gibson ore have already been shipped, giving a net return of over $125 per ton.

The ore shipments from McGuigan, in the Slocan, for '98 were 934 tons.——The Bosun shipped 120 tons in January.——Five carloads of ore were shipped by the Dardanelles last month.——The Ymir mine has a combination 40-stamp mill concentrator and will soon be treating 100 tons per day.—— The Le Roi mine at Rossland has shut down shipments for ten days, pending the completion of the skip from the 700 to the 800-foot level. The shaft between these levels is practically completed. There is merely a pillar of rock left under the skip at the 700-foot station. Ore chutes, pumps, rails and air pipes are being put in. After the completion of the shaft full work will be resumed and shipments will continue at the rate of 200 to 300 tons a day. The shaft will be deepened to 900 feet. An electric hoist will be erected. The size of this new plant is not decided on It will probably be not less than 100 H. P.

The Hall Mines, Ltd., expect to start treating lead March 1st.

MEXICO.

A newly discovered vein of iron, lead and silver, in the San Lorenzo Sierra, near Cuencame, will be opened up and known as the Parida mine.— A vein of zinc, silver and gold ore was discovered recently near Zacapoaxtla, and work is progressing on the property. The new 100 ton furnace erected by S. A. Barron, in the Magistral district, is in operation and smelting 130 tons every twenty-four hours.

During 1898 there was done in the Creston mine at Minas Prietas about one and three-fourths miles of new development work.

The Susie is a new mine of antimony and the Maria one of copper denounced near Tlacotepec, in the State of Guerrero, by F. C. Burgdorfer. —The gold mine of Kraft & Anderson, near Chihuahua, is a heavy shipper. The ore goes to the smelter at the rate of 100 tons per day; it is manganese oxide and carries gold.

THE PHILIPPINES.

A California miner, now a soldier in Manila, writes of the mineral resources in the Philippines, saying: "Nearly the whole island of Luzon contains minerals of many kinds, gold, silver, copper and coal being chief among those found in appreciable quantities. So far the greater part of the work done on quartz has been on the small veins, carrying rich pockets and yielding indifferent general results. Some spasmodic attempts have been made by stock companies to mine quartz, but as yet I have been able to learn of no proposition that has been free from the stock gamble and where the mining was capably and honestly carried on. The Indians (Igorotes) sell yearly a large amount of placer gold of fair quality to itinerant traders. I am credibly informed that with wooden bowls they produce about $500,000 yearly from the sands of the provinces of Cayagan, Ilocos, Abla, Boutoc and Benguet. Many idols and ornaments of pure gold, of native manufacture, have been shown me. But the excessive greed and corruption of Spanish officials of these islands have made everything like continuous mining, even by the wild tribes, precarious and well nigh impossible. It is my honest belief that if American occupation holds, many profitable ventures may be made in placer mining, for nearly all of the streams of the northern part of Luzon are auriferous and have an abundance of water and wood and effective fall."

Commercial Paragraphs.

JEANESVILLE IRON WORKS CO, Denver Branch, A. Middlebrook manager, received an order this week from St. Louis, Mo., for one of their improved sinking pumps, No. 9 B; also shipped one of the same size to New Mexico. Their shops are very busy on mine pump work.

MESSRS. E. H. BENJAMIN, mining engineer; A. M. Hunt, mechanical and hydraulic engineer, and Wynn Meredith, electrical engineer, have formed a copartnership with headquarters at 331 Pine St., San Francisco, and are prepared in their respective lines to make expert examinations, furnish advisory reports or supply competent construction supervision.

THE Vulcan Iron Works Co. of Seattle, Wash., expect to be settled and ready for business in their new quarters by the 15th inst., and state that after that date they shall be pleased to receive all interested at the new plant, which will be by far the most complete and best appointed and equipped in the Northwest. It will be thoroughly equipped with new machinery of all classes, and its capacity more than five times larger than at the old plant. The Vulcan Iron Works Co. of Seattle propose to make a specialty of mining machinery and engine building and will also be prepared to manufacture all other classes of machinery.

Recently Declared Mining Dividends.

Pennsylvania, California, 5 cents per share, $3000; payable immediately.

Swansea, Utah, $5000; Feb. 10.

Gold King M. Co., Colorado, 1 cent per share, $10,000; payable Feb. 20.

Deer Trail No. 2, Washington, $2500; payable immediately.

Ruth mines, British Columbia, 22½% per share; Feb. 1.

Recent Mining Incorporations.

California M. Co., San Rafael; capital stock $100,000, subscribed $160; T. W. Tompkins, M. Gottschalk, W. M. Byrnes, H. Wilkius, J. W. Cochrane.

Tiger Fork Placer M. Co, San Jose; capital stock, $17,500—subscribed; S. P. Sanders, J. H. Miller, J. F. Jury, W. B. Sanders, N. A. Sanders.

Longfellow M. Co., S. F.; capital stock, $100,000; subscribed, $2500; E. Anderson, R. W. Dron, C. P. Eells, H. L. Atkinson.

Obituary.

At Trail, B. C., Jan. 31st, J. E. Boyden, master mechanic for the Trail smelter and superintendent city electric plant, was killed by a shock received while working at the switchboard; 500 volts passed through his body.

Industrial Notes.

—The Northern Pacific Railroad is advertising Hawaii.

—Spokane, Wash., made half a million barrels of flour in '98.

—New and important oil strikes are reported at Summerland, Santa Barbara, Co., Cal.

—During last month 1406 passengers and 6160 tons of freight went to Alaska via San Francisco and Seattle.

—The Mexican Coast Steamship Co. is announced ready to ply between southern California ports and points on the west coast of Mexico.

—Approximately, the total area of the railway belt in British Columbia is 10,985,738 acres, and the area of the part of the belt surveyed by the Dominion Government is 834,140 acres.

—The world's shingle packing record was broken recently by H. Tritz of Pilchuck, Wash. He packed 1000 in 8 minutes and 5 seconds. The record heretofore was held by F. Tocbed of Wisconsin.

—The Copper River & Yukon Railroad Company ask Congress to grant them $16,000 per mile subsidy, rights to incorporate for fifty years, and right of way for a railroad and telegraph line from Valdes Inlet, Alaska, to the Klondike.

—At Colon several of the strikers have returned to work as a result of the railroad's notification of an increase of 25 cents silver in the rate of wages. The strikers at Panama still refuse to go to work and the deadlock there still continues.

—Internal revenue receipts at San Francisco for January amounted to $249,706, about double the sum received during the same month of last year. The customs receipts for the port during January amounted to $541,212, as against $499,268 for the preceding month.

—The U. S. shipping interests of the Hawaiian Islands have greatly increased since annexation. There were last week at San Francisco loading for or on the way to the Islands fifty vessels, of which thirty-five fly the American flag, five British, three Norwegian and two German.

—Baker City, Or., has planned to bring water from mountain streams by a ten-mile gravity system to cost $140,000, to raise which the city would have to be bonded. In one of the 200-foot artesian wells, having a 6-inch pipe, 85 feet of 1-inch pipe was inserted, and, by a small air compressor, the flow from this one well was increased one-third.

—Over $1,000,000 of the recent issue of $1,500,000 State of Jalisco, Mexico, 6% gold bonds have been sold since the bonds were brought out at par and interest about a month ago, showing how radically the recent war has changed sentiment in respect to securities outside the United States. The price of the bonds has been advanced to 102.50 and interest.

—J. A. Scrymser, president of the Pacific Cable Co., arrived from Hongkong and Yokohama, thinks that no American cable could land in the Philippines or on the Asiatic coast without the consent of the English companies, which have controlling contracts with the different governments, some of which run till 1949. The Japanese Government is willing to go into the proposition under certain conditions.

—Tacoma, Wash., reports the purchase of the Tacoma street railways for nearly one million dollars by a New York syndicate, the consolidated street railways of that city, to be operated by the Tacoma Railway & Power Co., now being organized with $2,000,000 capital, about half of which is to be used for the construction of a electric power plant, water power to be derived from the White, Puyallup or Nisqually rivers.

—Los Angeles, Cal., hears of two banking firms which have formed an American company, contemplating the purchasing of all the beet sugar plants west of the Mississippi river; capital stock, $20,000,000. It is thought there that the beet sugar plants which the company will take are those at Grand Island, Neb.; Norfolk, Neb.; Chino, Cal., and Huename, Cal. The last named is the big factory at Oxnard in Ventura county.

—The three steamship companies sending vessels from San Francisco across the Pacific are giving present preference to freight waybilled through from the East, and local shippers find it difficult to get any freight space at all. Having worked up the trade they now find themselves virtually excluded. The remedy, of course, is to establish another line. The business justifies it.

—C. N. Sterry, the solicitor of the Santa Fe in California, is essaying the passage of a law to permit the Santa Fe Pacific—from Albuquerque to Mojave—to consolidate with the Southern California railroad and the Valley road. It is considered to be the intention of the Santa Fe to combine all of its lines west of Albuquerque into one company, with general headquarters in San Francisco. Officials of the Atchison Co. deny the report from San Francisco, which states that a deal has been concluded between the Santa Fe and the North German Lloyd Steamship Co., by which the latter will operate a Transpacific line before the first of next year.

—The following, in reference to the food supply in South Africa, is taken from the report of J. G. Stowe, U. S. Consul-General, dated Cape Town, November 30, 1898: "It was stated in a recent debate in Parliament here that in America wheat was $1.86 and flour $2.61 per 100 pounds; that a large fall in prices was expected, and that American flour was being adulterated. As an example of the present high cost of living here, it was said that an employee of the railroad, married and with three children, draws £12 ($58.40) per month; that he was obliged to expend for food not less than £7 10s ($36.50) per month, and for rent a minimum of £4 10 ($26.50) per month, thereby using up all his wages, leaving nothing for clothing or education. Flour is coming now from the United States. This latter article, now regularly imported, is in heavy demand, with inadequate supplies. Shipments on the sea are sold, and this month's imports are large. Quotations are 18s ($4.59) per sack of 196 pounds.

—The U. S. Treasury and War Departments will build a trail and wagon road from tide water to the Yukon river, entirely upon American territory. The southern terminus of the road, an all-land route to the Yukon valley, will be Valdez, on Prince William sound. From that point the road will pass to the west of the glacier of Copper river, following the contour of the country to Montasta pass, at the head of Tanana and Forty-mile rivers, 1600 feet high. Thence the road will follow Forty-mile creek and end at Eagle City, on the Yukon, just inside the American line. This route makes the road 400 miles long, all on land.

—An experiment concluded recently at Marysville, Cal., by Dr. F. A. C. Perrine of Leland Stanford University, utilizing the electrical power line of the Yuba Power Co., from its power house to Brown's Valley, a distance of ten miles, is said to have demonstrated that 36,000 volts may be transmitted over a copper wire, using glass insulation, against 16,000, which has been the maximum in power transmission heretofore. Such a commercial result would effect a saving of half in the cost of wire in the construction of electrical transmission plants in the future. As it is now, the cost of wire is about half the entire cost of the plant.

—At Vancouver, B. C., it is stated that the banks have shut down on twenty-eight canners in British Columbia owing to their inability to carry on business under the present Dominion regulations. Three bank managers are quoted as saying that with the present regulations canners cannot can and all the smaller concerns must go to the wall. It means a loss to the province of $4,000,000, and to Vancouver alone of $500,000. G. I. Wilson, the largest individual canner on the Fraser, is quoted as saying: "I have sold two of my canneries in Canada and am looking for a site in the United States. About twenty of the fifty canneries will move to the States should the blundering Canadian Government insist upon enforcing the regulations with the idea of barring American fish and fishermen. The rest will go out of business."

—The Anglo-American commission, laboring for reciprocity between this country and Canada, find coal, lumber, wood pulp and agricultural products all serious stumbling blocks. The Canadian representatives of lumber interests say the Americans have offered to reduce the tariff on lumber to one dollar, but that their commissioners are stoutly holding out for absolute free trade. The Canadian commissioners have disavowed the British Columbia parliament action and agreed to give the Americans the same privileges in the Atlin district as Canadians are given in American territory. Should there be no convention as the result of the commissioners' labors, then the American Government will ask the Dominion Government to set aside the obnoxious British Columbia alien mining law, which might create trouble between Americans and Canadians in the Atlin district.

—Consul Thackara at Havre, France, writes: "In conversation with an American lumber broker of Havre, J. N. Chrystie, 57 rue St. Quentin, he informs me that he has made several attempts to sell cargoes of California redwood for foreign account in France, but so far has been unsuccessful. Three difficulties stood in the way: 1. The price wanted by the American exporter has always been a little higher than the French importers could afford to pay. Twelve pounds ($58.39) per St. Petersburg standard (165 cubic feet)—say, $29 per 1000 square feet—is as much as the importer could offer this year c. i. f. Havre. 2. The voyage from the Pacific being a long one, the terms—2% discount for cash, payment on date of arrival (freight deducted)—were held out for by the French importer, the American exporters' terms being four months from date of bill of lading. 3. The smallest vessel which could be chartered was of a capacity of about 60,000 square feet, and this seemed too much for a trial shipment. Fifty thousand square feet would be ample, as the wood is not generally known. If these difficulties could be surmounted, Mr. Chrystie is under the impression that a market for California redwood could be built up. The sizes wanted are 8 inches full in thickness (as wood of this thickness and above is admitted free of duty), 14 feet and upwards in length, and 12 inches and upwards in width—the wider the better. If the wood is 1 centimeter less than 8 inches in thickness, it most certainly will have to pay customs duties; so I say 8 inches full. It should be clear stuff."

Catalogues Received.

Catalogue "A," issued by the Vulcan Iron Works, 505 Mission St., San Francisco, Cal., illustrates and describes the Vulcan single and double tramway system, the single-carrier trolley lines, the double-carrier reciprocating gravity tramway, and, in general, surface haulage plants and rope-power transmission. Especial attention is given to detailed description and illustration of the Vulcan double-rope tramway, and on pages 27 and 28 is a series of questions upon the answers to which can be given estimates of what such work would cost in any special case. Catalogue "B" is specially devoted to description of the single-rope system. Those interested in aerial transportation can secure a copy upon request.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DESIGN FOR HORSESHOE PAD.—Edward D. Flint, Oakland, Cal. No. 30,095. Dated Jan. 31, 1899. This invention comprises an improved design for elastic pads to be used in conjunction with horseshoes and provides a better and more convenient support between the shoe and the hoof of the horse.

ADJUSTABLE HINGE WINDOW.—Wm. McCall, San Francisco, Cal., assignor to the McCall Sliding Hinge Window Co. No. 618,608. Dated Jan. 31, 1899. This invention relates to windows and is applicable in part to ordinary windows having slidable sashes, but is especially adapted for use upon that class of windows in which the sashes are hinged upon one side to a strip which is slidable on vertical guides. It consists of a hollow metallic parting strip having outwardly turned edge flanges, similar flanged plates secured to the frame exterior to the line of travel of the sashes and plates fixed to the edges of slides to which the sashes are hinged, these plates traveling beneath and being guided by the flanged plates and parting strip.

ADJUSTABLE FAIR LEADERS.—Wm. F. Murray, San Francisco, Cal. No. 618,607. Dated Jan. 31, 1899. This invention relates to that class of gear known as "fair-leaders," which are designed for the change of direction of ropes so that they may lead in any direction and retain the directing pulley fairly or in direct line in both directions therefrom. It comprises a globe having a slotted central opening for the pulley, a pin passing through the globe and forming an axis or shaft upon which the pulley is turntable and a two-part socket partially enclosing the globe having the periphery of the globe fitted within it and means by which the parts of the socket are adjusted with relation to each other to clamp the globe and thereby fix the position of the pulley.

SIGNAL CONTROLLING TRACK INSTRUMENT.—E. A. Holloway, Gilroy, Cal., assignor of one-half to F. U. Reeve. No. 618,604. Dated Jan. 31, 1899. The object of this device is to provide a means for giving a signal such as is required when trains approach railroad crossings or other points where it is desirable to notify a distant point of the approach of the train. It comprises insulated track sections over which the train passes successively, wires connecting said track sections with a battery and with electro magnets, which are successively energized by the passage of the train, latches whereby metallic connection is made through the magnets one after the other, an electrically controlled signal apparatus which is energized after the second electro magnet is energized and its connections made, and a third electro magnet and disengaging bar, the whole device being acted upon by the passage of the train over the track sections so that the magnets, being successively energized, will first operate the signal and lastly restore the parts to their normal condition in readiness for the passage of another train.

FISHING REEL TENSION APPARATUS.—A. V. Chapin, Ferndale, Cal. No. 618,599. Dated Jan. 31, 1899. The object of this improvement is to provide a varying tension upon the reels used by fishermen so that the line may be allowed to run out more or less freely as desired. It comprises a connected pawl and ratchet mechanism by which the reel is turnable to wind or unwind a line and an intermediate device by which the tension upon the unwinding line may be varied independent of that upon the line when it is moving in an opposite direction.

TRUNK LASHING.—Jas. Cameron and W. E. Link, San Francisco, Cal. No. 618,598. Dated Jan. 31, 1899. The object of this invention is to provide a lashing for trunks which is cheap, readily applied and effective, and which will present no especial incentive to dishonest persons to take it off and steal it in transit. It consists of ropes passing respectively longitudinally and transversely across the bottom, their junction being connected, thence up the ends and back strap, loops through which the meeting portions of the ropes are freely movable at points where they are contiguous to each other upon the top of the trunk, flat wire links to which the ends of the ropes are secured, and straps fixed to one pair of the links adapted to pass through the other pair over and over, whereby a purchase is provided to tighten the lashing.

APPARATUS FOR EXTRACTING METALS.—Philip Somerville, Bishop, Cal., assignor to the California Agitating & Leaching Machine Co. No. 618,622. Dated Jan. 31, 1899. This invention relates to an apparatus for extracting metals from their ores, and it is capable of being used for separating coarse from fine material. The invention comprises essentially a frame or support, one or more rotatable barrels mounted therein having spiral flanges fixed to the interior extending from one end to the other, the screen extending longitudinally through the flange, an inlet at one end of the barrel and an outlet at the opposite end, and devices at the inlet end for feeding material and fluid matter to the barrel. This applies to the uppermost when two barrels are employed, and with this construction a device serves to deliver the material from the discharge end of the first barrel by gravitation into the receiving end of the other barrel, by which it is again returned to the front by the spiral of this barrel.

Personal.

J. GRIFFITH becomes Gen. Mgr. Boston & DeLamar Co., at DeLamar, Nev.

WM. MCKINLAY, Supt. Providence mine, Nevada City, Cal., is in San Francisco.

J. F. WEBB of Placerville, Cal., will make his future headquarters in Denver, Colo.

T. E. SCHWARTZ becomes Gen. Mgr. Moyer mine, of the Iron Silver Co., Leadville, Colo.

F. E. WARE, San Francisco, Gen. Mgr. Mt. Shasta mine, Shasta, Cal., has returned from the mine.

DAVID SWICKHEIMER and A. J. Clark of the Japan Mines Co., Telluride, Colo., are spending the winter in Los Angeles, Cal.

G. A. RICE of Denver, Colo., has returned from New York to Esmeralda county, Nev., where he is sampling a copper property that he has had under development for some months.

THE California State Senate has granted Lieut.-Gov. Neff, president of the California State Miners' Association, leave of absence from the State for six months. It is his intention to make a visit to the Hawaiian Islands.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JANUARY 31, 1899.

618,556.—BOILER—A. Bink, Stockton, Cal.
618,598.—TRUNK LASHING—Cameron & Link, S. F.
618,599.—FISHING REEL—A. V. Chapin, Ferndale, Cal.
618,405.—BOTTLE—S. Erstad, Bisbee, A. T.
618,669.—POP CORN GEM MACHINE—J. E. Harvie, Los Angeles, Cal.
618,462.—WINDOW—E Hipolito, Los Angeles, Cal.
618,604.—TRACK SIGNAL—E. A. Holloway, Gilroy, Cal.
618,691.—BICYCLE GEAR—C A. LaGrave, Carson, Nev.
618,608.—WINDOW—W. McCall, S. F.
618,426.—CAN OPENER—E. D Middlekauff, S. F.
618,515.—MOP WRINGER—Emma E. Miller, Sac'to, Cal.
618,607.—FAIR LEADER—W. F. Murray, S. F.
618,724.—SAND PAPERING MACHINE—A. A. Pelton, Spokane, Wash
618,481.—FEATHER RENOVATOR—W. W. G. Reed, Los Angeles, Cal.
618,622.—EXTRACTING METALS—P. Somerville, Bishop, Cal.
30,095.—DESIGN, HORSESHOE PAD—E. D. Flint, Oakland, Cal.
30,113.—DESIGN, ESCUTCHEON PLATE—B. Phelps, Seattle, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

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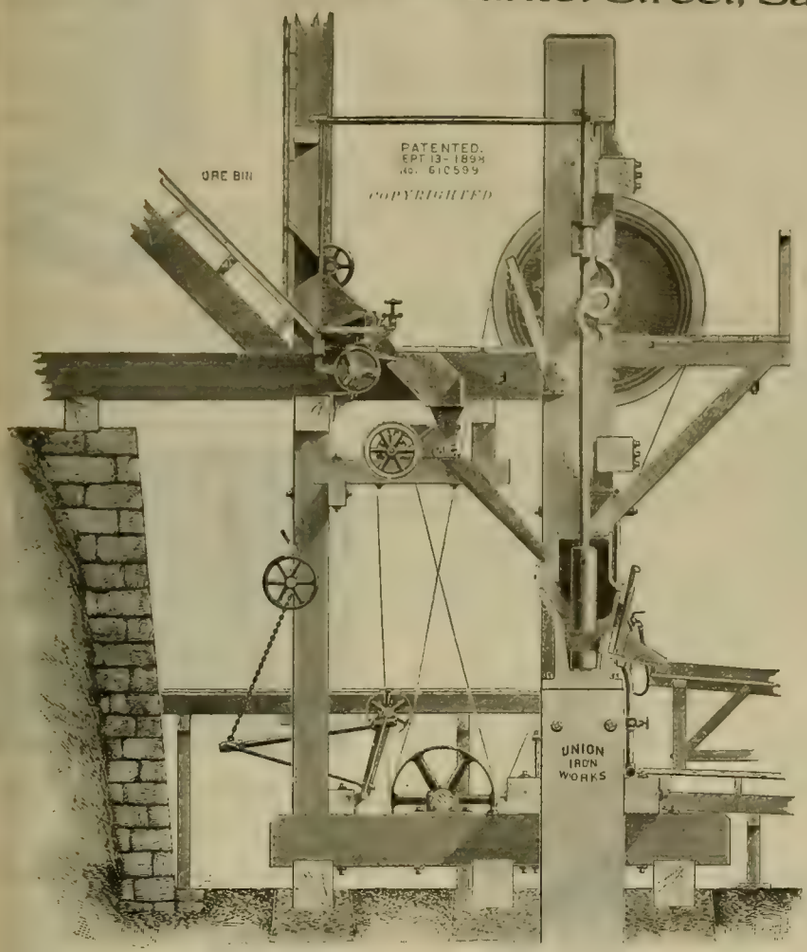

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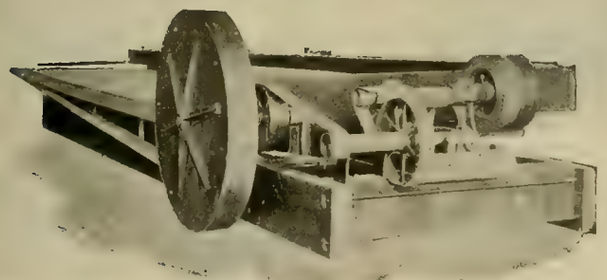

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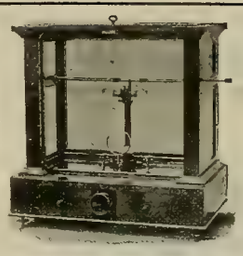

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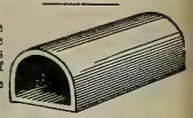

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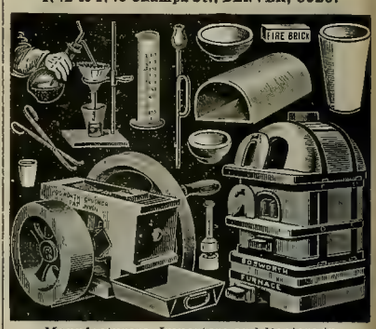

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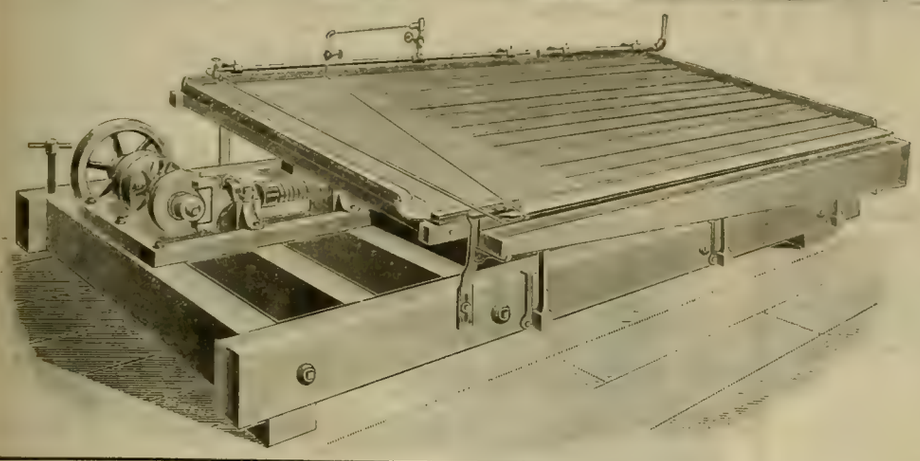

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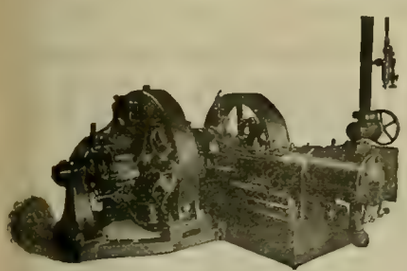

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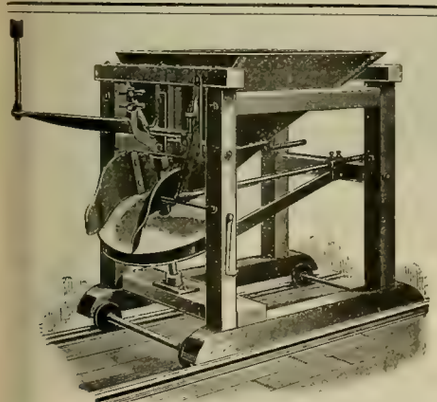

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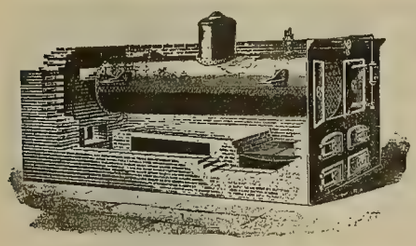

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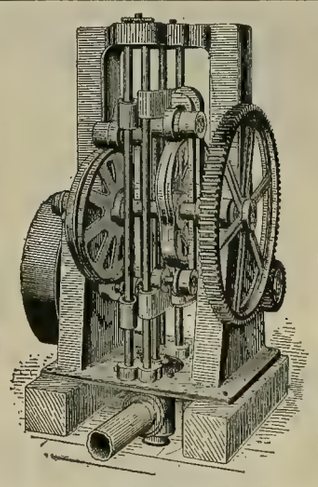
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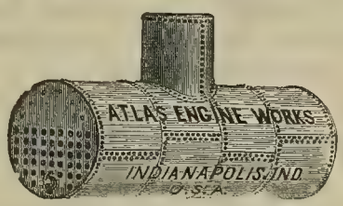

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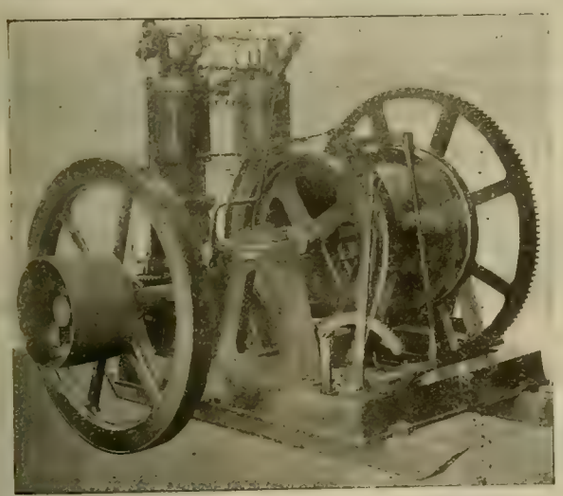

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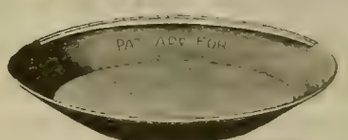

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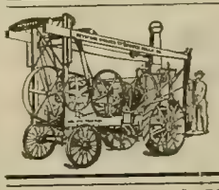

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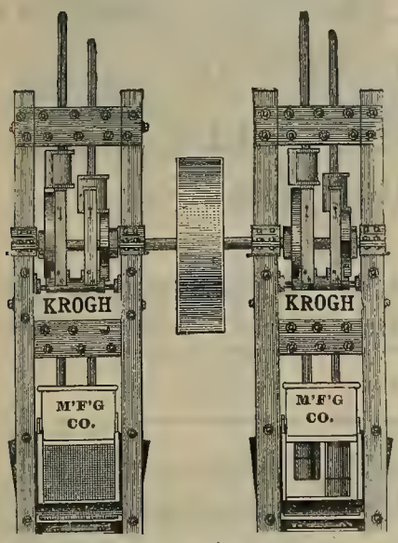

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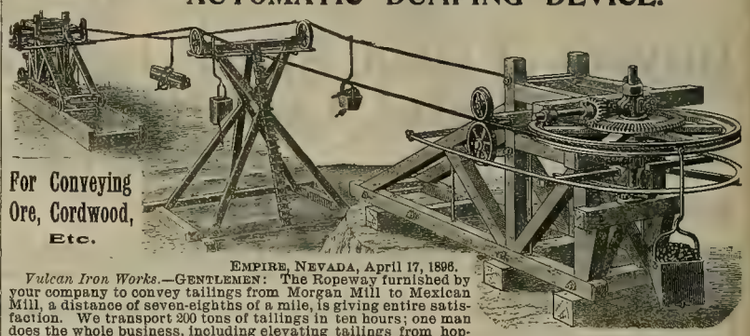

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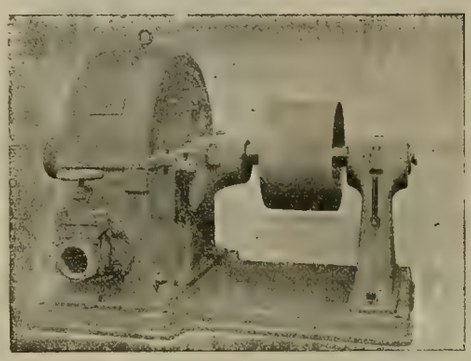

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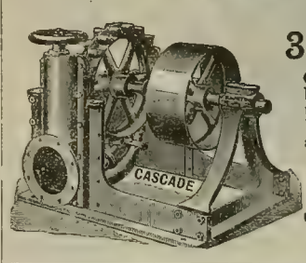

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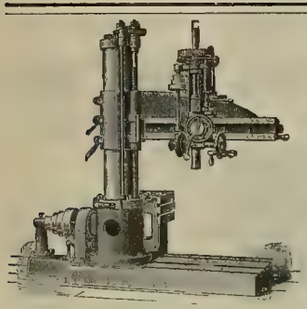

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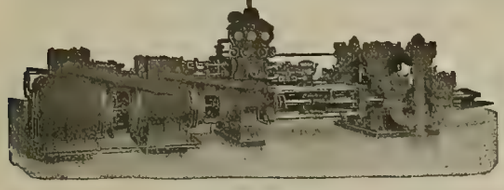

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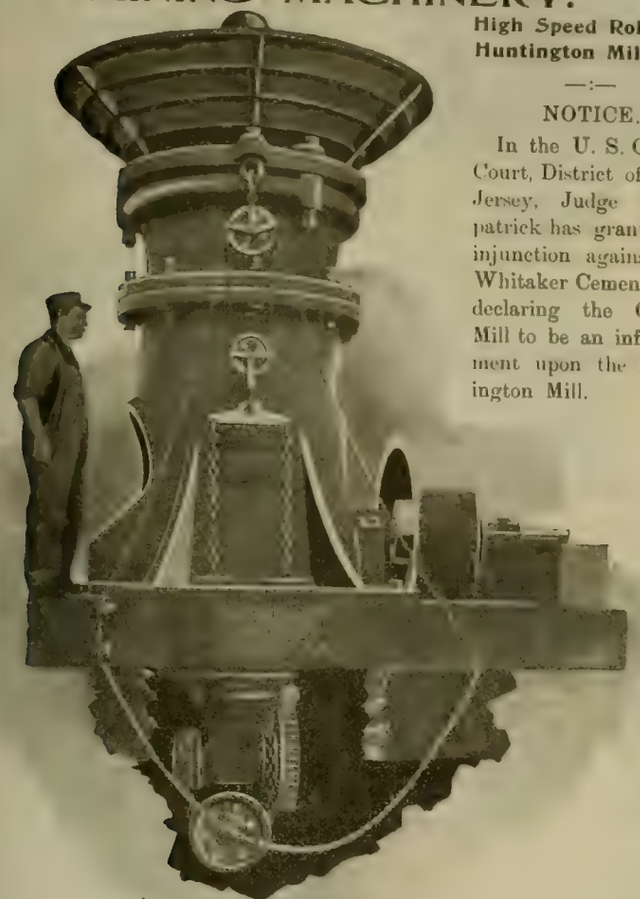

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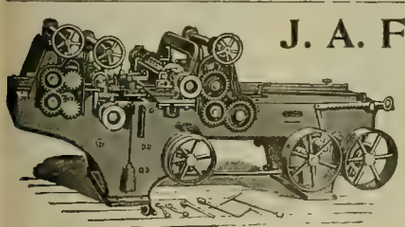

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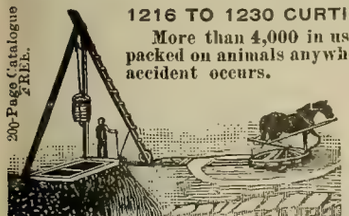

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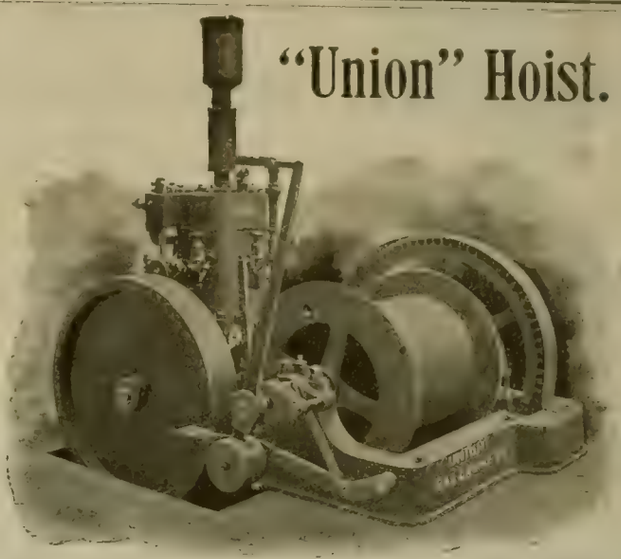

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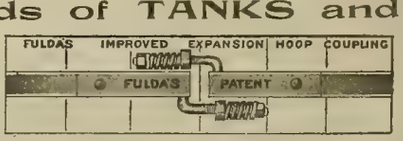

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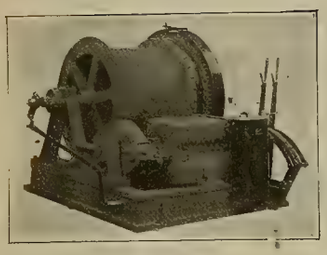

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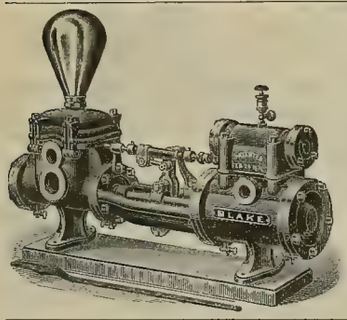

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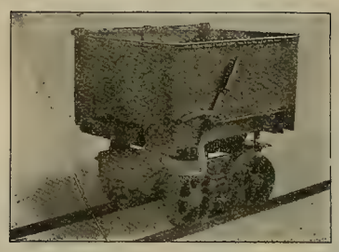

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A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc. Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St. S. F.

TUBBS CORDAGE CO.

(A CORPORATION.)

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. Extra sizes and lengths made to order on short notice

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MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

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Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

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SAN FRANCISCO Pioneer Screen Works.

JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices.

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

—MINING SCREENS A SPECIALTY.—

221 and 223 First Street, San Francisco, Cal.

Mining, Mill, Driving, —AND— Locomotive Headlights.

SIZES ON HAND:

24-inch,
20 "
17 "
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10 "
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Boesch Lamp Co.,

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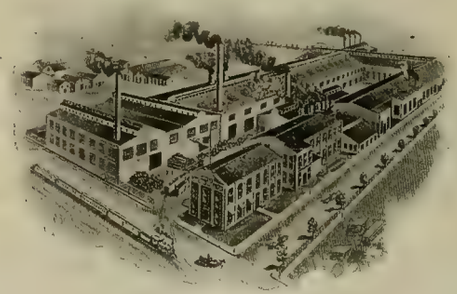
L. PETERSON, MODEL MAKER,

226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential*.



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Gen'l Western Offices,

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Canton Extra Drill Steel, Warranted.

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FOR SALE BY ALL DEALERS.

Cyanide Potassium—99% pure, Beckton brand.
Chloride Lime—Best English in casks and drums.
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WORKING TESTS by Amalgamation, Concentration, Chlorination and Cyanide.

ORES CRUSHED AND SAMPLED. MILL RUNS.

Prices on Application.

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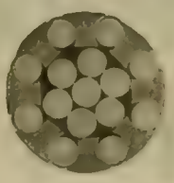
Locked-Coil Cables AND Webber Compression Grips

Are features of the patented **BLEICHERT WIRE ROPE TRAMWAY** And other systems of aerial transportation.

Bleichert Tramway of the Solvey Process Co., transporting rock.



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Engineers and Contractors, and sole licensees in North America for the Bleichert System. Also, **Wire Rope Equipments for Surface and Underground Haulage**, Etc.

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Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & CO.'s Patent Agency will have the benefit of a description in the *Mining and Scientific Press*. We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

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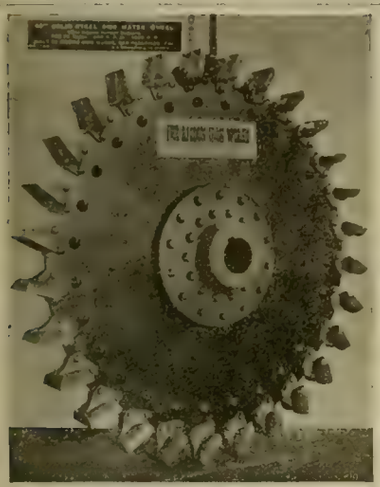

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We build Water Wheels for any head and for any power. Complete electrical power generator wheels a specialty. Large wheels up to 50 feet diameter for driving compressors.

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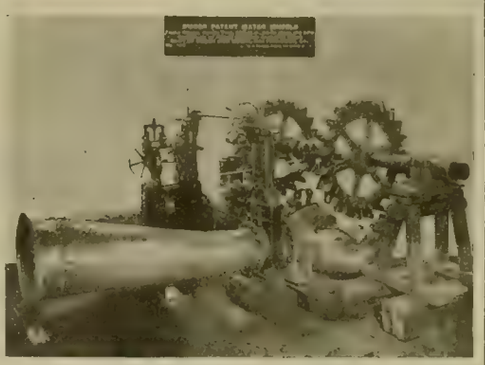

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For keeping your iron and wood work in perfect condition. Nothing else "just as good." Circulars cheerfully furnished.

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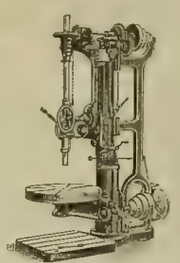

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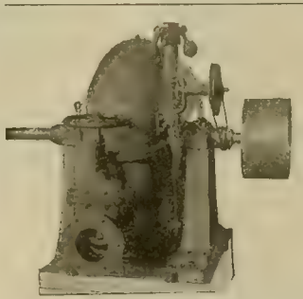

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Patent Water Wheels.

Don't buy any other until you have seen them and investigated their merits. We not only guarantee high efficiency and regulation, but obtain it in actual practice. Estimates and surveys made for the installation of Water Power Plants of all sizes and capacities.

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BROMINE
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And Other Aquarious Chemical Solutions. OUR **FILTER PRESS** Removes all Slimes and Hastens the Deposition of the Metals.

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1898 IMPROVED.

THE TRUAX PATENT IMPROVED

AUTOMATIC ORE CARS,

— Made by —

THE TRUAX MFG. CO.,

DENVER, COLO. 1717 Wazee St. ..... AND ..... SAN FRANCISCO, CAL. 114 First St.

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Patented: Jan. 5, 1892. Aug. 27, 1895. July 19, 1898.
In Canada: June 21, 1898.

MINING HOISTS.

Engines, Boilers, Saw Mills, Hoe Saws, Mill Supplies.

TATUM & BOWEN,

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Dewey, Strong & Co., Patent Agents,

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NOTICE.

The Name of the

RIX COMPRESSED AIR MACHINERY CO.

HAS BEEN CHANGED TO

The Compressed Air Machinery Co.

WM. A. HEWITT. P. H. REARDON.

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WE WILL CONTINUE TO MANUFACTURE AND SELL

HIGH GRADE AIR COMPRESSORS,

"GIANT" ROCK DRILLS, MINING HOISTS, ORE CARS,

STEAM ENGINES, BOILERS, Etc.

The Compressed Air Machinery Co.

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MANUFACTURERS OF AND CONTRACTING ENGINEERS FOR

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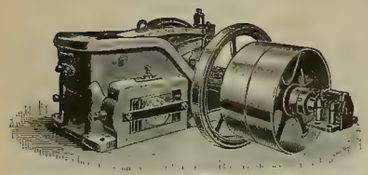
SMELTING FURNACES.

AMALGAMATION AND CONCENTRATION PLANTS.



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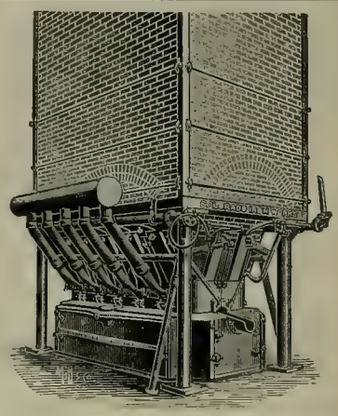
Investigate our late improvements in ORE CRUSHING MACHINERY. We guarantee capacity per day to any degree of fineness.

OUR PATENT HOT BLAST APPARATUS for all Smelting Furnaces is a Success. A great economizer of fuel. and enlarges capacity of furnace.



Standard Silver-Lead Water Jacket Smelting Furnace.

Equipped with Arch-Bar System of Mantles, insuring rigid and strong walls. No Cracks.

CONSOLIDATED KANSAS CITY SMELTING & REFINING COMPANY.

Incorporated Under the Laws of New York.

Capital paid in.....$3,400,000.

BUYERS OF ALL CLASSES OF

GOLD, SILVER, LEAD AND COPPER ORES,

Bullion, Mattes and Furnace Products,

GOLD BARS, SILVER BARS, SULPHIDES AND CYANIDE PRODUCTS.

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BLUE VITRIOL,

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SMELTING WORKS: Argentine, Kas.; El Paso, Tex.; Leadville, Colo.

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In United States— Denver, Colo. Cripple Creek, Colo. Salt Lake City, Utah. Spokane, Wash. New York City, N.Y. St. Louis, Mo. Joplin, Mo.

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Watch this Space for Description of the Above Machinery.

Send for Catalogues and Full Information.

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THE VULCAN IRON WORKS CO.

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Iron and Brass Founders, Machinists and Blacksmiths.

Manufacturers of ALL CLASSES OF MACHINERY.

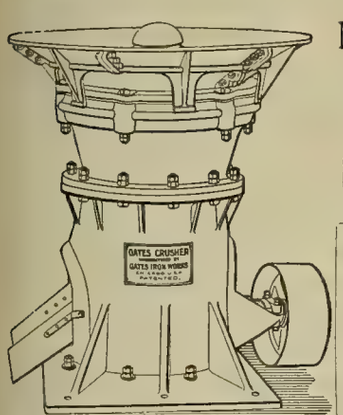
Mining Machinery and Engine Building

A SPECIALTY.

Are Now Erecting the Most Modern and Up-to-Date Plant on the Coast, which, when completed, will have more than five times the capacity of our old Plant, and will be thoroughly stocked with necessary . . . machinery and supplies for the use of mills, etc. . . .

WILL GUARANTEE TO TURN OUT WORK TO YOUR ENTIRE SATISFACTION, PROMPTLY AND AT PRICES THAT CANNOT BE BETTERED ANYWHERE.

Gates Rock Breaker.



NEW DESIGNS AND PRICES.
THE GREATEST ROCK BREAKER ON EARTH,
Fully Described in Our New No. 1 Catalogue.
OUR
Special Fine Crusher
WILL INTEREST YOU.

TREMAIN STEAM STAMP.

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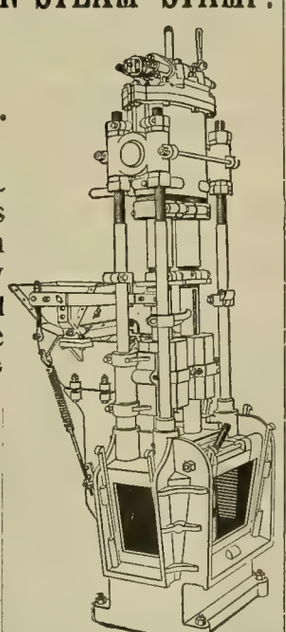
Success.



The TREMAIN STEAM STAMP MILL will enable a prospector to pay for his development. It has a capacity of from 10 to 15 tons per day. It weighs only 3350 lbs. and costs less than any mill ever offered the public, considering the results obtained.

Gates High Grade Rolls.
Gates New Vanner.
Gates Standard Gravity Stamps.
Gates Shoes and Dies Stand First.

Original Designers of Rock and Ore-Crushing Plants.
Macadam and Ballast Plants Our Specialties.

GATES IRON WORKS,
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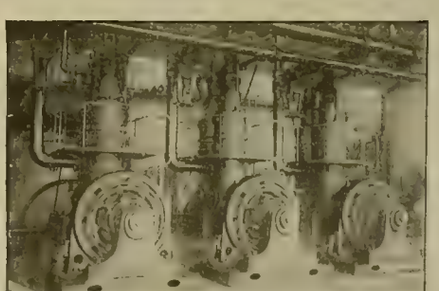
Agents for Gates Rock and Ore Breaker, Pelton Water Wheel Co., San Francisco.
Agents for Tremain Steam Stamp Mill, Henshaw, Bulkley & Co., San Francisco.

CENTRAL VALVE ENGINES.

Compound or Triple Expansion.

Condensing or Non-Condensing.

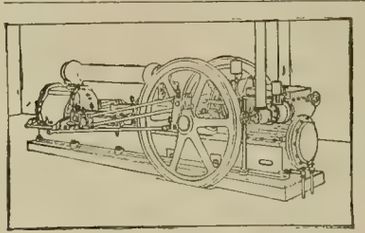


Maximum Economy.

Highest Efficiency.

Lowest Cost per K.W. Hour.

DIRECT COUPLED UNITS FOR LIGHTING AND POWER PLANTS.
Engines Especially Designed for This Service.
Dynamos Especially Designed for These Engines.
Over 215,000 I. H. P. in Use.
M. C. BULLOCK M'F'G CO., 1172 W. Lake St., Chicago, Ill.



THE NORWALK Air and Gas Compressor.

In use in every State in the Union, Central and South America, Great Britain, etc. Also by the U. S. Army and Navy.

ESPECIALLY DESIGNED FOR DRIVING
Rock Drills,
Pneumatic Locomotives,
Engines, Pumps, Coal Cutters,
And Other Mining Machinery.

The Best Machine for Compressing Air for All Dynamic Purposes. Send for Illustrated Descriptive Catalogue.

HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.

RIVETED SHEET STEEL WATER PIPE
For Placers, Water Powers, Irrigation, Etc.
THE WEIGELE PIPE WORKS
2949-51 Larimer-St DENVER, COLO.

Market Reports.

The Markets.

SAN FRANCISCO, Feb. 9, 1899.

SILVER. — London, 27¼d; New York, 59½; San Francisco, 59½; Mexican Dollars, 47½@48. New York exchange, sight, 17½; telegraphic, 20 cents premium.

Gold continues to arrive from Australia. On the 11th ult. the Mariposa brought $2,434,300; last Wednesday the Moana arrived with $2,190,870.

LEAD.—New York reports "dull" $4.57½ bid, $4.62½ asked. The firm naming the settling price for leading miners and smelters at the West quotes Lead at $4.30.

Local, pipe, 6@6¼c; sheet, 6½@7c; pig, 5¾c; bar, 6c.

COPPER.—Still booms: New York reports Lake "strong," $17.75 bid, $18 asked. Local bar 21c per lb.

New York reports: "After some small sales at 18c, it is very uncertain that any more copper of the lake brands could be picked up at this figure. Manufacturers have advanced the price of sheet copper to the case price of 21½c—an increase of 2½c per pound."

At Chicago last week Lake copper was quoted in carload lots 18c, small lots 18¼@18⅜c. Casting was 17¼c carloads and 17½@17⅝c for small quantities. Tin was higher at 26@26½c. Lead 4.45c in car lots, small quantities 4⅜@4¾c. Spelter 5.65c, carloads, 6c in small lots. Antimony is 10¾@10⅞c in small quantities. The selling prices of dealers were as follows: Copper, heavy, $16.50; copper, bottoms, $14.50; heavy red brass, $15.50; heavy yellow brass, $11; light brass, $8.50; lead, $4; tea lead, $4.40; zinc, $4.10; pewter, $15.50.

IRON.—American, soft, $22@24 per ton; Scotch, $25. Local bar, 2¼c per lb.

SPELTER.—10½.

TIN.—Pig, 23c per lb.; Bar, 26c. New York reports "easier," $23 bid, $24 asked.

ANTIMONY.—16.

BABBITT METAL.—No. 3, 8c.

QUICKSILVER.—An advance in export is reported. Local, $42; export, $39.00@39.50; carload lots, special rates.

The price of quicksilver has advanced in London to £8 15s 6d per flask (76½ pounds), equivalent to about $44 in our market. This is an advance of £1 during the past month. The visible supply of quicksilver in the United States is placed at 6500 flasks. Advancing prices continue to be predicted, based on the improvement in the industrial demand. There is no manipulation connected with the advance.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1* 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13⅜c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 30 @ 31c per lb.; carloads, 29c; in 10-lb. tins 37c; sulphuric acid, 2¼c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9¼@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French. 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 7½c; 6s, 14 oz., 6¾c; 6s, 12 oz., 5¼c; 6s, 10 oz., 4½c; Granite (Mining) Candles—6s, 16 oz., 8¾c, 6s, 14 oz., 7¾c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $2.40; cut, $2.25; 10 to 20d, wire, $2.45; cut, $2.30; 8d, wire, $2.50; cut, $2.35; 6 and 7d, wire, $2.60; cut, $2.45; 4 and 5d, wire, $2.70; cut, $2.55; 3d, wire, $2.85; cut, $2.70; 2d, wire, $3.10; cut, $2.95. In carload lots, 10c per keg less.

The American Steel Wire Co. has advanced the price of wire and wire nails $2 a ton, making the price $1.45 a hundred base at mills to jobbers, and wire nails $1.60 a hundred.

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 9, 1899.

The week's business was of larger volume at an average of unchanged prices. It is in the East the big business is now being done in mining stocks. Boston and New York are doing tremendous business. A New York man says:

"Take the total transactions of a week ago to-day, for instance, which were published as being anywhere from 1,600,000 to 1,800,000 shares. As a matter of fact, the aggregate for that day was 250,000 to 500,000 shares in excess of the 2,000,000 mark. The market was so congested on that day, and also on other days of last week, that the clerks and reporters were unable to get a record of anything like an accurate total. Brokers were too busy to stop to tell of transactions, and the result was that the published totals, as large as they were, were away off from the mark. There is a dearth of good brokers' clerks in Wall street at the present time, and some of the houses are advertising for help in bold-face type. So great is the demand for well-equipped brokerage help that the men can practically name their own salary. I know of one house that pays a head clerk $400 per week. His duty is to keep the other clerks in line so that they can keep up with the business of the concern. Many of the active houses have day and night shifts, and practically all of them have to pay fines daily for not getting their stock sheets into the Exchange on time. One commission house recently played a mean trick upon one of its associates by buying up its entire clerical force. The firm made an offer of double pay, and practically the entire force went over to the enemy. Commission brokers and floor specialists are holding their heads high nowadays, and their customers in many cases are congratulating themselves if their orders are executed."

9:30 A. M. SESSION.

500 Belcher	21c	250 Justice	12c
200 Best & Belcher	54c	100 Mexican	55c
100 Bullion	05c	500 Ophir	86c
900 C. Cal. & Va	$2 00	100 Sierra Nevada	87c
400 H. & N	28c	50 Union Con	42c

2:30 P. M. SESSION.

600 Ophir	95c	100 Yellow Jacket	19c
200 Gould & Curry	36c	300 Sierra Nevada	90c
600 Best & Belcher	59c	200 Utah	17c
100 Con. Cal. & Va	$2 10	600 Bullion	05c
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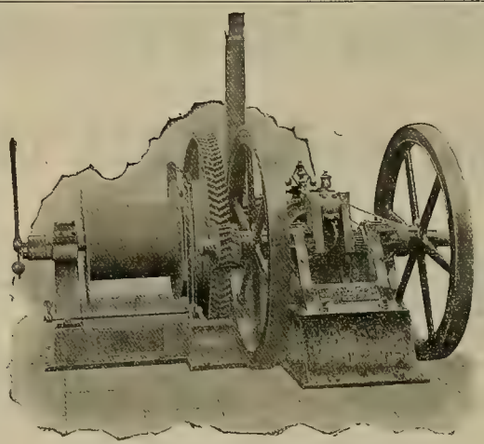

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Assessment Notices.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of January, 1899, an assessment (No. 20) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No 310 Pine street, Rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of February, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 21st day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, Rooms 15 and 17, San Francisco California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of January, 1899, an assessment (No. 17) of 1 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 13th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office -217 Sacramento street, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of January, 1899, an assessment (No. 115) of Twenty cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14 Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on TUESDAY, the 21st day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 13th day of March, 1899, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14 Nevada Block, No. 309 Montgomery street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1899, an assessment (No. 15) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of February, 1899, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on SATURDAY, the 11th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of February, 1899, an assessment (No. 23) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of March, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 3rd day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of February, 1899, an assessment (No. 8, new series) of seven (7) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of March, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 5th day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. P. THURSTON, Secretary.

Office—324 Pine St., San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from F. M. Phelps, in the Cedar Creek Mine, near Fair Play, El Dorado Co., to deposit tailings in Cedar Creek; from A. B. Jacks, in the Badger Hill Mine, near Spanish Ranch, Plumas Co., to deposit tailings in an old pit; from John H. Hoad, in the Hoad's Ranch Mine, near Merrimac, Butte Co., to deposit tailings in Haphazard Ravine; and from J. S. Mills, in the Mountain Ranch Placer Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in Murray Creek, gives notice that a meeting will be held at Room 69, Flood Building, San Francisco, Cal., on February 27, 1899, at 1:30 P. M.

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DELINQUENT SALE NOTICE.

NATIONAL CONS MINING COMPANY. Location of principal place of business San Francisco, California. Location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 5th day of December, 1898, the several amounts set opposite the names of the respective shareholders, as follows:

	No. Cert	No. Shares	Amt.
G. Schmitt	96	1	$ 10
G. Schmitt	55	1000	100 00
G. Schmitt	57	500	50 00
G. Schmitt	60	500	50 00
G. Schmitt	126	100	10 00
G. Schmitt	132	25	2 50
G. Schmitt	147	119	11 90
G. Schmitt	155	100	10 00
G. Schmitt	167	4	40
G. Schmitt	211	50	5 00
G. Schmitt	220	500	50 00
K. Schmitt	6	500	50 00
K Schmitt	7	500	50 00
E Fey	17	100	10 00
E Fey	74	200	20 00
E. Fey	108	200	20 00
T. R. Squires	124	250	25 00
B Strueven	141	500	50 00
B. Strueven	184	500	50 00
W. I. Smith	153	300	30 00
W. I Smith	217	500	50 00
N Frost	215	500	50 00
N Frost	216	500	50 00
C. Smyth	222	60	6 00

And in accordance with law and an order from the Board of Directors, made on the 5th day of December, 1898, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, 773 Mission street, San Francisco, California, on WEDNESDAY, the 14th day of February, 1899, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

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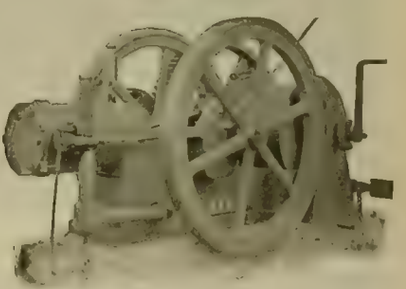

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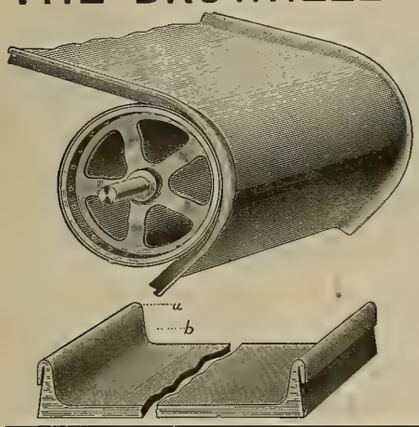

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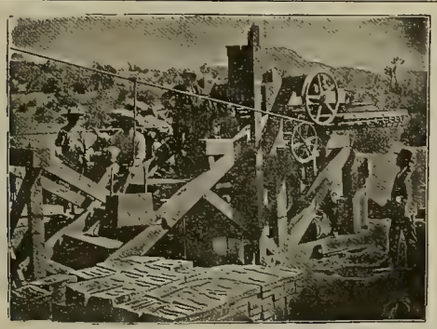

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No. 2015.—VOLUME LXXVIII. Number 7. SAN FRANCISCO, SATURDAY, FEBRUARY 18, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A California "Horseless Carriage."

In the issue of December 24th, '98, an illustrated page was devoted to the present status of motor road locomotion, with mention of the recent Paris exhibition where were exhibited twenty-six "horseless carriages," of which sixteen were electric and ten gasoline. The subject is one that is attracting world-wide attention, and in few departments of industrial progress is there greater advancement than in that of furnishing suitable vehicles that dispense with the horse on ordinary streets and roads. Several California mechanicians have given the subject intelligent application and in two or three instances have produced vehicles that have answered all practical requirements; in all cases gasoline supplying the motive power. The success that has attended the manufacture of the road engines built by the Best Manufacturing Co. of San Leandro, Cal., for freighting purposes, naturally makes prominent any production of that firm along the line of supplying the traveling public with a device suitable for passenger traffic, and recent trials of a gasoline motor carriage built by that enterprising concern have demonstrated ability to make as great a success of such a motor as has been made in the manufacture of the Daniel Best 50 H. P. traction engine which is now successfully used in freighting, hauling 35-ton loads over roads with a grade of 25 inches to the rod.

Herewith is illustrated the latest creation of the San Leandro establishment, one engraving representing the motor carriage at rest: the other a snap shot of the vehicle carrying seven people on a pleasant January afternoon.

DANIEL BEST'S LATEST PRODUCTION.

This gasoline motor carriage is the first effort of the Best Manufacturing Co. of San Leandro, Cal., and they are so well pleased with its performance that they contemplate manufacturing them for the market. The weight of the vehicle with water and gasoline aboard for a trip of 150 miles is 2570 lbs. It is propelled by a 7 H. P. horizontal motor having two cylinders with the crank set at 180 degrees, thus avoiding disagreeable vibrations. Ignition is by an electric spark, and the motor is started by a crank the usual way, the starting being assisted by an arrangement for low compression. All speeds from four to twenty miles an hour may be obtained by means of a lever on the left hand side of front seat, controlling a system of friction clutches with belt and chain transmission; also has a speed for climbing hills, enabling it to ascend as much as a 10% to 15% grade with load of passengers. A varied speed can be obtained by changing the speed of engines; this carriage has attained a speed of eighteen miles an hour, carrying a weight of 1800 lbs. The pivoted hub is employed for steering, the lever being placed in the center of the front seat convenient to the operator. The wheels are fitted with solid rubber tires, wooden hubs, spokes, and steel rims, and are provided with roller bearings; differential gear on countershaft to facilitate turning, the lubrication being entirely automatic. It is also provided with a grip brake on the wrought rim sprockets which are bolted to the rear wheels, which is powerful enough to bring the carriage to a sudden stop. The main frame of the carriage body is made of channel steel and the frame for the running gear, of pipe. The entire carriage is made of the best material and in the best manner that mechanical skill can suggest to give it strength and durability for hard work. This vehicle is especially designed for family carriages, stage coaches for carrying mail and passengers.

BEST'S GASOLINE MOTOR CARRIAGE IN MOTION, CARRYING SEVEN PASSENGERS.

The New York City exhibit of automobiles closed on the 28th ult. Like its Paris predecessor, electricity and gasoline were the motive powers; of the former kind one was exhibited by a Connecticut firm that could make a distance of thirty-five miles on a hard, level road with one charging of the accompanying chloride storage battery: the gasoline motors were mostly small affairs, one being capable of carrying two persons at a speed of fifteen miles per hour. The California automobile herewith portrayed can carry eight, with a speed of eighteen miles per hour on the level.

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IN the California State Senate, Senator Davis of Amador Co. urges a joint resolution earnestly commending to Congress favorable consideration of the mineral land bill—a commendable effort and one that deserves immediate approval by reason of the magnitude of the interests involved.

AT Brooklyn, N. Y., last Saturday, the unusually cold weather incited constructing engineers, when the thermometer was —3° F., to take measurements of the Brooklyn bridge, trusses and other parts, to find out how much the contraction had been. In comparing these figures with those taken last July, when the thermometer was 90° F., it was found that the difference was 14½ feet.

SELLING prices of the Con. Cal. & Va., in old Comstock boom days, are recalled in the news from Boston that Calumet & Hecla stock sells at $800 per share. Of course, such a price, as 18 cents for copper, must occasion tremendous activity in production. One broker puts a column into three lines in saying: "People appear to forget that copper will sell harder at 18 cents than 10 cents, but will be produced a great deal more easily at 18 cents than at 10 cents."

SOUTHERN CALIFORNIA papers oppose the Act now before the California Legislature, entitled: "An Act authorizing the location and sale of mining claims upon public lands of the State," and declaring that "all the lands owned by the State of California, by virtue of its sovereignty, or acquired by grant of the United States, other than the 16 and 36 sections, and land for public use, containing placer, or other deposits of the character subject to location and sale under the laws of the United States relating to mining lands, were the same situated upon public domain of the United States, are hereby declared to be free and open to exploration and location by citizens of the State of California, to the same extent, and in the same manner, and upon the same terms and conditions, as are by the laws of the United States, and not of the State of California, provided for the location and working of mining claims upon public lands of the United States." The bill provides that a patent can be obtained for any such lands by any person, association or corporation, "claiming land by location or purchase from locators thereof," by filing in the office of the State Surveyor General application for a patent, and this can be on unsurveyed lands, if the applicant ask that it be surveyed and pay the expenses, the purchase price of the land from the State to be $2.50 per acre.

A Colorado Decision.

In the appeal case of the Mount Rosa M., M. & L. Co. vs. J. S. Palmer, the Colorado Supreme Court last week rendered a decision.

The Mount Rosa Co. located a placer claim in the townsite of Victor. While the company was still in possession, but before it had applied for a patent, two lode mining claims, 300 by 1500 feet each, were located by other parties who afterward sold them to Palmer, the defendant. Afterward the Government granted the patent for a placer claim to the Mount Rosa Co. Suit was brought by Palmer against the company to quiet his title to the two lode claims. The El Paso Co. court decided for Palmer and gave judgment to him for 20.3 acres, the full extent of his two claims as lode claims. The decision of the Supreme Court is that Palmer is entitled to 100 by 1500 feet, instead of 600 by 1500 feet, as the lower court awarded, holding that the law regulating the taking up of placer claims provides that if a lode or vein is known to exist on the land prior to the time patent is applied for, the locator of the placer claim may also locate the lode, and that this lode claim shall be 50 feet wide, 25 feet on either side of the vein. If the locator of such placer does not locate a lode known to exist on the placer claim before he applied for patent, the United States law is that he abandons such lode and it may be taken up by anyone else. The contention of the Mount Rosa Co. was that as the two lode claims had been located by the grantors of Palmer prior to the time the company applied for patent, the company had not abandoned the lode claims. The Supreme Court holds that Palmer had the same right to locate a lode claim on the placer claim that the United States law provided the Mount Rosa Co. had; namely, two claims 50x1500 feet each, or 100x1500 in all. Neither of these two points—whether a person may locate a lode claim on placer ground before patent for the placer is applied for, nor the extent of such lodes, has ever been decided before in Colorado.

The Colorado Supreme Court has evidently based its decision not on the U. S. statutes but upon the ruling of the Secretary of the Interior, in the case of the Shoubar Lode, 1 L. D. 551, 3 L. D. 388, where he ruled that where a lode claimant has failed to adverse a placer application he will not be permitted to acquire more than 25 feet of surface on each side of the lode. In the case of Aurora Lode v. Bulger Hill and Nugget Placer, 23 L. D. 95,348, it was further held by the Secretary of the Interior that where a lode claimant adverses and is defeated in the suit upon such adverse claim he shall be limited to "so much surface as is reasonably necessary for his use in connection with the located lode." The subject is one of interest and has been elaborately argued and repeatedly decided in California and Montana courts.

Electric Power Transmission.

The progress of practical electrical development is illustrated by comparison of the statement a few years ago, from then authoritative sources, that a 25-mile transmission was "an interesting possibility," with the fact that this month a southern California power company has completed a high-voltage long-distance transmission line from its power house in the San Bernardino mountains to Los Angeles eighty miles away, capable of carrying 33,000 volts for transmission.

This is not the limit of possibility in that direction, but to date marks the maximum reached. In these matters California occupies prominent place. During the present week a contract was let at Visalia, Cal., for a long-distance transmission electric light and power line sixty-two miles, the source of power being the Kaweah river thirty miles distant. Minor enterprises are of numerous occurrence and are of prime importance in connection with the industrial development of the State. There are several very large long-distance electric transmission plants now in successful operation in various parts of California, the San Antonio plant of Pomona being the world's pioneer in high potential.

Washington State presents another example of progress therein. The Snoqualmie Falls Power Co. announce the virtual completion of a remarkable hydro-electric project, of which considerable has already appeared in these columns. This company takes the water of Snoqualmie Falls—a height of 268 feet—generates a high-potential electric current and carries it thirty miles on aluminum wire to supply light and power. This service is over two separate pole lines, carrying four independent 25,000-volt circuits; 6000 H. P. is the initial capacity of the plant.

Railroads and Interest Rates.

Illustrative of the decline in current rates of interest and the changes in value of railroad stock as an investment is cited the case of stock of the New York Central Railroad, of which several years ago Wm. K. Vanderbilt sold 300,000 shares for $130 a share with the promise that it should pay 8% dividend. The dividends have fallen steadily until they are now but 4%, yet the stock is selling to-day at $140, or more than when the rate of interest was double what it is to-day. It is figured that about $300,000,000 worth of railroad bonds are now outstanding in this country, paying 7% interest and representing sixty-five different issues. Nearly all of these bonds will mature within the next ten years and those roads will thereafter refund them with issues paying a much lower rate of interest. There are twelve issues bearing 3½% interest, eleven paying 3% and one 2½%.

In connection therewith, it is of further interest to note the railroad feature as affecting loans and rates of interest. The downward tendency of interest rates is universally noticeable. One of the reasons for such lowering is thought to be the manifest fact that the railroads of the country are reversing their former methods and are lending money instead of borrowing it. Time was when big railroad corporations borrowed extensively for improvements and extensions; now they devote their surplus earnings and profits to supplying the immediate monetary requirements of the men who formerly looked to banks for such accommodation. In this they are in line with leading industrial corporations throughout the country. Then, too, the West is not in need of borrowing from the East, but has money of its own to lend. These, with gold imports and generally higher prices, are among the causes for the present scramble for securities or insecurities that, though paying but 4%, command a higher price than when they paid 8%.

AT the last annual convention of the California State Miners' Association Gov. Budd jocosely suggested in his address to the delegates that at the next legislative session the California miners take measures to sequestrate the $250,000 appropriated by the State five years ago in conjunction with a national appropriation similar in amount, and which is unexpended in the general fund. He pointed out that the usual legislative raid on the State general fund might make a minus quantity of that amount. Acting on the pointer, Senator Davis of Amador this week introduced bill No. 302, creating a State debris fund of $250,000, and having transferred thereto the sum of $250,000. It was at once favorably reported by the committee to which it was referred, and will doubtless become a law.

PROBABLY the greatest advertisement ever given to any American manufacturing concern is that received by the Union Iron Works of San Francisco, builders of the battleship Oregon. Her great run around Cape Horn, her immediate readiness thereafter for active duty and her glorious Santiago record have been the theme of countless columns in every publication in every language on earth. The same firm will now receive plaudits of additional fame in the successful completion for the Japanese Government of the Chitose, the fastest war cruiser afloat. Last Saturday's official trial on San Francisco bay gave that vessel an official speed of 23.76 knots, exceeding the Minneapolis by .69 of a knot.

INCREASED output always occasions renewal of suggested legislation levying increased taxation on mines and their products. Arizona's Legislature is now discussing a bill providing for the levy and collection of a tax of $2 on each $100 of the net proceeds of mines in that Territory. The Michigan Legislature has before it a bill placing a tax of one cent per pound "on copper ore that goes into the market at 14 cents per pound." Up to '91 Michigan mine output was thus taxed.

Concentrates.

TO RAISE 2200 cubic feet water per hour from a mine 378 feet deep would require 26.25 H. P.

THE Idaho Legislature last week "indefinitely postponed" a bill making eight hours a legal day's work for a miner.

CYANIDE results from the Cigale, West Dip region of Utah, indicates that in that section at least it pays to roast the ore.

A DREDGE weighing 30,000 pounds, with a daily capacity of from 600 to 1200 cubic yards, would require a motor of 25 H. P.

INCREASING membership and a higher price therefor exemplifies the present prosperity of the Salt Lake, Utah, mining exchange.

"MUNDIC" is a Cornish term for iron pyrites, or arsenical pyrites. It occurs in auriferous quartz, having a bright, scintillating luster.

IN the British Columbia Parliament a bill has been introduced repealing the recent law excluding "aliens" from placer mining in that province.

ZINC was never higher than at present, which with the comparatively good figure for lead will tend to develop the zinc-lead properties of Colorado and Utah.

ON the New York Stock Exchange, Colorado has thirty-three of the eighty-eight mines which are dividend payers; Utah, twelve; California, eleven; Montana, ten.

A SUBSCRIPTION to the stock of a corporation can not be varied by parol testimony as to a contemporaneous understanding to accept payment in property instead of money.

AN agent who represents both buyer and seller, without their knowledge of such double representation, their interests being antagonistic, cannot recover commissions from either.

TO FIND the weight of water in a pipe, square the diameter in inches, divide product by 3; the result will be the weight of water in pounds for each foot of pipe. The same rule applies to circular, vertical tanks.

AN unpatented mining claim cannot be "jumped" if its original locator, before Jan. 1st of the year succeeding its location has begun the necessary "assessment" work, and by consecutive days labor completes it.

AT 18 cents per pound for Lake copper, it is only necessary for the companies to sell 8¼ pounds of the metal in order to net $1 clear profit, as it is understood that the cost of production does not exceed 6 cents per pound.

A CUBIC FOOT of cast brass will weigh 504 pounds; rolled, 524 pounds; of rolled copper, 548 pounds; of 24 carat gold, 1204; of platinum, 1342; of steel, 490; of silver, 655; of cast iron, 450; of mercury (32° F.) 849; of quartz, 165.

MINERS back from the Klondike say that there has been a most unusual period of mild weather at Dawson. To such an extent was this the case that many of the shafts upon which the men were at work have been filled with water.

A TANK containing 6000 pounds of water at a temperature of 60° F., to be heated to the boiling point will require 909.272 pounds steam at a pressure of 100 pounds per square inch, the steam discharging directly into the water.

IN the rush of water consequent on the recent bursting of the reservoir at the Big Dipper gravel mine, Iowa Hill, Placer Co., Cal., a 1600-pound shaft was carried three-fourths of a mile down the canyon. The mill will be rebuilt.

BRITISH COLUMBIA wants the Canadian Government to appropriate $50,000 for a mineral exhibition at Earl's Court, London, this year, and at the Paris Exposition in 1900. Such an exhibit would be a good investment for any mining region.

A CLASSIFICATION of electricity according to its statics or dynamics would be: 1, electricity at rest, or static electricity; 2, electricity in locomotion, or current electricity; 3, electricity in rotation, or magnetism; 4, electricity in vibration, or radiation.

LEAD pipe will weigh per foot, according to diameter; ¼ in. 1 lb; ⅜ in. 1 lb. 5 oz.; ½ in. 2 lbs. 3 oz.; ¾ in. 2 lbs. 11 oz.; 1 in. 3 lbs. 7 oz.; 1¼ in. 3 lbs. 11 oz.; 1½ in. 5 lbs. 3 oz.; 1¾ in. 5 lbs. 5 oz.; 2 in. 6 lbs. 11 oz.; 2½ in. 10 lbs.; 3 in. 11 lbs. 10 oz.; 3½ in. 15 lbs.

THE Western Chemical Co. of Denver, Colo., are credited with success in manufacturing what is practically chemically pure sulphur worth $22 per ton. The sulphur was produced from iron pyrites taken from the Vulcan mine of Gunnison county, unusually rich in sulphur.

"A MICHIGAN copper mining company, about to begin sinking two big shafts, proposes to make one power house and hoisting works simultaneously serve, using two drums." So says a Marquette, Mich., exchange. Details of such an arrangement would be interesting.

DENVER papers again assert that, with two exceptions, the Colorado smelters have joined in "an ironclad combine to so control the price of silver as to force it up," and, incidentally, to raise the smelting rates. The present smelter rate for lead is about 38 cents per 100 pounds less than the market quotations.

CONCERNING the recent rich find in the Crowned King mine in Bradshaw basin, thirty-five miles south of Prescott, Arizona, a feature of the strike is the abrupt change of the ore from basic iron pyrites to free gold. In that region, as elsewhere, many of the mines are free milling on the surface.

AT the Tamarack mine, Calumet, Mich., last week, E. Hawkins, a laborer, fell down the shaft, from the surface, a distance of over 5000 feet. A few fragments of the body were found. He was doubtless unconscious before he had fallen 500 feet, and dead before he was 1500 feet down. The fall occupied eighteen seconds. This from a column of local chronicle.

"DELTA METAL" is an alloy whose first manufacturer was one Dick. It is compounded of zinc, holding a little iron in solution, and melted copper. The statement is made that the iron is so intimately combined in delta metal that no magnetic effects are traceable to the alloy, which recommends it for mathematical and optical instrument making—though on doubtful grounds. There is certainly considerable resistance to corrosion on the part of the alloy in question; and its toughness and strength are qualities of special value.

IN looking over the books of the Virginia, Nev., Miners' Union from Jan. 1st, '89, to Dec. 31st, '98, the *Enterprise* estimates that 168 members in good standing died within the time specified; the cause of death in seven-tenths of the cases was miners' consumption. One hundred and sixty-eight deaths at $82 50 each, aggregates $13,860 paid in cash by the union in the decade.

FROM every part of the region east of the Sierras come accounts of unusually severe weather. Throughout Colorado—especially in Boulder, Clear Creek, Gilpin, Lake, Summit, San Miguel and Eagle counties—the drifting snow and cold weather have occasioned serious loss, and in parts of Utah, Nevada, Idaho and Montana the low temperature and great snowfall caused temporary cessation of considerable outside occupations.

THE output of gold from the Klondike and British Columbia has raised Canada to the fifth place in the list of gold-producing countries. While the United States shows a greatly increased output for '98, it is second to the Transvaal, South Africa. The five leading gold-producing countries for '98, according to figures recently published, are: Transvaal, South Africa, $73,476,600; United States, $64,300,000; Australia, $61,480,768; Russia, $25,186,994; Canada, $14,190,000.

AT the Golden Jubilee Miners' Exposition in San Francisco one year ago, several suggested an idea that, put into execution, would have been an interesting and valuable part of any mining exhibit. It would look well in any State mining display at the Paris Exposition, viz: a complete quartz gold producing and milling plant in miniature, from the extraction of the ore to the gold bar. Men who are familiar with the process sometimes forget that to many others a representation of how it is done would be of interest. Were such a device on a scale as small as could be practically operated to be exhibited anywhere where multitudes congregate, it would be a continual center of attraction.

OF course, it is "possible" that a ton of gold "ore" would "run" $500,000, as claimed in the Denver daily's excerpt regarding Isabella, though the "ore" would not be greatly in evidence. Our Colorado correspondent need waste little time on figuring on the value of a "ton" of gold, though correct in asserting that a "ton of pure gold at $20.67 per ounce would only be $496,080," if two things be allowed—one that there is such a thing as a "ton" in troy weight. There does not appear to be, and if a "ton" is talked of it is necessarily in sole connection with avoirdupois weight; this would necessitate the use of that system of weight in which the denomination "ton" appears, and, according to such use, a "ton of pure gold" would be worth $602,875.

ALUMINUM BRONZE is likely to come into general use. It is an alloy of 90% to 95% of aluminum and 5% to 10% of copper, of golden color, and keeps well in the air, without soon becoming dull and changing the color. It can be cast excellently, can be filed and turned, possesses unusual hardness and firmness, attains a high degree of polish, and is malleable and forgeable. The technical working of the material is not essentially different from that of iron; the metal is, especially in a warm condition, worked like iron on an anvil, with hammer and chisel, except that the temperature to be maintained in forging lies between dark and light cherry red. In case the articles are not forged in one piece, and the putting together of separate parts is a necessity, riveting and, in particular, soldering have to be resorted to, with soft or hard solder. Besides forging, the bronze is well suited for embossing. After finishing the pieces the metal can be toned in different ways, as may be desired, by treatment with acid.

C. T. G., RED ROCK, ARIZONA, wants "a cheap binding material for manufacturing briquettes from fine ores to be used in smelting," and to know how a reasonably hard briquette is made. Answering the first part of the question, generally, burned lime is used as a binding material, but in some places—for instance, at the El Paso, Texas, smelter—rich clay is used. A high authority on this subject writes to the MINING AND SCIENTIFIC PRESS: "I personally prefer lime." A leading smelting works uses about ¾% lime in the Chilian mill, where the ore and lime are moistened and mixed. From the Chilian mill the mixture is discharged into a conveyor and disintegrator of very simple design. This conveyor drops the mixture into a hopper and from here it drops by gravity into the feeder of the moulding press. From this mixture is made bricks of fine ores, lime and water, 8x4x2¾ inches. The bricks are put on edge on shelves and allowed to dry and set, which requires in warm, dry weather about four days, in damp weather as much as eight days, after which the bricks are ready to be fed into the blast furnaces.

TO DETERMINE whether fine gold in fine tailings is amalgamable by a more effective system than copper plate process is only worth while in cases where exhaustive tests show that there is a profitable commercial advantage in adopting a more complicated process; for in all things the laboratory question of perfectness always gives way to the practical question of profit. Where the loss is very high in the fine tailings or slimes it will doubtless be found also high in the coarser sizes of tailings, and, as a consequence, it becomes really a question of another system of treatment for the original ore, not solely of the slimes, and is therefore to be treated under the head of "gold in a condition not susceptible of amalgamation on copper." Probably the best test of the highest amalgamation obtainable is by use of an amalgamation pan, either large or small. Small laboratory pans are made which can be run either by hand or from any small running shaft, and will take a charge of three to five pounds of ore. These small pans, if properly constructed and run, will give results closely approximating mill work by pan amalgamation.

A PATENT for any land claimed and located for valuable deposits may be obtained as follows: Any person, association or corporation authorized to locate a claim, having so claimed and located a piece of land for such purposes, and complied with all legal requirements, may file in the proper land office an application for a patent, under oath, showing such compliance, together with a plat and field notes of the claim or claims in common, made by or under the direction of the United States Surveyor-General, showing accurately the boundaries of the claim or claims, distinctly marked by monuments on the ground, and post a copy of such plat, together with a notice of such application for a patent, in a conspicuous place on the land embraced in such plat, previous to the filing of the application for a patent, and file an affidavit of at least two persons that such notice has been duly posted, and file a copy of the notice in such land office, and thereupon be entitled to a patent for the land in the manner following: The register of the land office, upon the filing of such application, plat, field notes, notices and affidavits, publishes a notice that such application has been made, for a period of sixty days, in a newspaper to be by him designated published nearest to such claim; and he also posts such notice in his office for the same period. The claimant at the time of filing the application, or at any time thereafter, within the sixty days of publication, files with the register a certificate of the United States Surveyor-General that $500 worth of labor has been expended or improvements made upon the claim by himself or grantors; that the plat is correct, with such further description by such reference to natural objects or permanent monuments as shall identify the claim, and furnishes an accurate description, to be incorporated in the patent. At the expiration of the sixty days of publication the claimant files his affidavit, showing that the plat and notice have been posted in a conspicuous place on the claim during such period of publication. If no adverse claim shall have been filed with the register and the receiver of the proper land office at the expiration of the sixty days of publication, it is assumed that the applicant is entitled to a patent, upon the payment to the proper officer of $5 per acre, and that no adverse claim exists; and thereafter no objection from third parties to the issuance of a patent can be heard, except it be shown that the applicant has failed to comply with the above terms.

PROF. HOFMAN'S description of the daily collecting of amalgam and dressing of plates at the 120-stamp mill of the Golden Star, S. D., is as follows: "When the plates are to be cleaned, the water supply of the one battery is shut off, the stamps are hung up and the splashboard removed and washed at the head of the apron plate with water through a hose. It is then placed at the lower end of the plate and the hose is turned on to the screen and apron to remove all the sands that have collected there. The plate, if normal, is now clear and bright, except for occasional spots, so-called blisters, resulting from iron and copper salts. These are removed with a scrapper (a blunt, double-edged chisel). Then the two men loosen the amalgam with heavy whisk brushes, beginning at the top and working downward. When this is done the amalgam is swept in the opposite direction and collected at the head of the apron. There it is brushed into the amalgam scoop with a rubber scraper (a small, sharp-edged piece of belting) and emptied into a small iron receiver. After this the plates are brightened by brushing them with a whisk broom, using tailings moistened with a dilute solution of potassium cyanide, the men working from the head of the plate downward. If necessary, a little quicksilver is sprinkled on the plate from a bottle, over the neck of which a piece of canvas is securely tied. After being brightened, the plates are smoothed with soft paint brushes passed transversely over them, beginning at the bottom. This finishes the operation, which requires four hours for the twenty-four plates. The amalgam contained is contaminated with impurities. To remove these it is placed in a Wedgewood mortar and diluted with quicksilver. The amalgamator then adds water and works the amalgam to bring all impurities to the surface. These are in part washed off (the sands) with a hose, in part removed with a sponge or wet cloth (the base-metal amalgam) until the amalgam is perfectly bright. It is then passed through a small strainer and the residual pasty amalgam is transferred to a piece of linen, where the excess of quicksilver is pressed out by wringing. The ball of hard amalgam obtained is locked up in a safe and kept until the next clean-up. All the sands are returned to the battery; the waters go to waste, and the quicksilver goes back to the main stock."

IN the Munktell chlorination process a chloridizing roasting is preferred. If the material after roasting and washing is found to contain gold in somewhat large grains, these may be conveniently separated by washing; or by some other mechanical means the heavy metals are removed. The material, after being reduced to a sufficiently fine powder and freed from protoxides—whether roasted and separated from the coarse grains of gold or not, as circumstances may require, is subjected to the following process: (The ore when pulverized should not be too fine, so as to allow liquids to percolate through it.) A small quantity of hypochlorite of lime, or some other salt in which the acid consists of chlorine combined with oxygen, is dissolved in water or in some suitable liquid, such, for instance, as a solution of chloride of sodium, when the raw material contains silver. Instead of chloride of sodium, chloride of calcium or some other substance capable of dissolving chloride of silver may be employed. The solution contains about 1% or less of hypochlorite of lime. This solution, before it enters the running tanks containing the auriferous material meets with a highly diluted solution of some acid, such as muriatic acid, sulphuric acid, carbonic acid or some other acid, the solution being of such strength that equal volumes of acid and the hypochlorite of lime will just suffice for the decomposition of the hypochlorite of lime. The mixed liquids now percolate through the material, whereby the chlorine produced by the mixture, partly in a nascent state unites itself with the gold, which is thereby dissolved, and is continually allowed to run off at such a rate that only a small excess of chlorine remains in the solution. This solution is led into the precipitation tanks, where the gold, and any silver present, is precipitated by one of the usual methods. This method of extracting gold can be carried out without the escape of any considerable quantity of chlorine. The solution may also be stronger and be mixed beforehand, and then, after a longer or shorter time, be poured over the crushed raw material prepared in the manner described. In this case, however, not only does much chlorine escape, which has a very detrimental effect on the carrying out of the process, but also, larger quantities of the solution are required. By allowing the chlorine in a very diluted solution to act on the auriferous substances, and by producing this chlorine at the same moment the solution is used, the process becomes convenient and comparatively inexpensive. The process can be carried out with simple apparatus. A convenient arragement consists of tanks having a layer of filtering medium above a false bottom. Over each tank are two vessels by which the quantities of the solutions are measured. They are filled by means of pipes or conduits and discharged into other conduits leading to the tanks. Other pipes or conduits carry water or other liquids to the tanks for dissolving and carrying away the protoxides, if any.

U. S. Gold and Silver Coinage; Worth; Ratio of Gold and Silver, Etc.

CROWN KING, ARIZONA, Feb. 3, '99.
TO THE EDITOR:—Is there absolutely $20 worth of gold in a $20 gold piece, or a fraction less?

BUTTE, MONTANA, Feb. 1, '99.
TO THE EDITOR:—How is the 16 to 1 gold and silver ratio figured out, and at present prices what is the ratio?

TELLURIDE, COLO., Jan. 25, '99.
TO THE EDITOR:—What are the gold and silver coins of the U. S., their weight and amount of alloy? What does each contain in pure metal?

GRANT'S PASS, OR., Jan. 20, '99.
TO THE EDITOR:—How much fine gold is there in a $10 gold piece?

SEATTLE, WASH., Feb. 2, '99.
TO THE EDITOR:—What are the San Francisco mint charges for coining gold, and what does the mint pay for gold?

It often happens that when several questions almost identical in point of inquiry are received, a few lines in "Concentrates" suffice for the lot; but in the case of the above five inquiries the subject is deemed of sufficient general interest to make complete and detailed answer in the manner following:

THE MINT OF THE UNITED STATES AT SAN FRANCISCO, SUPERINTENDENT'S OFFICE.

TO THE EDITOR:—In answer to the inquiries submitted as to the number of grains of fine gold in a gold dollar, and whether or not there is really twenty dollars worth of gold in a $20 piece of U. S. coinage, etc., the following may be said:

A $20 piece is worth exactly $20 in gold, and if melted and nothing lost in melting this will be shown to be the fact. The alloy therein neither adds nor detracts from the actual value of the coin.

In $1 U. S. gold coin there are 23.22 grains of fine gold and there are 464.40 grains of this pure gold in a $20 piece. One grain of gold 1000 fine is worth .0430663. The gold unit of value is the dollar which contains 25.8 grains of *standard* gold 900 fine; but the amount of *fine* gold in the dollar is 23.22 grains, the remainder of the weight being an alloy of copper. While the gold dollar is the unit and standard of value, the actual coinage of the $1 gold piece was discontinued in 1890.

An ounce of pure gold—that is, 1000 fine—is worth exactly $20.671834625, and a grain of gold 1000 fine is worth .0430663. Fine gold is 1000 fine and standard (or coin) gold is 900 fine. The Government pays for gold at the rate of $20.67 per ounce fine, or $18.60 per *standard* ounce 900 fine.

The Government makes no charge for coining gold if it is presented at the mint of standard fineness—that is, containing .9 gold and .1 copper. A charge is, however, made for preparing it for mint purposes—that is, when the bullion deposited is not suitable for coinage, as is usually the case, and therefore requires parting and refining. Charges are made for these operations equal to the expense incurred in taking out the base metals and parting the silver from the gold. A small charge is also made for the copper used in the alloy.

The accompanying table will show the actual fine gold and silver in U. S. coins, the weight of alloy and total weight:

GOLD.

Denominations.	*Fine Gold Contained, Grains.*	*Alloy Contained, Grains.*	*Weight, Grains.*
One dollar ($1)	23.22	2.58	25 80
Quarter eagle ($2.50)	58.05	6.45	64.50
Three dollars ($3)	69.66	7.74	77 40
Half eagle ($5)	116 10	12.90	129.00
Eagle ($10)	232 20	25.80	258.00
Double eagle ($20)	464.40	51.60	516.00

SILVER.

Denominations.	*Fine Silver Contained.*	*Alloy Contained.*	*Weight.*
Standard dollar	371.25	41.25	412.50
Half dollar	173.61	19.29	192.90
Quarter dollar	86.805	9.645	96.45
Dime	34.722	3 858	38 58

CHAS. G. YALE, Statistician U. S. Mint.
San Francisco, Feb. 8, '99.

The "16 to 1" gold and silver ratio is determined in two ways. Our Butte inquirer will note above that a gold dollar contains 25.8 grains *standard* gold (900 fine); a silver dollar contains 412.5 grains standard silver. The larger number divided by the smaller gives a quotient of 15.988372+ —practically 16. Again, an ounce of fine gold being worth $20.671834625, and an ounce of silver for coinage purposes being reckoned at $1.2929, the former number divided by the latter gives a quotient of 15.988+. Again, the alloy in both gold and silver coins bears the same relation to each other. Though the first and second ways cited illustrate on what the "16 to 1" ratio is based, yet it is further interesting in this connection to note that the same result can be worked out from similar comparison of the proportions of alloy used in coinage. It will be noted from the tables furnished by Mr. Yale that the alloy in the gold dollar is 2.58 grains and in the silver dollar amounts to 41.25 grains. Dividing the smaller number by the larger, as before, gives the same result as in the other two cases—viz., 15.988+.

Answering the inquiry of the Butte, Montana, reader, in a general and extended way, it may be said that, taking the number 20.67 as a "constant," and the current silver quotation as a divisor, the ratio may be easily figured for any year. For instance, forty years ago the London value of an ounce of fine silver at average quotation for that year—1859—was $1.36; the ratio that year was 15.29; in 1869 the same silver value was $1.32 per oz., making a ratio of 15.60; in 1879 silver's average was $1.123, being a ratio of 18.40; in 1889 it was $0.93512—ratio 22 10; so far in '99 silver is similarly quoted at 59½, which gives a present ratio of 34 744+.

Tin Plate Battery Screens.

TO THE EDITOR:—In your issue of January 14th, in his valuable contribution to the science of stamp milling, Mr. W. J. Loring of Angels, Cal., mentions two plate battery screens. Although a prominent mining engineer has referred to their adoption as being a retrograde step, the writer believes they are an improvement in principle upon those usually sold by the manufacturers. This I will attempt to show by the accompanying magnified sketch, in which *a*,

Fig. 1.

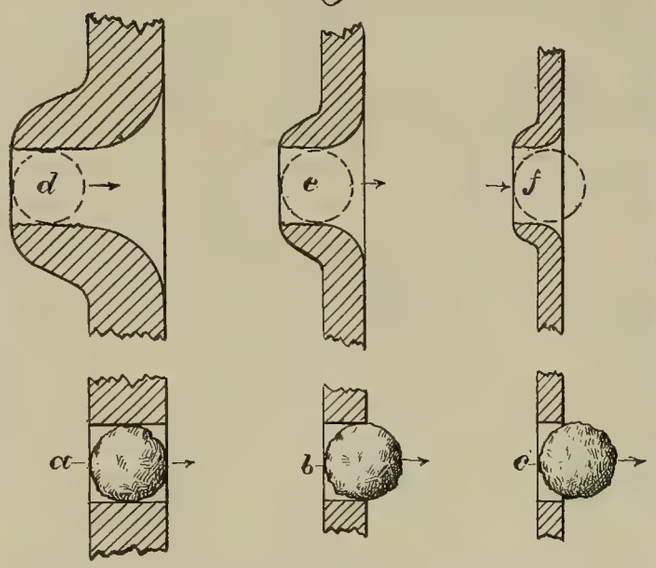
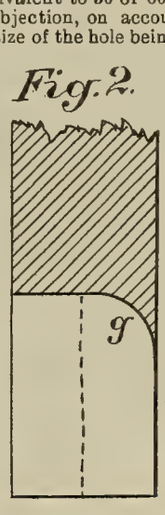


Fig. 1, represents a grain of sand lodged in the hole in the screen, whose thickness is equal to the diameter of the hole. At *b* the thickness is reduced one-half. At *c* it is but one-third that at *a*. Assuming that the splash of the pulp will force or hammer each grain of sand so lodged through the hole until its inner surface is flush with that of the screen, it will be observed that the thinner screens have much the advantage over that at *a*, where it is likely to remain lodged, while at *c* it is free to drop out. Herein I think lies the principle that permits the tin plate screen to hold its own where once used. Holes tapered from the outside are intended to obviate the difficulty, but they are expensive to make, and, if tapered enough to work well, the size is soon enlarged beyond the desired limit.

Although larger sizes of the burr punched screen, shown at *d e f*, run longer without clogging, those of No. 10 or 12 (equivalent to 50 or 60 wire mesh), are open to same objection, on account of the ratio of thickness to the size of the hole being usually greater

Fig. 2.



than with the Nos. 6 or 7, thus increasing their tendency to clog. I venture the conclusion that the punched screen of a thickness of about one-third the diameter of its holes has come to stay. Wire screens give too much trouble from clogging and breaking. Given a sufficiently strong and tough metal, round holes may be punched so close together as to be almost equal to the wire screen in issuing capacity, and without its tendency to clog, if made thin as above indicated. The same principle applies to trommel and other screens, a fact which I commend to the attention of screen manufacturers.

While on the subject of screens, it may be mentioned that some twenty years ago the writer adopted the plan of rounding the lip edge of the screen frame, as shown at *g*, Fig. 2, which causes the pulp to hug to it, following it down to the lip of the mortar. This removes the necessity of a splash-board or curtain, unless, perhaps, when using screens coarser than usual. MILLMAN.

Baker City, Oregon, Jan. 20th, '99.

Machine Work.

There are many people now living who can remember when joiner work, including even flooring and ceiling, was nearly all planed by hand—a laborious process that did not in most cases include thicknessing, and was consequently an inferior method, except perhaps as to finished surfaces; and even this exception is not to be in comparison with the fixed knife planing machine employed in Europe and, more notably, with smoothing machines invented in the United States.

Measured by manual energy, which may be taken as 2500 foot-pounds, or one-thirteenth of a horse power, for a strong man, it would take 130 men to equal the planing machine before named; but there is a difference in favor of the machine in the guidance and application of the cutting edges that justifies the ratios before named.

These comparisons convey an idea of the extraordinary economic results of machinery attained in the principal processes of wood conversion. They seem incredible, but there are no longer means of comparing, because values are now adjusted to the machine product alone, and handwork no longer exists.—John Richards, in the Engineering Magazine for February.

A WASHINGTON special says: "The lead interest will not suffer by reason of the negotiation of the treaty between Canada and the United States. Republican friends of the lead interest in this country have been especially active, and Senator Shoup of Idaho says that, after careful investigation, he believed there was no fear whatever of the incorporation in the treaty of any clause which would unfavorably affect the lead mining industry of this country. The knowledge of strenuous opposition in the Senate to any such proposition will, it is believed, be sufficient to prevent its incorporation in the treaty, which must subsequently be ratified by the Senate. Senator Shoup has been actively engaged during the past week in running down the rumors of action adverse to the lead-mining interests, and is satisfied that, if they ever had any basis, they have no standing before the joint commission."

ICE STORMS are commonly believed to be due to rain falling on surfaces cold enough to freeze it. The fact that the objects iced are often comparatively warm makes this simple theory insufficient, and observations during a remarkable ice storm last October, in Germany, have proven to Dr. W. Meinhardus that the phenomenon is one of the singular condition of liquids, known as "superfusion." In this state the liquid has a freezing temperature, but is kept from solidifying by some special circumstance. In the storm observed, reports from elevated stations showed that the moisture was condensed in an upper air stratum above freezing point in temperature, and that the rain fell through a colder stratum, becoming chilled to freezing temperature, but remaining liquid until the drop was deformed by striking a resisting body.

"THE SOUL," meaning the highest intellectual faculties, is located by the new phrenology in the posterior cerebral lobes. Dr. C. Clapham offers proof in the facts that the posterior lobes are most highly developed in man, and that the development is especially notable in men of great ability and in the highest races. The lobes are imperfect in idiots.

C. M. O'LEARY writes from Dawson that he discovered Dec. 8th on his claim on Hunker Creek the tusk of a mastodon. The tusk was imbedded in the snow and ice 30 feet deep. It was 9 feet long, 26 inches in circumference and weighed about 500 pounds. This would be an interesting specimen for the Mining Bureau Museum in San Francisco.

Some Experiences of a Working Miner.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS

As I came down the mountain road leading into T——, I had just reached the outskirts of the town when there occurred a terrific explosion, followed by a shower of rocks of all sizes, which fell all over the place. One large boulder crashed through the roof of the mill, narrowly missing the machinery. When I had waited long enough to feel reasonably sure that there would be no further demonstration of the kind, I continued on my way into town. On inquiry, I learned that the boss of a gang of men who were working in a large open cut had "sprung" three deep holes an hour previous and charged them with both nitro and black powder. They were "fired," and, although they had shaken up the ground considerably, had failed to do material execution. The boss, Mr. B——, then determined to break those holes, if it took all the powder in the magazine to do it, and he used plenty, with the result above stated, exemplifying in a most forcible manner the maxim: "Where there's a will there's a way." The common impression about town was that the magazine had exploded. Mr. B—— went to the office, explained the occasion of his experiment and drew his time, there being no objection.

Transportation of ores from mine to mill, or, rather, from stope to mill, is always an important matter and should receive careful consideration. At one of the largest mines in California, having a 60 stamp mill, the ore, after being broken down in the stope, is loaded from ore bins in the stopes into cars holding one ton each. These cars are trammed through a long tunnel and dumped into a large ore bin at the surface, from which it is reloaded into cars holding three tons each. These are made up into a train of six or eight cars and hauled to the mill on a "down grade." The ore is dumped into a large bin back of the mill, reloaded into small cars, trammed into the top of the mill and dumped onto the grizzlies, after which it passes through the mill automatically. The cars which haul the ore from the mine to the mill could as well be run into the mine, loaded there and then hauled to the mill and into it, and dumped with a single handling.

Another "trick," and *not* one worth knowing, is that of placing the ore breaker 18 to 24 inches, and even more, above the level of the ore floor. The only reason I could ever conceive for this foolish arrangement is that otherwise the men whose business it is to feed the breaker might have a chance to rest. I have in mind an instance where one man in ten hours put 200 tons of quartz through a single breaker every day in the week for months, and he had no grizzly, either. In this case the breaker was of a style and size suited to the work, and it is needless to say the breaker was not set above the floor level. I also have in mind another instance where, in a 10-stamp mill with grizzly, the rock-breaker man was kept constantly busy shoveling the entire shift to keep enough rock in the bins to feed the mill twenty-five tons daily. This breaker was too small for the work and it was set about 2 feet above the floor level, and every pound of ore that did not pass the grizzly had to be shoveled into the jaws of the breaker and the ore broken so coarse that a great deal of it had to be broken with a sledge before it would go into the crusher at all. It pays to think about all these things when building a mill.

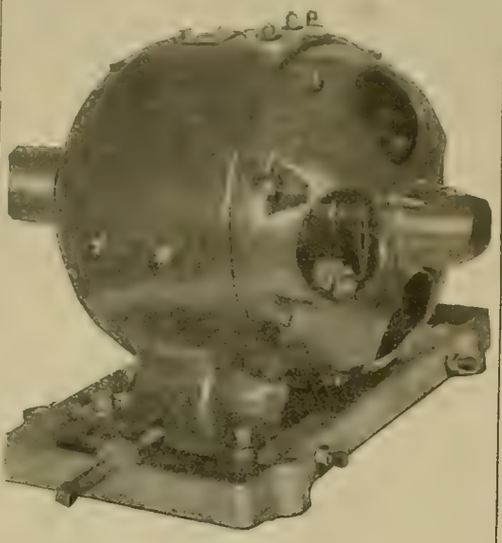
Speaking of mill construction recalls a large mill in a prosperous camp in this State, in which some improvement might have been made. The battery posts do not extend down alongside of the mortar blocks to the bottom of the pit, but are set on a saddle, or cross piece, which reaches transversely across the mortar block at the ends, resting on heavy timbers placed back and front of the mortars. Of course, this construction is calculated to furnish a firm foundation for the battery posts, but it does not, and the cam shafts jump and rattle at such a rate that the boxes require frequent rebabbiting.

Johnnie and Jimmie B—— owned a pretty good prospect that promised to become a mine some day, and a big one, too. They had opened it by a large, open cut, exposing the vein 30 feet wide. The cut was 20 to 30 feet wide at the face. They sold the mine for more money than they could count, and they took a contract from the purchasers, when they had completed the 60-stamp mill, to deliver 180 tons of ore daily at the head of the tramway leading to the mill. The price was 35 cents per ton. Johnnie and Jimmie hired three or four other men and they began operations by drilling about twenty holes, each 3 or 4 feet deep, and firing them. It sounded like Fourth of July, and tons of gold ore filled the air, but very few tons fell in the big timbered chute built to receive it. Then the boys commenced gathering up ore all over the cut and on the hillside beyond, but after getting it all in the bins at the head of the tramway, and after firing a good many more blasts of the same sort, at the end of three days they quit, admitting there was no money in it at that price. The company sent up to D—— and got a *miner* to come down and figure on the same layout. He came, looked at the ground, sized up the situation and offered to break all the ore the company could crush at 33 cents per ton. He went to work, and, hiring Johnnie's and Jimmie's men, put down some deep holes, chambered them, and then charged them properly, and the result was the great mass of red gold-bearing rock simply slid down into the chute and was trammed to the ore bins as fast as it could be used at the mill, and faster. In another letter I must tell you of some timbering I have seen.

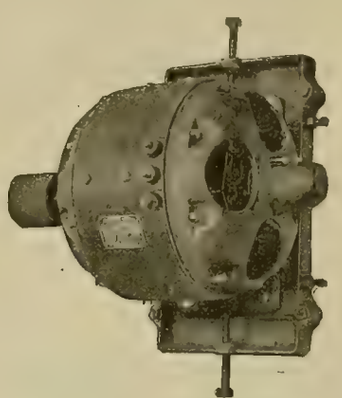
MINER.

Details of the New C. E. Motor.

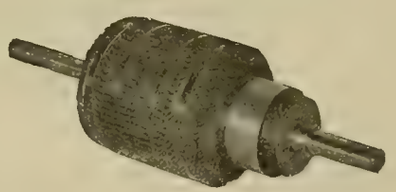
To meet a demand for larger direct current stationary motors as compact and efficient, motors of the type C. A. which range from ½ H. P. to 2 H. P.,



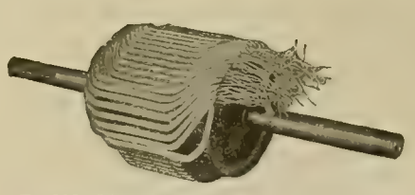
C. E. MOTOR.



C. E. MOTOR, WALL SUSPENSION.



C. E. ARMATURE.



C. E. MOTOR ARMATURE WITHOUT COILS.

the General Electric Company has still further improved a line of motors known as the type C. E., in which the motor frame, which is also the magnet yoke, is of soft steel of high permeability. It is cast in the form of a hollow cylinder with projecting feet on the outside and seats for the pole pieces on the inside. The short magnetic current which this arrangement gives and the use of the best material contribute to make the new motor efficient in all its capacities. To obviate eddy current losses the pole pieces are built up of iron laminations, and are secured to the yoke by through bolts with nuts on the outside. The field coils are held in place by the extended lips of the pole pieces and as the face of the pole piece covers a large surface of the armature, without increasing the size of the filed coils, the efficiency of the motor is materially augmented. The armature coils of copper wire, form wound, insulated and tested, are placed in the core slots, the ends of the coils lying along the flanges. This arrangement constitutes the cylindrical armature winding, providing a large ventilating surface for the conductors, reducing the length of wire necessary with consequent decreased resistance, and is thus conducive to coil running and high efficiency as well as to ease of removal and replacement of any coil. The insulation employed is that used with all G. E. railway motors and is tough, impervious to moisture and practically indestructible. The coils are securely held in a rigid position and injury to the insulation from sliding or vibration is impossible.

The bearings are supported by cast iron end shields. This method of support is lighter, but not less rigid, than pillow blocks; and, while affording protection to the working parts, does not lessen the compactness of the motor.

Slow speed in motors means diminished losses by wear and friction of belting, bearings and commutator; but as decrease in speed necessitates a corresponding decrease in output in motors of a given design, a reduction in speed requires a heavier and more expensive machine to give the same output.

The C. E. motors are built in capacities of from 2 H. P. to 10 H. P. in slow speeds and from 3 H. P. to 15 H. P. in moderate speeds. They are conservatively rated and will run under full load at an unusually low temperature. The standard type will deliver the rated output continuously without rising in temperature above 40° C. above the surrounding air. With the wire screens over the hand holes this will be slightly exceeded. The motors will carry a temporary overload of 40% without injurious heating. Following its usual practice the General Electric Company makes all parts of these motors to gauge, and duplicate parts can thus be obtained without delay.

The Advance in Copper.

The doubling of value of stock in the big copper producing companies is only a surface indication of the tremendous activity in copper mining everywhere. A product selling in open market for 18 cents and costing 6 cents per pound to produce is in active demand, and the world is being ransacked for this metal that electrical development has made so permanently valuable. Nothing but excessive production can check the present demand, and nothing (except prohibitory and extortionate figures) can quickly check the advance in price.

For nearly seven years increasing foreign consumption has sustained the American copper market; now that domestic requirements have been augmented, the price mounts still higher. Since '94 the American copper production increased from 160,000 tons to 234,000 tons; in the same time foreign production decreased from 90,000 tons in '94 to 85,000 tons in '98. Meanwhile exports of American copper have risen from 77,000 tons in '94, and 65,000 tons in '95, to 145,000 tons in '98, thus leaving for domestic consumption 83,000 tons in '94 and 106,000 tons in '95, and in '98 but 89,000 tons.

In addition it is to be noted that when the big French syndicate went to pieces just ten years ago it left 170,000 tons in the hands of the sub-syndicates of the bankers. Lake copper then fell to below 10 cents, and the bankers called for a conference with the leading American producers. The Calumet and Hecla people told them that if they wished to market their copper the price would be about 5 cents per pound, and they would be found willing to meet the market at that figure, with the Anaconda also in competition for the market. This was bitter, but resulted in an agreement that there be no restriction as to the price of copper, but the Calumet and Hecla and the Anaconda agreed not to increase their output in consideration of the bankers agreeing to market only a limited amount per annum for their accumulated supply.

That visible supply of copper in March, '89, has come down from 170,000 tons in the hands of the bankers' syndicate to a total world's visible to-day of 26,000 tons, and the world through a dull industrial period the past ten years has been absorbing 15,000 tons of copper per annum more than the world has been producing. Now on both sides of the Atlantic there is increased consumption, the smallest visible supply ever known, and little probability of new copper fields now being opened becoming immediate important factors in production. Meanwhile those who are trying to corner the market are taking a lesson from the dear-bought experience of the French syndicate, and, instead of trying to control the product, are attempting control or ownership of the mines themselves.

THE Pump Manufacturers' Association, in session in Chicago, has resolved to raise the prices of all pumps from 15% to 20%. The reason given is that the cost of material has considerably advanced.

The "Electro-Zinc" Process, and Experimental Researches Which Led to Its Development.

By W. BETTEL, Johannesburg, S. A.

Before describing my method of precipitating gold and silver by the "electro-zinc" process, permit me to refer to experimental work in connection with slimes treatment which led up to its development. As some of you will remember, I devised in 1892, a system for treatment of deposited slimes, where the separation of gold solution from the solid was effected by means of a washing filter press of special design, which in conjunction with Dr. A. Simon, I patented in this State in 1893. The first trial for percentage of extraction took place on December 14, 1892, at the Robinson Gold Mining Company's cyanide works in the presence of Capt. Mein, G. A. Darling, Dr. A. Simon, E. H. Johnson and others. The slime, selected by the cyanide works manager, Mr Darling, as being—in his opinion—the most difficult to treat, was mixed with a cyanide solution of about 0.2% strength in the proportion of 1.25 tons solution to one ton of dry slimes. To the solution was added potassic-manganic cyanide, in the proportion of 0.1 pound per ton of dry slime. As soon as the mixture was thoroughly pulped, it was pumped into the filter press (one of Johnson & Co.'s 24-inch frame machines with a washing attachment). The machine was so worked that the safety valve did not act until a pressure of 100 pounds per square inch was indicated, which took twenty minutes. The valve was then reversed, washing with water started, and continued until red litmus paper ceased to show alkalinity in the wash water; the pump was then stopped.

There being no facility for precipitating the gold from this cyanide solution it was decided to take the difference between the assays of orginal and residual slimes as proof of extraction. Eight assay tons of originals and the same quantity of residues were taken and assayed with the following results, which were checked by Mr. Darling: Originals 7 dwts. fine gold per ton; residues 3 grs. fine gold per ton: showing an extraction of 98.2% (theoretically).

Several trials were subsequently made, the total amount treated amounting to 3½ tons, and the lowest extraction (without washing) was 89.8%. An experiment with rich vanner slimes, containing ferrous and ferric sulphates and free acid, equivalent to a cyanide consumption of ten pounds per ton of dry slimes, was then tried, lime being mixed with solution for neutralization of acidity, and two pounds potassic-manganic cyanide added per ton of dry slimes, to oxidize ferrous hydrate and to facilitate solution of the gold and silver.

The mixture was agitated for 1½ hours, taking care to keep the solution alkaline (a previous experiment with part of the same slime had given unsatisfactory results, and nearly all the cyanide in a 0.2% solution was decomposed after five minutes agitation). The slimes were finely divided, 98% passing through a 10,000-mesh screen, and contained 30% pyrites.

The assay value of the original slimes was:—(dry weight) 7 oz. 13 dwts. 6 grs. fine gold per ton and of the residues 3 dwts. 12 grs. fine gold per ton: showing a theoretical extraction of 97.7% with a consumption of two pounds oxidizing agent and 3¼ pounds cyanide per ton. (The value of the oxidant was at that time, 1s. 9d. per pound).

A trial of half a ton of finely ground black sand from the Rietfontein Gold Mines, which had been treated by amalgamation in a Chilian mill, assaying gold, 2 oz. 17 dwts. 9 grs., gave a residue of gold, 1 dwt. 9 grs., equal to a theoretical extraction of 97.6%; 96.2% of this fine sand passed through a 10,000-mesh sieve.

In all the experiments, a small quantity of coarse sand was left in the agitator, from which not more than 20% of original contents of gold had been removed. No notice was taken of this residue, as it was assumed that in treatment on a large scale it would be removed if present to the extent of more than 2%, and treated as sand or concentrates.

The value of such a process, whereby, with the use of a moderate amount of solution, a high extraction of gold was readily obtained, using the ordinary zinc process for precipitation, did not however appeal to engineers in this country, none of whom had had experience in the separation of liquid from solids by filter-press treatment, and they were therefore disposed to exaggerate the cost of handling by the filter-press process.

It is true I recommended that only slimes of over 4 dwts. assay value should be treated by the filter-press process, as no means were then known whereby a rapid discharge of the pressed cakes of slime, by simultaneous separation (by a mechanical contrivance) of all the frames, became feasible. Such a drawback no longer exists, for after nearly six years' study of the mechanics of the filter-press process I have discovered a simple means of opening presses of any size, so that by one movement each plate (or as many as required) is separated from its neighbor a sufficient distance to enable the cakes of slime to be removed with great rapidity.

I anticipate, by this modification of the filter-press process, to be able to treat deposited slimes at a cost of 4s 6d per ton of 2000 lbs. dry weight, obtaining a 90% extraction, the plant being considerably cheaper than a current-slimes plant of equal capacity. This, however, is a matter for future consideration.

In the course of my experiments I found that although strong solutions of cyanide and alkalies effected the settlement of slimes, and ensured clarification of the solution, yet the same slimes, in dilute solution of these substances, refused to settle completely, the solutions remaining muddy for a considerable time. One sample examined did not clarify completely in three months.

Being desirous of obtaining a rapid clarification of solutions for purposes of decantation, I undertook a series of experiments with a view to finding a cheap flocculating agent which would not decompose cyanide. I found that soluble hydrated oxides which formed insoluble compounds with silica, such as hydrates of lime, strontia and baryta, to be the most suitable, but, for commercial purposes, lime could only be used, the others being too expensive. I thereupon tried a weak solution of cyanide, lime in excess and an oxidizing agent, and found that such weak solution would readily clarify, leaving the gold in solution. This pointed out means whereby poor slimes, deposited in dams, might be readily treated.

It then occurred to me to try the effect of flocculating of slimes by lime for co-precipitation of "float" gold. I will ask you to remember that when gold is finely divided, so as to cause it to remain in suspension in water for months, ordinary chemical precipitates fail to bring down more than a fraction of the gold.

From the rapidity with which the gold in slimes dissolved in weak cyanide solutions I concluded that the state of division of the finer particles of gold in slimes approximated to that of the particles which, prepared chemically, cause a pink coloration in water, or, as is suggested by R. Zsigmondy, is in actual solution as so-called "colloidal" gold.

I thereupon made a solution of gold containing 5 milligrammes of gold per litre and added thereto a reducing agent in sufficient excess to separate metallic gold in the pink state.

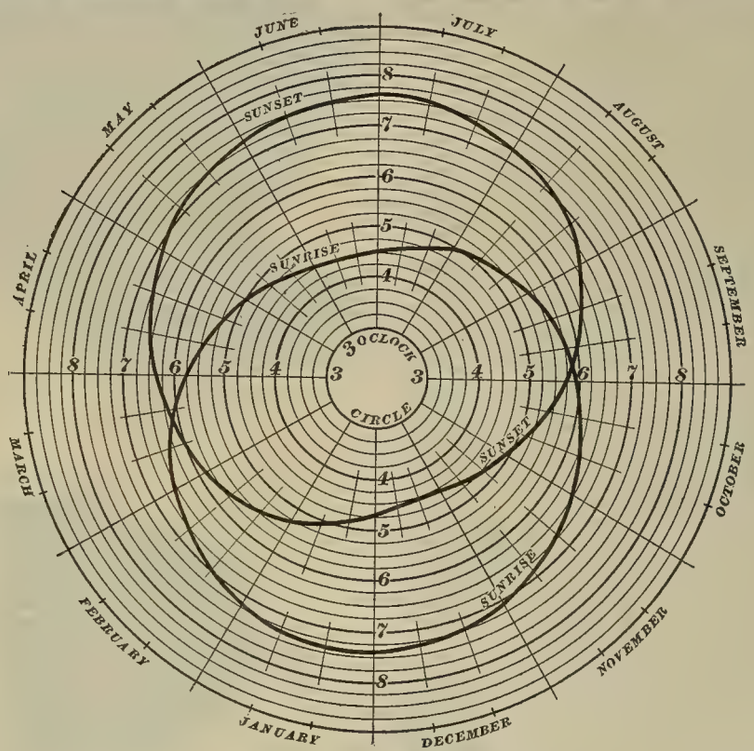
This represented the amount of gold in an actual slimes pulp, carrying 3% of slimes assaying 5 dwts. fine gold per ton. In this solution was diffused some slimes residues from my filter-press treatment containing no free cyanide and only 3 grains fine gold per ton, in the proportion of 30 grammes per 10 litres (= 2 2 gallons), and then 22 grains of lime finely ground—the lime was white and well burnt—the slimes precipitated carrying with them practically all the gold. The clear fluid filtered through Pasteur-Chamberland filtering candles showed, by assay, one grain of soluble gold per ton, the unfiltered liquid, perfectly clear, assayed only 1¼ grains gold per ton. I, therefore, felt sure that if slimes were flocculated with lime the gold would be co-precipitated, and many subsequent experiments on flocculation of slimes with lime confirmed me in this belief. Up to that time it was thought that float gold could not be precipitated by any means, and all who saw my experiments on slimes flocculation and made guesses as to the chemical agent used were always wide of the mark, for although lime had been used for neutralizing acid slimes, its flocculent effect when used in excess upon slimes effluents from dams had never previously been observed and noted.

At the time I made my experiments on treatment of current slimes the Molloy-Simon process, using electrolytically prepared sodium amalgam, was the only method likely to yield good results on dilute solutions, but the enormous area of the precipitant seemed then (as it does now) an insuperable obstacle to its employment.

(*To be continued.*)

A Chart for Sunrise and Sunset.*

The accompanying chart, by which, at a glance, the time of sunrise or of sunset for any day in the year can be quickly ascertained, is of interest. Those who understand the use of diagrams in general will appreciate its handiness, while an explanation will serve a double purpose with those who are not fully cognizant of the usefulness of such diagrams, showing not only how to use this particular chart, but illustrating one of the simplest methods of representing to the eye the rate and manner of change of a varying quantity.



SUNRISE AND SUNSET CHART.

Suppose it is desired to know at what time the sun will rise on the 10th of May: first find the slice of the chart marked *May*: the line dividing the April slice from the May slice is the last day of April. The 10th of May will, therefore, be one-third of the way over the May slice—reckoning thirty days to the month. The sunrise curve is marked *Sunrise*; concentric circles struck from the center of the chart are marked *3*, *4*, *5*, *6*, *7* and *8*; these represent hours; the space between every adjacent pair, as between the 4-o'clock circle and the 5-o'clock circle, is divided into four equal parts, each small space representing a quarter of an hour, or fifteen minutes. That is all there is to the chart itself. On the 10th of May, that is one-third of the way over the May slice, a radial line will intersect the *Sunrise* curve at a point just beyond the third quarter past the 4-o'clock circle, indicating that on that day the sun will rise at about 4:47 A. M. The short radial lines every third part of a slice help to locate any intermediate date.

*Condensed from Mechanic Arts Magazine.

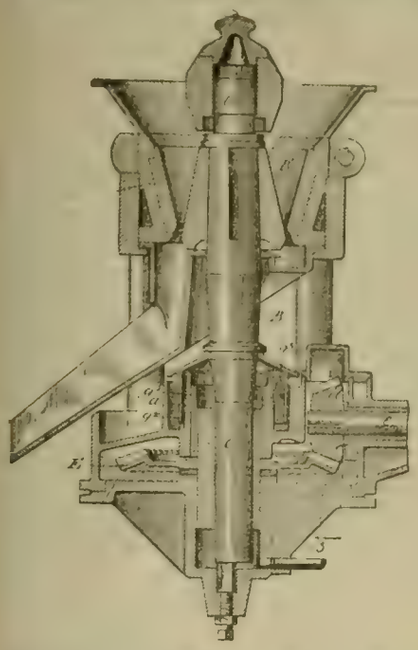
AT the Vulcan shipyards, Stettin, Germany, is now building the largest steamship in the world, "Die Deutschland." She is 622 feet long, 67 feet beam and 44 feet depth of hold. With bunkers and ballast tanks filled she will draw 29 feet of water. Her coal bunkers will carry 5000 tons. She will have two six-cylindered quadruple expansion engines of an aggregate capacity of 33,000 H. P. Twelve double and four single boilers will supply steam at 210 pounds pressure. The contract calls for a speed of 23 knots per hour, and it is expected that she will make 25 knots, or about 28½ miles per hour on her trial trip. Five dynamos will supply the necessary current for lighting.

Latest Mining and Metallurgical Patents.

Patents Issued February 7, 1899.

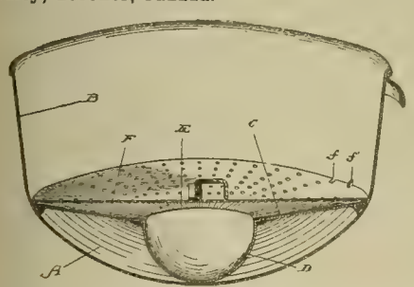
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ROCK AND ORE BREAKER.—No. 618,860; P. W. Gates, Chicago, Ill., assignor to Gates Iron Works.



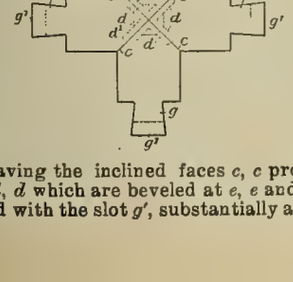
A combination of a gyrating shaft, a bevel gear provided with a hub in and by which the shaft is journaled and gyrated, a bevel pinion meshing with and adapted to drive the bevel gear, a frame portion surrounding the bevel gear and pinion providing a main oil reservoir beneath the bevel gear into which the bevel pinion dips, a portion of such frame surrounding the hub of the bevel gear and extending above the same so as to form a cup-shaped oil recess around the gyrating shaft, an oil reservoir adjacent to the bevel pinion into which the oil may be thrown by the bevel pinion and a channel leading therefrom to the oil cup surrounding the gyrating shaft so that the impact of the oil thrown on the oil in the oil reservoir forces it into the oil cup surrounding the gyrating shaft, and a channel leading from the oil cup to the main reservoir so as to promote the circulation of the oil, and a removable cap for the bevel pinion chamber provided with narrow end portions to concentrate the flow of oil to the vertical reservoirs.

PAN FOR WASHING GOLD.—No. 618,918; S. G. Stoodley, Toronto, Canada.



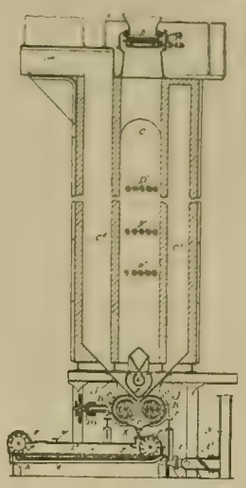
Consisting of a substantially semispherical-shaped bottom, a rim or side united to the bottom, the bottom gradually curving into the side, a concaved false bottom within the pan, a bowl located centrally between the false bottom and the true bottom, a central opening through the false bottom into the bowl, and a perforated plate or strainer supported above the false bottom.

DIE FOR MANUFACTURING OR SHARPENING STAR-BIT ROCK DRILLS.—No. 619,087; H. O. Palmer, Bolton, Eng.



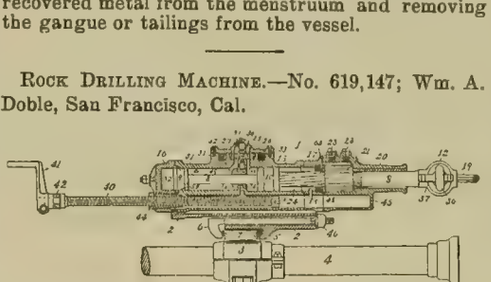
A die having the inclined faces *c*, *c* provided with recesses *d*, *d* which are beveled at *e*, *e* and the shank provided with the slot *g'*, substantially as described and illustrated; of a dolly-tool comprising a block or body with a suitable shank and having two V shaped grooves crossing one another, of four dies each having a beveled working face formed of two surfaces at right angles to one another and each surface having a recess which gradually dies away from its maximum depth at the outer end of the die, the deep end of the recess being beveled.

APPARATUS FOR EXTRACTING METALS FROM THEIR ORES.—No. 619,094; J. J. Shedlock, London, Eng.



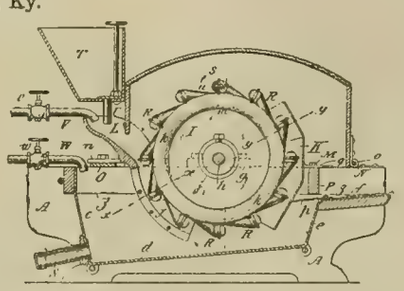
A process of treating ores consisting in delivering finely divided ore in a shower into a calcining chamber, heating the ore to the required degree as it falls and also subjecting it while descending to the action of successive fluid sprays issuing at varying points from top to bottom of the chamber between grinding and feeding rollers, then delivering the ore into an absorbing vessel containing a menstruum in which the metal to be removed is absorbed, separating the recovered metal from the menstruum and removing the gangue or tailings from the vessel.

ROCK DRILLING MACHINE.—No. 619,147; Wm. A. Doble, San Francisco, Cal.



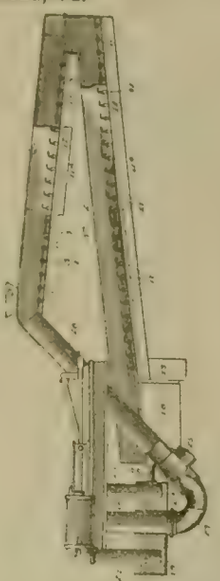
In this machine a main actuating cylinder is divided into two chambers by a midway partition, a piston in each chamber, these pistons being connected by a common piston rod passing through the midway partition, direct ports 28, 29 admitting steam or like expansive fluid to the inner ends of the pistons, a balanced valve controlling admission of such expansive fluid to the ports, an exhaust way 30, a parallel chamber 45 communicating with the exhaust way, and ports 58, 59, between the parallel chamber and chambers 57. There are a drill stem 8 and pistons 9 and 10, the slide distributing valve 25 with ports and passages to supply and exhaust air or steam from the inner ends of the pistons, ports 51 and 55 in the sides of the main cylinder and passages 53 and 56 leading to and supplying air or steam under direct pressure at the ends of the slide valve at predetermined points of and reversing the piston's stroke.

AMALGAMATOR.—No. 619,199; J. N. Marion, Louisville, Ky.



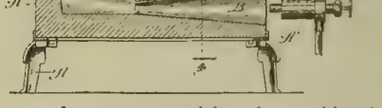
A combination of a quicksilver reservoir; a feeder tube through which the mass of combined liquid and solid matter, to be submerged in the quicksilver, is fed; a rotary wheel, or disk, provided with peripherally arranged piston-like devices that force the contents of the feeder tube downwardly through it and thence out into the mass of quicksilver in the reservoir, as specified, of the tubular housing, or tunnel, K, having its lower end submerged in the mass of quicksilver, having the diameter of its bore materially greater than that of the peripherally arranged devices, and having its upper end some distance above the top of the mass of quicksilver: through which housing the peripherally arranged piston-like devices of the said wheel, or disk, travel.

AMALGAMATING APPARATUS.—No. 618,938; V. Hanson, Richmond, Va.



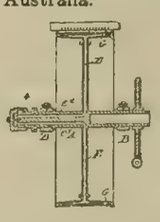
Comprising upper and lower oppositely inclined riffle boxes, transverse troughs having discharge nozzles outside of the boxes, strainers located outside of the boxes and extending longitudinally of the same at an inclination and arranged beneath the discharge nozzles, a collecting chamber located at the lower end of the lower strainer, a vat receiving the water from the lower riffle box, a dead-water tank having an overflow pipe connected with the vat, a pump having a depending take-up pipe extending into the tank, a feed pipe depending from the pump and a lift pipe extending from the feed pipe to the upper riffle box.

ASSAY FURNACE.—No. 619,044; Wm. Hoskins, Chicago, Ill.



An assay furnace comprising, in combination, a shell *A* divided into a rear crucible chamber *C* and a combustion chamber *B* and a muffle chamber *D*, in front of and communicating at their rear ends with the crucible chamber and the one with the other through an opening *r*, an opening *m* and an opening *m'* respectively near the front and rear ends of the top of the muffle chamber, a chimney *F* leading from the opening *m*, a tube section m^2 depending in the opening *m'* and a draught flue *F'* connecting tube section with the chimney.

FILTERING APPARATUS FOR SEPARATING GOLD AND SILVER BEARING SOLUTIONS.—No. 619,211; A. M. Nicholas, Bulong, Australia.



In a filtering apparatus, combination with a revolving wheel having peripheral closed compartments and provided with a circumferential covering of filtering material, of an exhaust pipe having one end open to a portion of the wheel shaft and successively communicating with separate longitudinal passages in the shaft as the wheel revolves, a series of hollow spokes leading from the shaft passages to the peripheral compartments, means for feeding the substance to be filtered upon the filtering material on the upper side of the wheel as the latter revolves, and water supply pipes to spray water upon the substance.

Latest Progress in the Application of Storage Batteries.*

NUMBER II.

By Joseph Appleton.

The weight of each cell is 6,200 pounds complete, and the total weight of the battery is, exclusive of copper conductors, 1,092,200 pounds. The battery is installed in the basement of the Adams street building. It has a capacity of 22,400 ampere hours at the eight-hour rate; the maximum rate of discharge being 11,000 amperes for about 1½ hours. Thirty of the eighty-three cells on each side of the three-wire system are end cells and are connected to three end cell switches on each side, so that, if desired, the battery can discharge at three different pressures. These switches have capacity of about 3,000 amperes each, so that they will fully take care of the maximum discharge of the battery; the connections between the end cells of battery and these switches are made by copper conductors 6″ x ½″, and the main connection of the battery of copper conductors, 6 x 1, giving a sectional area of 6 square inches.

The end cell switches are located near the battery and are operated from the distributing switchboard room by small electric motors, so arranged that when it is desired to cut in or out any number of cells it is simply necessary for the switchboard attendant to press a button, which will operate the motor and move the switch over from one contact to the next, the switch stopping automatically when it is in a proper position on any contact.

Both the short and long feeders running from the distributing board at Adams street can be supplied with the necessary voltage, 120 to 140 volts, to utilize their full capacity, making a large saving in the cost of the feeders. The charging of this battery is done over the tie line from the Harrison street station, no boosters being used. When charging, a pair of generators in the Harrison street station are disconnected from the system and connected to a portion of the tie line for charging the battery, the necessary voltage being obtained by speeding up the generator.

The battery carries about 11,000 amperes during the peak of the load, or about 26% of the total load. The advantages of batteries under these conditions will be readily seen, as they will take care of the maximum load during the short time it occurs, and will increase the load on the generators during the remainder of the time when they have to be charged.

This battery is used in addition to carrying the peak of the load for maintaining a constant pressure on the system, and relieves the switchboard attendants at the generating station from constantly watching and regulating the pressure, the battery taking care of any fluctuations automatically.

The use of large water powers as a motive power for generating stations from which electrical energy is transmitted and distributed over extended areas is growing. The power from such a plant is largely sold for manufacturing purposes, and is charged for at so much per horse power per annum, the power being available twenty-four hours per day. While the mills and factories using this power do not usually run for more than ten hours per day, therefore, a man who requires a maximum 100 H. P. for ten hours a day, or 1,000 H. P. hours, really has to pay for 2,400 H. P. hours, while be uses only 1,000, and probably less, for the average rarely, if ever, exceeds 70% of the maximum.

With a storage battery capable of supplying 50 H. P. for ten hours, or 500 H. P. hours, he need only pay for one-half the amount of 50 H. P. for twenty-four hours, and the battery will furnish the remainder, and can be charged during the fourteen hours he is not using the power. In addition to this, the battery will take care of any fluctuation above the average, and enable the man to buy the average amount of power he requires instead of the maximum.

Such an installation has been made by the Buffalo Street Railway Company. Before describing this installation I would like to mention the different methods of installing storage batteries in connection with railway plants. These may be divided into two classes:

First—Where the battery is installed at the power house to take care of the peak of the load and the fluctuation of the of generators.

Second—Where the battery is installed at the end of a long feeder to keep up the pressure at that point, and to obviate the necessity of sending the maximum amount of current over the long feeders from the power house.

We will consider an installation of each kind and their respective methods operation.

The Buffalo Street Railway Company's plant is of the first class, and is especially interesting inasmuch as it is operated in connection with the Niagara Falls power. They operate practically all the cars within the city limits, and have a steam plant capable of delivering 7,000 electrical H. P., in addition to which they take 2,000 H. P. from the Niagara Falls power, this current being transmitted in the form of high tension alternating current from the falls to the power house, and being then transformed by rotary converters to the ordinary 550-volt direct current.

The storage battery is installed at the main power house and is connected directly in parallel with the steam plant and rotary converters.

When a storage battery is installed at the power house, and is connected directly in parallel with the generators on the bus bars some means has to be provided for regulating the voltage of the battery to suit the generators. As you know, railway generators are over-compounded, the voltage rising as the load increases, while with the storage battery the reverse is the case, the voltage decreasing as the discharge increases. In order to make the battery work properly in parallel with generators of this type and take fluctuations of the load, keeping the generators constantly loaded, some means of compounding the battery has to be adopted. This is done by using a compound wound booster in series with the battery, which is so designed as to increase its voltage in proportion to the increase of load.

The battery discharges during the morning and evening peak, and is charged between times, also at night, from the Niagara Falls power. By the aid of the battery they are enabled to make very much more use of the Niagara Falls power. Before they installed the battery they were only able to shut down their steam plant from 11:30 P. M. until 5 A. M., during which time the rotary converters carried the entire load, which averaged about 600 H. P., while they were paying for 2,000 H. P. With the aid of the battery they are enabled to shut down their steam plant from 7 P. M. to 7 A. M., and about eighteen hours on Sunday.

An illustration of the second method of using storage batteries for railroad work is seen in the case of the battery installation of the South Side Elevated Railway Company of Chicago. This company operates an elevated railroad about nine miles long, all the trains being equipped with the Sprague multiple unit system. The power house is located approximately at the center, and the two storage batteries near each end of the line, and are connected directly across the system without a booster. The charge and discharge of these batteries are controlled by the drop over the feeders from the power house to the batteries, this drop varying according to the load on the system from 10 to 80 volts. When the load on the system is light, the drop in the feeders is small, and there is voltage enough to charge the battery. When the load becomes heavy, the drop on the feeders is increased; this consequently causes the batteries to discharge into the line. The method of operating is entirely automatic.

From a number of load curves it was ascertained that when the power house was operating without the battery during the peak of the load the maximum load was 7500 amperes, with sudden fluctuations of 5300 amperes, while with the batteries in operation the maximum load at the power house, under exactly the same conditions, was 5700 amperes and the fluctuations only 2000 amperes. Thus the batteries had increased the capacity of the power house by about 2000 amperes, and steadied the load on the generators to the extent of nearly 3000 amperes.

Those acquainted with the operations of railway plants will appreciate such results.

The switchboard is simple. Each battery is connected to the power house by two special feeders in addition to the general system of conductors, so that the proportion of charge and discharge can be regulated according to the conditions of the load. If it is found that a battery is being discharged more than it is being charged, an extra feeder is connected between it and the power house so that it will be relieved of a portion of the load. By this means a very complete control can be obtained of the battery from the power house, and the most efficient method of operation secured.

A battery installed at the end of a line in this way not only increases the capacity of the power house, and saves the investment in copper by making it only necessary to transmit over the feeders the average amount of current required instead of the maximum, at the same time maintaining the proper voltage at the end of the line, thereby enabling the motors to run at the point of highest efficiency. A variation in voltage at the end of the line between conditions of maximum load and minimum load of 10% is ample to make the battery self-regulating and take care of the fluctuating load without a booster. Statistics show that a storage battery installation of this description has much to recommend it from a commercial point of view.

One of the most interesting and important storage battery installations recently made is that in connection with the underground trolley system of the Metropolitan Street Railway Co. of New York. Their system covers a large area, and they have utilized storage batteries in sub-stations. Two are now in operation, one at the foot of West Twenty-third street, and the other at Thirty-second street and Fourth avenue.

I will briefly outline this plant and method of operation: The battery consists of 540 cells, each containing 51 plates, 15″ square. The dimensions of the cells are 4′x 21″x 24″. The battery is divided into two sections, 270 cells in each, which are operated in parallel. This is done to keep the size of the cells within practical limits and to enable them to be more easily inspected and cared for. A cell 8′ in length, which would be the size if only one battery were used, is too large to be satisfactory. The capacity of the complete battery is 8000 ampere hours, with a one-hour rate of 4000 amperes.

The function of this battery is to take care of a portion of the morning and evening peaks, and to take up the fluctuations of load at all times. The method of operation is as follows: Sufficient cells are provided so that the voltage of the battery just balances the average voltage of the system; consequently when the battery is connected to it it acts as an equalizer and does not charge or discharge except as the fluctuations occur. When the battery discharges on a peak and is being charged during the hours of light load, a booster is connected in series with it to regulate the amount of charge and discharge. The output of the booster and, consequently, the charge and discharge of the battery, is controlled by varying the strength and polarity of the shunt field. The daily work of the battery is about as follows:

From 7 to 9 A. M. it discharges on the peak. From 9 to 12 it floats on the system as an equalizer. From 12 to 3 or 4 P. M. it is charging. From 4 P. M. to 8 P. M. it discharges on the peak. From 8 to 12 midnight it is floating on the system, and after midnight the battery is given its principal charge, this being continued until the battery is full.

(*To be continued.*)

*Condensed.

An Improved Safety Explosive.

An improved safety explosive is reported from Germany. The *Revue Technique* says that according to the specifications of his patent O. Frank of Berlin proposes to employ permanganates in conjunction with ammoniacal saltpeter and carbonaceous matter for the production of safety explosives. He takes a smaller quantity than usual of the carbonaceous matter and substitutes for the loss about 10% of permanganate, the resulting explosive then having, it is stated, the same disruptive force as usual, but affording absolute security from ignition of the mine gases. A previous inventor employed bichromates for the same purpose, but it is now claimed that the permanganates are superior to the salts just mentioned. For instance, if two explosives be taken, the one containing eighty-nine parts of ammonium nitrate, seven parts of dinitrobenzol, and four parts of potassium permanganate, whilst in the other the same quantity of potassium bichromate is used instead of the permanganate, it will be found on explosion that for thin cartridges a No. 1 cap will suffice to fire the permanganate explosive, whilst for the bichromate cartridge a No. 6 cap will be necessary. With the permanganate explosive the leaden testing cylinder—Trauzl type—will be enlarged in volume by the explosion by 450 cc., the increase with the other explosive being only 3 80 cc. In point of safety the permanganate explosive is still more decisively superior. Thus 437 grammes of bichromate explosive suffice to produce the ignition of a 7% mixture of fire damp and coal dust. On the other hand, with permanganate no ignition is caused even with a charge of 600 grammes. If the same results are obtained on a large scale in practical work, the new explosive should prove very useful in dusty and fiery mines.

The Automobile.

On the front page of this issue appears further illustrated notice of the latest in motors. In every part of the world where roads or streets admit of such style of conveyance these electric and gasoline motors are finding their way; in some cases steam and compressed air furnish the motive power. During the present month incorporation has been effected of the New York Auto-Truck Co., with a capitalization of $1,000,000. The successful operation of the plans of this new concern means the displacement of the horse on large trucks, it being claimed that the use of compressed air motors, made especially for work of this nature, will produce more satisfactory results, and in the end be cheaper than horses. Compressed air motors, unlike horses, have no appetites. It is understood that these motors are to be manufactured at the works of the American Wheelock Engine Co., New York. Joseph Leiter, W. C. Whitney and the Rothschilds are interested. The motors will be built under the Knight-Hoadley patents. Experiments in this direction were first undertaken at the suggestion of a large New York mercantile concern that desired to replace its horses with some such device.

Notes on Experimental Metallurgy.*

By J. E. CLENNELL, Salt Lake City, Utah.

The cyanide process on the Rand has now become such a cut-and-dried affair that the field for experimental work appears to have been reduced to very narrow limits. Except in the department of slimes treatment, the opportunities for improved practice seem to be few indeed. This condition of affairs is in part due to the surprising uniformity of the material which presents itself for treatment, and partly also to the concentration of a very large amount of talent and experience on the same problems.

It is far otherwise, however, in a district where the ores to be handled vary from place to place, and where the difficulties encountered even in adjoining mines may be of a totally different character. As even in Johannesburg some of your members may occasionally be called upon to decide on the best system of treatment for a given ore, some account of the experimental methods which we have been led to adopt in this country may not be without interest.

If some of you find little or nothing new in what I have to say, I hope at least that points will be raised the discussion of which will prove valuable and interesting.

When the question arises, "How is the ore from a certain mine to be treated?" there are two preliminary enquiries which in America, at all events, must unfortunately be made in every case before it is safe to proceed a single step with the metallurgical problems:

First—Is there any ore to be treated?

Second—Is there anything of value to be extracted from it?

If either of these questions be answered in the negative, which I am sorry to say is only too frequently the case, the problem is naturally much simplified. It is much to be desired, however, that some means could be devised for rapidly solving these preliminary queries, if possible at the expense of the mine owner or promoter at whose instigation the examination is undertaken in the first instance. This is a promising field for research which has so far been but little exploited. Some time since a California mining paper published a formula which professed to give the relation between the statements made by the prospector, the distance and inaccessibility of the locality, the price demanded by the owner, and the real extent and value of the ore body, but I am afraid the "personal equation" enters too largely into such a computation for it to be of much practical value.

Let us suppose, however, that we have satisfied ourselves that there is something to be treated, and something to be got out of it; we have next to consider the general lines on which we are to go to work to extract these values in the most profitable manner possible. It has been well remarked that practical metallurgy is not the science of getting metals out of ore, but the science of getting money out of ores. Hence a process which may be complete and admirable from a scientific point of view may be worthless when it comes to a question of satisfying the importunities of stockbrokers.

So great is the interest in the cyanide process displayed throughout the whole world, and so touching the faith in its powers and possibilities, that the first question in nine cases out of ten asked by the person or persons interested in the real or alleged ore under examination is, "Can the ore be treated by cyanide?" In the remaining tenth case it is usually assumed without question that the ore can be so treated. If you begin to express doubts or suggest difficulties a certificate is often triumphantly produced, affirming that the ore was treated in such and such an assay office and an extraction of 99% or upward obtained by this universal solvent. Subsequent enquiry generally fails to elicit any information as to how that 99% was obtained, such details as fineness of crushing, strength of solution, time of contact, and proportion of solution to ore treated, being beneath the notice of that class of metallurgical experts from whom the certificate referred to is obtained. By dint of much cross questioning and considerable patience it may, however, sometimes transpire that the result in question was obtained on perhaps two ounces of material, shaken in a large bottle with about ten times its weight of 1% cyanide. The assay of the original is probably "guessed" from the supposed average of the mine, in which case it is hardly necessary to remind you that the wish is frequently father to the thought. The assay of the residue is obtained on a charge which never exceeds half an assay ton (*i. e.*, 14 58 grammes), and when the quantity of gold finally obtained is too small to be easily weighed, the eye is often the instrument used in determining its quantity. Here, again, there is fine scope for the personal equation. From these two data the extraction is then "calculated."

Where such methods are in vogue it is hardly surprising that experimental metallurgy is somewhat discredited, and that much disappointment and loss has frequently arisen when an attempt has been made to realize these laboratory results in practice. Indeed, it has happened pretty frequently that a mine owner will spend $100,000 or $200,000 in erecting a plant for treating his ore by a plant utterly unsuited to it, rather than risk $100 or $200 in systematic laboratory tests to ascertain whether the ore can be treated by that or any other process.

Those of you who have had the pleasure of investigating ores from the Leydenburg or Zoutpansberg districts will hardly require to be told that there are even some gold mines which are not "cyanide propositions." Where the problem is complicated by varying proportions of silver, arsenic, antimony, copper, zinc, lead, etc., in almost infinite combinations, it is evident that a solvent exhibiting more or less partiality for each of these ingredients is hardly likely to give such satisfactory results as when applied to a mixture of finely divided gold with practically inert material, such as silica and ferric oxide.

Roughly speaking, we may classify ores according to the system of treatment best adapted for them, as:

1. Smelting ores.
2. Concentrating ores.
3. Free milling ores.
4. Cyaniding ores.

Of course, the same ore may belong at the same time to two or more of these classes, as, for example, the Rand conglomerate, which is both free milling and cyaniding; but I propose to restrict the descriptive term to the process whereby the greatest percentage of the value is obtained, so that all ore from which 66% of the value is obtained by amalgalation, and 35% by cyanide treatment of the tailings after amalgamation, would be described as free milling.

The term "smelting ore" would be applied only to such ores as can be smelted direct without previous concentration.

"Concentrating ores" will be defined as those in which at least 50% of the total value can be obtained by concentration in a comparatively small percentage of the original weight.

Such a classification as the above is, of course, not scientifically exact, but some such preliminary division must be made to determine the lines which the subsequent treatment is to follow.

Naturally the first operation necessary will be to obtain a correct average sample—by no means so simple a matter as might appear to the uninitiated. The "average prospector" may be safely trusted to pick out a sample far above the average of the deposit which is to be tested—the more he knows about the character of the rock the more certainly will he smell out the rich spots, not necessarily with intent to deceive, but from sheer natural instinct, and the incapacity of realizing what is meant by an average. A mining expert of my acquaintance bases all his investigations on the philosophical maxim that "all good things are soft." If there be any truth in this principle, it will easily be seen that the method of knocking down ore with a pick indiscriminately, wherever you can get at it, will have a tendency to yield high results. Even the most accurate methods of mine sampling are at best very rough approximations, since most of the ore alleged in the expert's report to be "in sight" is,-as a matter of fact, out of sight, and practically out of reach for sampling purposes. But it will be needless for me to enter into details on the subject of ore sampling before such a society as ours, especially as we are at present discussing the treatment of ores in the laboratory. It will suffice to say that I have found the safest rules to be: take plenty of ore, and take it from as many different points as possible. In cases where it is possible to determine the exact limits of the ore body, and its dip and direction, it is, of course, best to take samples at right angles to the walls, but in all cases a more reliable result is got by separately assaying the samples from a large number of different points, and averaging the results, having regard to the estimated quantity of ore represented by each sample than by mixing the samples (however carefully they may have been taken) and making a single assay of the mixture. It may here be remarked that in estimating the size of the ore body the seller always includes everything that lies between the extreme walls, whether it be granite, limestone, shale or what not, but in taking the samples he carefully excludes what are in this country termed the "horses," and, indeed, frequently confines himself entirely to a streak of a few inches along one or other of the walls.

Let us suppose, however, that an accurate sample has been taken; the assay of this will at once decide whether it is worth while to consider the question of metallurgical treatment. A few simple tests will show us under what class the ore is to be included. High values in gold and silver, especially if associated with much galena or iron pyrites, will naturally indicate smelting as the best process to use. Lower values, associated with a moderate amount of heavy mineral, point to concentration as a likely method. A hand panning test, with assays of both products, often gives valuable information. In all tests the essential points to be determined are the percentage of the total original weight finally obtained as concentrates, and as tailings, and the percentage of the total original values going into each product. We might define the "efficiency of concentration" as the ratio of the latter datum to the former in the concentrates produced. If this efficiency is low in a carefully made hand test, it will be probably quite safe to assume that concentration on a larger scale will be still more unsatisfactory, and investigations in this direction may be omitted.

(To be Continued.)

*Journal of the Chemical and Metallurgical Society of S. A.

Secret of Casting Copper Again Discovered.

Every little while the secret of successfully casting copper is discovered, this time by B. S. Summers, in the foundry of the Western Electric Co. at Chicago, who has, it is stated, applied for a patent for a successful process for casting copper. Chemists and workers in metals have been experimenting with this problem for many years, but complete success, it is said, has not been attained until within the last week. A Chicago statement is to the effect that in the foundry of the Western Electric Co. from 300 to 500 pounds of the metal are now being successfully handled in this manner each day.

So-called copper castings have been on the market for many years, but have contained a large percentage of foreign metals, principally zinc and aluminum, which render the articles far from perfect in the construction of dynamos, switchboards, and other electrical machines. They all have a low conductivity, the range being mostly under 50%. All contained at least 4% of zinc, for with any less portion of this metal in the mixture the castings were spongy and full of blowholes. The highest conductivity was in one case when 77½%, Mathieson's standard, was reached. The assertion is now made that the castings made at the Western Electric shops have been made of such poor copper that 99.92% conductivity has been obtained in one lot, and the average is more than 90%. A few impurities remain in the copper, but they are usually less than .35 of 1%, and sometimes .01 of 1%. Molten copper exposed to the air generates gases that prohibit good castings. These gases form blowholes in the mass, and the articles come out full of cells like a honeycomb. Sometimes the gases form to such a degree that the mass is pushed out of the mold to the floor. Mr. Summers adds some chemical mixture to the melted copper just before it is poured into the moulds that takes up the air in them and allows smooth castings to be produced.

Such a process would be of great value in electrical work. Copper is the only practical metal where high conductivity is necessary, and the purer the copper the better the results. Where pure copper was required heretofore, rolled metal was taken, and the articles cut out with saws in the shape required. The alleged discovery is possible to save in the weight of the metal, for in some places where a 3900-pound piece was formerly designed, a casting weighing 2600 pounds could be used. The difference in cost of working the metal would be a great consideration, for copper is worth twenty cents a pound.

The "rights" of the new process belong to the Western Electric Co. solely. The ancients are claimed to have tempered copper, and some claim has been made in the past to casting it. When Mr. Summers was asked if he was working on the process of tempering copper he remarked that this was the next thing to be done, but would say nothing in regard to any experiments he had made along this line. Mr. Summers is credited with having recently perfected the making of semi-steel, a union of steel and cast iron, with the cheapness of manufacture of cast iron and a great part of the strength of steel, and thus enabled his establishment to cut down the weight of dynamos and other machines.

Patent Office Statistics.

Commissioner of Patents Duell furnishes the following statement relative to the business of the Patent Office for the year '98, and the condition of the work at its close:

During the year there were received 33,915 applications for patents, 1843 applications for designs; 84 applications for reissues; 1659 caveats; 1796 applications for registration of trademarks; 316 applications for registration of labels, and 50 applications for registration of prints.

There were 22,207 patents granted, including designs; 60 patents reissued; 1238 trademarks registered, and 200 labels and 35 prints. The number of patents that expired was 15,548. The number of applications forfeited for non-payment of the final fee was 4363. The number of allowed applications awaiting payment of the final fee was 6824. The total receipts were $1,137,734.48, while the total expenditures were $1,136,196.20.

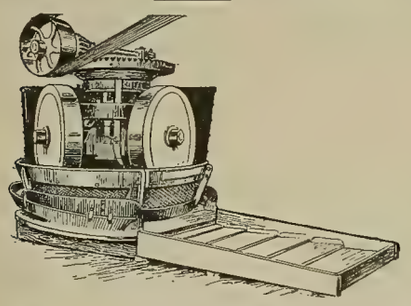
On Dec. 28th, '97, there were 11,382 applications awaiting action, while on Dec. 27th, '98, the number then awaiting action was only 5467. At the end of the year '97 the divisions were in arrears from five weeks to seven months, while at the close of '98 thirty-five of the thirty-six divisions were in arrears

only six weeks on new work and fifteen days on amended work, and the remaining division is up to them by this time.

The improved condition of the work of the office is owing to the fact that last June Congress granted a small increase in force, and to a large falling off in the number of applications received in '98, as compared with '97. The reduction in the number of applications received is due to two causes; first, the change of the patent law, which went into effect on Jan. 1st, '98, requiring inventors to file their applications for United States patents within seven months of the time of filing applications for foreign patents, which led to the receipt of an abnormally large number of applications during the last three months of '97. The second cause was the war. From April 1st the number of applications received decreased very rapidly, and most of the decrease for the year was within the following six months. This is but history repeating itself, as the records show that in '60 there were more applications for patents received than were until the close of the war in '65.

The number of patents granted to the Pacific coast during '98 was as follows: California, 619—1 to every 1951; Oregon, 73—1 to every 4298; Washington, 134—1 to every 2607. Hawaii since annexation to the United States has been granted seven patents.

A Notable Victory for the Bryan Quartz Mill.



As previously noted in the issue of January 28th, in the United States Circuit Court at San Francisco, on the 23rd, Judge Morrow gave judgment in favor of the complainant in the case of the Risdon Iron & Locomotive Works of San Francisco against L. C. Trent for a permanent injunction and an accounting. The matter in dispute was the infringement by the defendant of a patent on a roller ore crusher. Judge Morrow decided that the Bradley crusher of the respondent and the Bryan crusher of the complainant were practically the same invention. A perpetual injunction was granted and an accounting ordered.

According to this decision the Risdon patent is declared to be a pioneer invention and infringed by any one making, using or selling an ore crusher embracing a fixed vertical central shaft with flexible intermediate mechanism between the gear and rolls.

It is a truism that "the simplest things are always the best." The Bryan Roller Quartz Mill is the simplest of such mills, and in these days of many new inventions it proves that the old principles of mining upon which it is built are hard to excel, as it embodies all the advantages of the earlier machines, at the same time possessing the simplicity and durability that are required in mining machinery. As hereinbefore illustrated and described in detail, it has added to the principle of the Chili mill three rollers to run in a continuous discharging pan, and consists of an annular cast iron mortar fixed with steel dies arranged in the path of the three crushing rollers. Power is applied direct from a pulley through a bevel gear and pinion secured to a stationary center post.

A few of its advantages are: It is easily, quickly and cheaply erected, requires little attention, crushes hard or soft ore equally well with small amount of power and little wear and tear of machinery, and, being simple, strong, cheap, does more and better work for less money and with less labor than many more pretentious appliances.

At present several hundred Bryan Roller Quartz Mills are in successful operation in this country as well as in Mexico and abroad, which shows how their merits are being recognized by those desiring such apparatus.

For proof that the Risdon Iron Works possesses great facilities for the manufacture of mining machinery, they take proper pride in calling attention to the fact that they are among the largest manufacturers in their line on the Pacific coast, having built a great number of quartz mills, among others the 240-stamp mill of the Alaska Mill & Mining Company, the largest mill in the world at the time, and also have put up some of the largest pumping and hoisting plants in this country, their machinery being in active operation in every mining district in the world.

They give due and timely warning to all whom it may concern that they will prosecute to the full extent of the law any and all infringements of their patent on the Bryan Roller Quartz Mill.

The Genesis of Petroleum and Asphaltum in California.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

Maltha asphalt, jew pitch, mineral pitch and brea are hydrocarbons which contain either sulphur, oxygen or nitrogen. They may contain one or more or all three of these elements in varying proportions. They can be produced synthetically by sulphurizing, oxidizing or nitrogenizing petroleum oils.

Oxygen, sulphur or nitrogen, when chemically united with a hydrocarbon such as some of the petroleum oils, produces a resin-like substance, to-wit, asphaltum.

One of the solid asphaltums when taken from the ground is brown, owing to its porous condition, caused by the evaporation of the petrolene. It melts at 245° Fahr. When it is melted it becomes black or blackish green. Another asphaltum when taken from the ground is black in color, shaded with brown, or red and dark green when sulphur is present. When purified it assumes an indigo blue reflection. It is opaque, scentless, tasteless and fragile, breaking with a conchoidal fracture, which has a glassy brilliancy. By rubbing it acquires a resinous electricity. Its specific gravity varies from 1.100 to 1.247. At ordinary temperature it is readily reduced to a powder. In a condition of extreme subdivision it takes a brownish tinge. It melts at about 105° to 108° C.

Immediately above its melting point asphaltum is volatile, and if the temperature is carefully raised it disengages in abundance white vapors which belong to oils, which become thicker in proportion as the operation is prolonged little by little, but slowly the volume of vapors diminishes, gas ceases to form, and a deposit of carbon, slightly bituminous, is reached, which is solid and has the appearance and often the hardness of jet. When subjected to quick distillation in passing on toward the dark red it sets free at the same time a mixture of brown oils, sometimes sulphuretted hydrogen and sometimes ammonia, while the retort retains about one-third of its weight of loosely compacted carbon. It is entirely insoluble in water; it gives up to absolute alcohol a small quantity of a yellow substance which exhales the odor of resin and has the appearance of resin. Ether extracts from it a brownish black substance called petrolene, and has the properties and consistency of maltha. The portion left by the alcohol and the ether is asphaltene.

The yellow substances, petrolene and asphaltene, do not exist in asphaltum in defined proportions. Sometimes the petrolene will represent two-thirds or more of the asphaltum. On the other hand, asphaltene composes almost exclusively other asphaltums. The properties of the asphaltums vary according to different proportions of these three principles.

Yellow Resin.—Absolute alcohol dissolves it without dissolving petrolene or asphaltene; it is also readily soluble in the solvents of petrolene and asphaltene. It has an appearance of a resin. When the solution in alcohol of the yellow resin-like principle is treated with liquid ammonia it produces an abundant white precipitate, while small globules of petrolene spring up from the bosom of the liquid and come floating in greenish yellow lentils to the surface.

Petrolene.—This is brownish black in color and has a soft and glutenous consistency. It is insoluble in absolute alcohol. Ether, benzine, benzene, acetone, and the fat oils dissolve it and the yellow resin, but leave the asphaltene intact.

Petrolene is also soluble in the solvents of asphaltene. The specific gravity of petrolene at 21° C. is 0.891. It burns with a very sooty flame. It has but very little taste.

A highly concentrated solution of caustic soda or caustic potash, when hot, dissolves petrolene; if some diluted sulphuric acid is poured into the liquid, a brown gelatinous substance is precipitated.

A current of chlorine precipitates the petrolene from its solution in benzine or in turpentine in brown and viscous flakes. These precipitates contain chlorine, and do no give anything further to alcohol or ether.

Hydrochloric acid precipitates petrolene from its solution in benzine in thick flakes; sulphuric acid in a solid and viscous deposit, which is transformed in time into a brownish red.

In making the experiment with sulphuric acid, the acid must be carefully and slowly added.

If asphaltum be kept at a temperature of about 250° C. by means of an oil bath until it no longer loses by weight, the petrolene is evaporated from the asphaltene.

Asphaltene.—Heavy petroleum oil, carbolic acid, turpentine, chloroform and bisulphide of carbon dissolve it without residue. It burns like resin, leaving coke. It is black, brilliant, and breaks with a conchoidal fracture. In the fire it only becomes soft near 300° C., and decomposes before completely melted. When torrified upon a platinum plate, it diffuses an odor of burned fat, afterwards of a sharp taste, which reveals an acid. It is solid, hard and fragile. When pulverized, it presents a mass of purple color, oftener of a brownish red. It develops, by friction, resinous electricity. In some of the asphaltums analysis has disclosed a large proportion of oxygen, in others a large proportion of sulphur. A current of chlorine precipitates the asphaltene from its solution in petroleum oils and turpentine.

Asphaltene is not sensibly affected by caustic potash or caustic soda in a concentrated solution in water.

The Formation of Asphaltum by the Resinification of Petroleum Oils.—When petroleum oils are left for a long time in the presence of oxygen gas, or the atmosphere which contains oxygen, and in the light, they absorb oxygen; some carbonic acid is set free, water is formed, their odor becomes weakened, and they likewise become viscous while they assume a darker and darker color. When petroleum oil is heated in a current of oxygen it undergoes a quick change and turns into petrolene.

If a current of sulphuretted hydrogen is conducted into boiling petroleum, a very mobile sulphurized liquid is distilled, having an unbearable odor of onions. If this treatment is repeated with the new compound, a second portion of the sulphuretted hydrogen comes to reinforce the former and the odor of the liquid becomes that of garlic. When this sulphurized oil is evaporated a resin is formed.

If petroleum oil is changed by the compression of sulphuretted hydrogen, and then the sulphuretted hydrogen be decomposed to sulphur and water, the oil will be sulphurized and resinified.

If petroleum oil is distilled in the presence of sulphur, the oils will be decomposed and sulphur compounds formed in the shape of a resin. Petroleum oil treated with nitrous gas absorbs it with a slight development of heat; the petroleum becomes thicker and is partly converted into resin.

All the petroleum upon which azotic acid is caused to act furnish yellow resins.

If petroleum is boiled in a cencentrated solution of nitrate of potash or of soda the nitrate converts the bitumen into resin and the liquid becomes a brownish red.

Polymerism of Asphaltum.—By exposure to daylight asphaltum polymerizes, that is, it acquires a higher molecular weight retaining the same atomic proportions. The stronger the daylight the more rapid polymerization takes place. When polymerized its molecule consists of two or more simple molecules united to form a complex molecule. It can be changed from a state of polymerization to its original or simple state by heat.

Polymerization is much more rapid and conspicuous with asphaltene than petrolene, the part of asphaltum soluble in alcohol does not polymerize.

Polymerization is more rapid and greater in asphaltum containing sulphur than in asphaltum containing oxygen. When polymerized the physical properties of the asphaltum are changed, it has a greater specific gravity, it is harder and more brittle, but the most marked change is that of becoming insoluble, or, to speak more exactly, of being dissolved with greater difficulty in its solvents than when not polymerized.

Asphaltum, on account of this photochemical action, is used in photography.

If a moderately concentrated solution of asphaltum in spirits of turpentine or chloroform be placed in a transparent bottle and securely corked, and then exposed for some time to the light of the sun, resinous substances separate and gradually appear which dissolve with greater difficulty in these solvents. If heated they dissolve: the greater portion of these separated substances adheres firmly to the sides of the bottle, a smaller portion remains in suspension in the solution.

Colored resinous substances will form in the California petroleums of commerce if exposed to light in the manner described above.

Solutions of asphaltum which are to be employed in photography must be kept in the dark.

Asphaltum is employed in photography in the following manner: When the solution of asphaltum with turpentine or chloroform is spread over a plate and left in a dark room until it becomes nearly dry, which will require a few days, and the plate exposed in a camera or placed under an object in contact with it, the time necessary to make the print varies very much and can only be ascertained by experiment. When printed the development is effected by quickly flooding with spirits of turpentine, which will at once dissolve the asphaltum, which has been protected from light, and partly dissolve that portion which has been exposed to the light. As soon as the subject is seen to be fully developed a gentle stream of water from a tap is allowed to flow over it to wash off the turpentine. If all operations have been conducted rightly a very delicate and perfect picture in asphaltum is the result.

(*To be Continued.*)

Mining Summary.

ALASKA.

The North American Transportation & Trading Co. is getting ready for extensive hydraulic mining this spring.

J. C. Green of San Francisco has finally succeeded in preliminary work of getting a railroad from the mouth of the Fish river, on Guildfrion bay, to his mines, the farthest north of any similar deposit. The distance is about thirty-five miles. There is a big body of ore in the Omalik group, 75% lead. Green has owned the property for many years, and run sailing vessels between the Fish river and San Francisco.

Paying placer ground is reported discovered eight miles to the interior from Fort Wrangel. Colorado men are said to have bonded a number of the new claims, which are located in a basin, for $75,000, paying $10,000 cash. This particular basin contains twenty-four claims, and it is stated there are twenty-five or thirty other basins of similar size and carrying placer gold in paying quantities within a radius of twenty-five miles of Fort Wrangel.

The report of the Alaska-Mexican mine shows 14,795 tons ore crushed and 104 tons sulphurets treated in January. The ore averaged $1 88 per ton; the bullion shipment was $21,023, exclusive of $5560, account of Alaska-Treadwell mine; expenses for the month were $24,844.

The Alaska-United mine report for January shows 13,104 tons ore worked and 350 tons sulphurets; the ore averaged $3.61 per ton; bullion shipment for month, $30,740; expenses, $21,463.

ARIZONA.

T. W. Tonking in the Oro Blanco district, at the Nil Desperandum, says during the last few years they have milled over 500 tons of ore there averaging $35 per ton.

The Graham *Bulletin* hears that the Detroit Copper Co at Morenci will shortly install an 800-H. P. gas plant at their works there.

F. A. Huntington of San Francisco has bought the Virgin copper mine in the Patagonia mountains near Crittenden for $40,000.

Silver Belt: The Old Dominion C. M. & S. Co., which shut down its smelter Dec. 8th last on account of the severe snowstorm and scarcity of fuel wood, is preparing to blow in one of its furnaces again. The *Republican* says the Old Dominion C. M. & S. Co. at Globe are now loading twenty cars with copper, twenty-five long tons to the car, which amounts to 1,120,000 pounds, worth $230 per ton, or $115,000 for the entire shipment. This is perhaps the largest single shipment of copper ever made from Arizona.

Republican: J. Breen and G Mitchell, superintendent of the United Verde Co.'s smelters have concluded a deal by which a lot of copper claims owned by Mr. Breen near Santa Ana, Sonora, have passed to Mr. Mitchell in consideration of $250,000. Mr. Mitchell already owned adjoining property, so that altogether he has a group of about 170 claims. The ore is of an exceedingly rich quality, some of it running as high as 23%.

Journal-Miner: The strike in the Crowned King mine seems to be true. In a letter written by Lester Jackson from the Bradshaws, he states that a 10-inch shoot of ore on the 500-foot level of the Crowned King had been run onto, which gave the marvelous valuation in assay of $180,000 per ton. The extent of the chute is not given but the ore was being taken out and sacked for shipment to Prescott. He also states that for the first time in many years, or since the memorable Peck excitement in the '70's, there was a revival of the old time interest and that in every section of the Bradshaws the mining element were to a man very much excited over the strike. The Crowned King has been rated for some years as one of the permanent and profitable producing gold mines of Yavapai county, and lies in a basin of the Bradshaw mountains and by trail about thirty-five miles south of Prescott. Its active life dates back but a few years, but in that time it has been steadily producing, having what is termed a strong fissure vein and remarkably rich shoots of ore varying in size. In its early life the King was a difficult mining proposition to handle in process of reducing its ore, owing to baseness, but as depth was reached the character changed so as to permit concentrating by the vanner process, and with continued development in depth the grade of gold has likewise improved in value, running from $14.35 in the upper workings to nearly $15 per ounce in the deepest. At present a 10-stamp mill is operated near the mine and the concentrates and amalgam from it freighted by teams over the mountains.

Prescott *Courier*. It is reported upon good authority that J. H. Costello has made a deal for the Milliken and Comer properties for a sum said to aggregate $50,000, and if the transaction is completed, assurances are given that extensive development will be done on both groups.——The report of the rich strike in the Crowned King mine has been confirmed; 8 inches of unusually rich ore has been struck on the lower level of the mine. The average value of the ore is not known, but some of it is said to assay $100,000 gold to the ton.

CALIFORNIA.

Alpine.

The Exchequer mill was recently sold for $825 to an English company.

Amador.

The new officers of the Kennedy M. & M. Co. are J. Barton, Pres.; D. E. Hayes, Vice-Pres.; E. C. Hutchinson, Sec'y; J. F. Parks, Supt. Work on the north shaft of the Kennedy is being pushed.

On the Adams property at Mt. Echo a nugget worth $185, 4¾ inches in length and from 1 to 2¼ inches in width, is reported.

The officers of the recently organized Peerless G. M. D. Co. are: H. Osborne, Pres.; G. G. Gates, Vice-Pres.; E. Ginocchio, Treas.; W. E. Downs, M. E.; G. W. Brown, Sec'y. There are to be 150,000 shares, par value $2 each, 100,000 to be disposed at an average of payment not to exceed 2 cents per month - first payment 3 cents. The promoters get 50,000 shares, turning over to the company a five years' bond on the Badanacco ranch, total price $20,000. Jackson men have bought some of the shares.

The *Ledger* reports twenty stamps crushing at the Bay State mine, Plymouth mining district. The mine is clear of water and the work of sinking is progressing.

The *Ledger* says: "A part of the output of the January run of our mines, $60,000, was shipped below last Sunday, two days in advance of the usual date; hence the bandits, had they been successful, would have secured a comparatively empty box—less than $2000 probably."

Record: The South Spring Hill mines at Amador City will probably soon again be operated as usual. The company is now, through Supt. J. R. Treglean, squaring up its indebtedness as rapidly as possible.

Butte.

On the north fork of the Feather, D. M. DeLong is getting out gold from ten miles of river bed worked by the company of which he is superintendent.

At Union the dredge on the Mortenson place is about finished. Since the advent of the dredge system there land that was not considered to be worth its tax value is now being mined and ranges in price from $40 to $60 per acre.

Calaveras.

A new town is building near the Royal mine about three miles from Copperopolis. Heretofore the Royal mine has made its headquarters at Copperopolis, but as soon as Hodson is christened it will be changed to that town.

El Dorado.

The sluice boxes of the Blue Rock mine, at Georgia Slide, were robbed during the night recently—the first time they have been disturbed in sixteen years.

Inyo.

At Tuber canyon, Panamint, the Montgomerys have milled the dump, all that came out of two deep shafts; it averaged $26 per ton. Phœbe & Co. of San Francisco have a bond on the property.

Kern.

The works of the California Borax Co. are about completed and are expected to start up during the present week, and will make the first shipment of their product this week. They will ship about 100 tons of refined borax per month.

A strike is reported in the Annex mine, at Randsburg, of a 20-inch vein of $100 rock.

At Barstow the management of the mill has made contracts which will keep the fifty stamps busy throughout the year. From all points north of Barstow the present rates are, including freight from Johannesburg to Barstow and cost of milling, $2.50 per ton on ore valued at less than $15 per ton, $3 for $20 ore, $4 for $25, and $5 for $35 ore.

Randsburg *Miner*: The Butte mine people have settled their difficulties and the mine passed back again into the hands of the original owners. J. C. Wilson has held the property for nearly two years under a bond of something like $50,000, but now he has given it up, and Rainey & Underhill, who are now here, will at once make arrangements to go to work on it themselves.

Los Angeles.

G. E. Metz and F. B. Brown have sued N. Bell for $10,000, alleged to be due as commission on the sale of a mine in Pinos Altos, Grant county, New Mexico, to Mrs. Phebe A. Hearst of San Francisco for $85,000.

Times: From the Red Rover mine, near Acton, a gold bar was received of the value of $1449 60. Since then assay of ore from the 300-foot level shows values higher than any of the rock heretofore milled. The bar weighed 90¾ ounces and was the result of a run of 125 tons; 20 tons came from the 100-foot level and 105 from the 300-foot level. The directors have decided to go down to the 1000-foot level. Among the improvements contemplated is the piping of water from Mt. Gleason. It is also the intention to increase the milling capacity from ten to twenty-five stamps. The Red Rover is the deepest mine in southern California. Among the stockholders of the company are Senator Stephen M. White and Governor Gage.

Mono.

The California Assembly last Wednesday passed the Senate bill appropriating $20,000 to build a wagon road from Mono lake to connect with the Tioga wagon road, owned by the National Government, and running through Yosemite Park reservation. At present, miners living in Mono, Inyo and Alpine counties cannot get across the mountains into the Sacramento or San Joaquin valleys.

Last Monday at Bridgeport the thermometer stood 20° below zero.

Bridgeport *Chronicle*: On Tuesday while two miners named Perkins and Ross, leasers of the Standard Con. ground at Bodie, were working in a drift from one of the Standard shafts, a cave occurred in the shaft which prevented them getting out. The Standard folks set a gang of men to work in another shaft 40 feet from the caved one to drift through to where the men were imprisoned and rescued them. They drilled through the 40 feet of ground in thirty-eight hours and rescued the men, which was remarkably fast working.

Nevada.

Near Nevada City the Odin M. Co. is building a gravel dump and sluice boxes at their mine, preparatory to beginning operations.

At the Pine Hill mine Supt. Rosenthal tells a local reporter that instead of a 10-stamp mill, as intended, a 20-stamp mill will be erected this spring.

The Spanish Con. Quartz M. Co. has been incorporated by Messrs. Fetz, Schuster, Ott, Schuk, Assion, Steinegger and Kurtsschoke, to work the Spanish mine, capital stock, $100,000, all subscribed.

At the Gold Hill Co.'s property at Grass Valley 3 feet of ore samples $17 50 gold, three ounces silver. Milling of ore begins May 1.

The Kate Hayes M. Co. will soon begin building a dam at Badger Hill.

Hydraulicking is to be resumed in the Sazerac gravel mine, near Nevada City.

Most of the Nevada mineral exhibit at the Trans-Mississippi Exposition has been donated to the University museum.

The *Herald* hears that at Omega everything is at a standstill for lack of water. They have plenty of snow, however, and will have water after awhile. On Diamond creek are several drift mines that will then be worked when the water comes. Porterfield Bros., at the Last Chance, have their mill ready for work. At Omega, J. R. Ritchie built a mill over a year ago, but has never been able to run it for lack of water.

Tully Bros. have made preparations for a summer's work at Omega, and hope to open up a good drift mine.

Grass Valley *Union*: The Brunswick M. Co. is arranging for deep working and is putting in a double hoist. The foundations will be of solid concrete 8 feet deep and 12x18 feet in width. The company has 1500 feet of new 14-inch No. 12 double riveted steel pipe.

Placer.

At Alta most of the gravel mines are working steadily. The Fairmount quartz mine ore, in Blue Canyon, runs $6 and $7 a ton, most of it free milling. A 5-stamp mill operates steadily. P. Laveau is the owner.

J. Nicholson is Supt. of the Hobart mine.

The Pioneer mine, near Damascus, has a shoot of paying ore which is uncovered at the 500-foot level and again at the 1000-foot level. A winze is sunk 200 feet below the 1000-foot level, where it shows that this ore body holds. This ore averages $11 per ton. Water is sufficient to drive the mill, which has twenty stamps, and it is proposed to double the capacity this summer. The earnings of the mine for the current month will make a good showing. The newly installed electrical machinery works successfully and is a saving in operating expense, as well as the increasing of the mine's productive capacity; 1200 tons a month can be easily crushed. The company will drive a new tunnel at the 1500-foot level as soon as the weather permits.

Herald: Work is still going on at the Eureka mine. The width of the channel at that particular point has been determined by upraises to be 100 feet.——Lack of water prevents work at the Big Gun.——The Centerville mine is paying splendidly.——The Pioneer continues to yield good paying ore.——The old Dardanelles is being worked by lessees. They are trying to pump out the old shaft and hunt for the back channel.——At Yankee Jims no mining is going on for lack of water except at the Anthony Clark mine in Georgia Hill. The tunnel is in 500 feet, and the upraises show a channel of moderate richness; but as only the edge of the channel has been reached, it is not a fair test of the mine. ——According to report, rich gravel has been struck in the Mayflower mine on the Orono lead at a point adjoining the Grinnell mine. There is sufficient water to run the compressors only. As soon as water comes, the company will begin hydraulicking the upper or Young America lead.——At the Crandall mine a new track has been laid the entire length of the tunnel. The new mill will be ready for use by the first of the month. The stamps will weigh 1100 pounds each, and the dies are one inch larger in diameter than those of any other battery in the county. The machinist warrants the battery to crush twenty-five tons of rock a day. There will be five stamps, and the mill will have a capacity of forty, if needed.

Riverside.

The Riverside M. Co. contemplates building a cyanide plant at its Granite group, forty miles from Salton. The Granite has about $15,000 worth of ore on the dump.

A new gold field in the Mountain Beauty mining district, in the southern end of the San Jacinto mountains, is partly in San Diego and partly in Riverside county, forty miles south and east of Hemet. The nearest point to the district is Oakwood. The formation in the district is granite and schist, the trend of the lodes is north and south. Two tunnels on the Mountain Beauty are in ore averaging $10 a ton.

Sacramento.

Colorado men this week launched a mining dredge in the old channel of the American river near Folsom on Mississippi bar, in an excavation filled with water from the North Fork ditch. It cuts its own way through the gravel beach, which is about 100 acres in extent. It is calculated to raise and wash 2000 cubic yards per day, and the gravel is expected to yield 18 cents per cubic yard. The cost of raising and working the gravel is estimated at 6 cents per yard.

San Bernardino.

A syndicate has been formed to work the placer grounds of Temple bar on the Colorado river, 150 miles above Needles, and at the mouth of the Grand canyon. The company has shipped out a boat 175 feet in length, which is now being put together at Needles, and will ply between Temple Bar and Needles.

San Diego.

Yuma *Sun*: The sudden and unexpected closing down of the mines and mill at Venus camp, Pichao district, twenty-five miles north of Yuma on the California side, has set afloat all sorts of rumors as to the probable cause. Mr. Blaisdell's explanation, that threatened trouble by heirs of the Jaynes estate who have appeared on the scene of action since the deal for the property was made, should be sufficient explanation of the shut down.

Union: The Elevada gold mine at Banner has been sold by C. F. Holland to parties whose names have not been made public.

Sierra.

J. C. King has returned to Salt Lake City from Downieville. While there he settled all claims held against the owners of the Ed Lewis mine, and next spring will develop the property. The Otsego G. M. Co., owning it, was recently incorporated under the laws of Utah.

Supt. Garnier of the Kenton mine, near Alleghany, reports completion of the mill, which will be started as soon as the weather favors.

Shasta.

Development work on the Eureka Tellurium mine, near Middle Creek station, progresses. P. Scherer, the owner, expects to tap a shoot of telluride ore.

The Mountain Copper Co. is trying to secure control of Pitt river.

The Mt. Shasta Milling Co. has finished stringing wire upon poles from Montague to the site of the former mill, near Little Shasta river, two weeks ago. Three No. 8 copper wires as an alternating current of high voltage is used to run a 40 H. P. dynamo at the mill in Montague.

The Shasta *Courier* says that the outlook for placer mining in the vicinity of Shasta for the season is poor. A wet season, however, would help the industry considerably.

Searchlight: It is thought that J. Sallee has made a deal whereby his Copper City holdings will pass into the hands of a syndicate. ——The White Oak mine has shut down pending the installation of a heavy steam plant. ——The Milkmaid mine at French Gulch is not to be worked. Senator Jones and his coowners would not give a lease that would permit of their working through the old tunnels. ——The Minetta B mine expects a profitable run the coming season. They have been engaged during the last two months in working off the top dirt and will commence on the gravel at once. They are using 2500 inches of water; the same amount is going to waste. J. T. White is Supt.

Siskiyou.

News: There is a good supply of snow on the summits.——At the gravel claim of Wilson Bros. & Kennedy on Eddy's gulch, Salmon country, good gravel is being sluiced. ——The Casey claim near Sawyer's bar is being worked by Hamilton & Marchand, with the prospect of a successful season.——A rich bunch of ore was taken out in a day and night this week at the Jillson & Roberts mine that yielded $3500.——The Oro Fino hydraulic mine has temporarily closed down on account of the cold weather.—— McCarty and Hadley recently found good pockets in their claims near Scott Bar, taking out $750 and $350, respectively.——The Summerville Co. is getting ready to pipe their recently purchased ground in the Cecilville section, and Colburn Bros. are getting ready to ground sluice the bar between the banks of Cecil creek near Cecilville.——The mill at the Cherry Hill mine on Cherry creek will be started up as soon as a short piece of road between the mine and mill is put in order.——Piping is going on day and night at the George Ziteman mine in the Cecilville country. This property is being operated by Morris & Johnson, who have it leased.——The Campbell placer property at Quartz Valley is now ready for a run with plenty of water.——Sinking is going on steadily at the Quartz Valley property recently bonded by Mr. Thornton of David Jones. A new boiler, engine and hoisting plant have been put in and a new mill is spoken of.—— The claim recently discovered by R. Luddy on the Salmon is being developed. A 10-stamp mill will be put in the spring.——Fifteen men are employed at the Bunker Hill hydraulic mine below Happy Camp. They are making extensive preparations for a big run. S. Gardiner of Oro Fino is Supt.——J. W. Martin has bought a half interest in the Fort Goff placer mine for $2500.——The Siskiyou hydraulic mine below Happy Camp had a 312-foot break in its flume some time since, caused by a slide. The repairs are completed and piping is now going on day and night, with fifteen men employed. The company owns 1200 acres of ground. They worked off eight acres last year, the last cleanup averaging $500 a day for a twenty-day run.——The extreme cold weather of the past few days has frozen up ditches, sluices and small streams, stopping mining except in the tunnels and drifts. The cold weather, however, will be beneficial in freezing the soft snow on the mountain tops, and also the streams, lakes and ponds from mountain springs, to melt during the spring and summer months, in furnishing a supply of water until late in the season.——A good-sized pay shoot is opened at the White Swan mine on the Salmon.——At the McArdle & Elliott mines, placer properties near Cottage Grove, work has been going on about a year, getting ready, and a large amount of money has been expended. Great results are anticipated.——At the Cherry Hill, Cherry creek, the pay shoot was recently crosscut at a depth of 452 feet below the surface, showing a width of from 4 to 5 feet. The management estimates the quantity of ore in sight between these points at from 10,000 to 14,000 tons. It is proposed to run on the ledge from the opposite side of the hill, 250 feet below the crosscut tunnel, giving a total depth of 702 feet.

Yreka *Journal*: Copper is reported discovered near Gazelle. Copper strikes have also been made at Preston peak.——The hydraulic, quartz and placer miners are getting ready to start up work again, since the change from severe cold to warm weather, which causes the snow to melt and supply water, so greatly needed for any kind of mining.——At Cottage Grove on the lower Klamath the Chicago Co. is fitting up an extensive hydraulic mine.——A. Wilder at Orleans bar occasionally finds nuggets of platinum.——A dredge is to be built and placed in Klamath river at Orleans bar. As the river is too heavy a stream for wingdamming in a portion of Siskiyou county, and all of Humboldt and

Del Norte counties where it touches, the best method of reaching the channel bedrock gravel is by dredging and raising it to sluices for washing.——A fine stringer of quartz has been found in the tunnel now being driven into the Golden Star mine on the north fork of the Humbug, formerly the old Spencer mine.

Tuolumne.

The San Guiseppe mine, Sonora, is soon to start up.

The Black Oak M. Co. is to supply Soulbyville with electric lights.

C. J. Berry, G. T. Turner and associates, California miners recently from the Klondike with considerable money, have bonded the Standard mine near Sonora and let a contract to run a tunnel 100 feet.

The first payment of $1000 has been made on the Leap Year gravel mine on Table mountain, recently bonded by Hawley, Cook, et al., and work on the property will soon begin.

A six-drill Rand air compressor is being put in at the Dreisam mine, Arrastraville; 1200 feet of 12-inch steel riveted pipe was recently placed. Water wheels are being set and the company's entire plant will hereafter be operated by water power.

At the Rising Sun mine, Arrastraville, the work of pumping out the old shaft had to be suspended on account of the extreme cold weather.

Work on the addition to the Jumper mill is being rushed. It is expected that by April 1st sixty stamps will be in operation.

The Golden Rule mill will start up shortly on New Era ore. Prospecting is being done at the north end of the New Era claim, adjoining the Golden Rule. The company now employs 200 men and pays on the 15th day of each month.

The gravel claims along Woods creek, above Yankee Hill, will all start up soon.

J. Schoenfeld, owner Mountain Lily near Columbia will put a 5-stamp mill on his property.

The Tuolumne County Electric Light & Power Co. has bought the Jamestown Electric Light Co.'s line and proposes to furnish light to Jamestown, Quartz and Stent, the power coming from the plant on the Stanislaus river and Phœnix lake.

S. Sprout, the new Gen. Mgr. of the App Consolidated Co., telis the Jamestown *Magnet* that Messrs. Hale and Jacobs, top and underground foremen respectively at the Rawhide, will perform the same duties at the App mine. The chlorination works at the Rawhide are in operation. F. Voorheis, the new foreman at the works, from Amador county, has taken H. Tuttle's place. He comes highly recommended. H. T. Sabin, assayer and metallurgist, is now in charge of the Rawhide assay office.

At the Santa Ysabel mine the ore body in the central ore chute has been cut a distance of 105 feet. The vein is about 8 feet in width.

The 50 H. P. dynamo at the Brown's Flat electric light plant is transferred to the Black Oak mine, where it has been installed in place of the former smaller dynamo. The new dynamo is capable of running 500 lights, and will furnish light for Soulsbyville also.

The San Giuseppe mine, at Sonora, is to be reopened Monday. It is bonded to Maynard, Lamb & Drake. The Sonora *Democrat* recalls the fact that the San Giuseppe has yielded the purest gold in its natural state ever discovered in the world. All the gold taken from the claim had an average fineness of 985, while the best reached 988⅓, worth $20.4341 per ounce, a shade better than the Mt. Morgan of Australia, and within less than 24 cents per ounce of being chemically pure. The old workings of the San Giuseppe consist of an incline shaft 225 feet deep, driven down on the vein at a pitch of 85°. At 70 feet the first level was established, the vein being drifted on 130 feet west and 20 feet east; level No. 2 is at 130 feet, drifting being done 120 feet west and 40 feet east; the third, or bottom level, is 220 feet from the surface, from which point a single drift runs east 50 feet. The vein carries an average width of 1 foot, all solid, and well sulphuretted. The mine paid well when operated by F. Sutton of Sonora. The ore was roasted in lump in a cupola furnace and afterward crushed in an arrastra. Though some were considerably lower, many runs were made on $50 ore. The property was in litigation for five years, and the last real work done on it was in '93.

Trinity.

The LaGrange Co. has sustained much damage by the bursting of pipes and it is calculated that it will be late spring before the damage can be repaired. The mine has been shut down. Hydraulic pipe all over the county suffered by the freeze and no attempt can be made to repair the damage until after the cold snap.

The Brown Bear mine at Deadwood was disabled by the bursting of pipes, compelling a discontinuance of work in portions of the mine. On Stuart's Fork the same condition of affairs prevails and a general suspension of work is the result.

Free Press: Cold weather has caused a shutdown of nearly all mining operations in this county, particularly hydraulic and placer. The freeze has not only cut off the water supply, but has inflicted damage in all directions that will require several months, in some instances, to repair. There is not much snow in the county now except on the north hillsides and on the higher mountains, where the thaw has been imperceptible and a considerable depth is still present.

COLORADO.

BOULDER COUNTY.

At Eldora a strike is reported in the cutting of the Memphis vein in the Mogul tunnel, the vein being 8 feet wide and of tellurium and sulphide of iron showing free gold. It was cut at a depth of 700 feet at a distance of 1000 feet from the mouth of the tunnel.

CHAFFEE COUNTY.

Iron is prominent in Whitehorn ores; the smelters bid 15 cents per unit for each unit of iron in excess of silica. This makes the smelter charge low. On one ore shipment to the Arkansas Valley smelter the charge was only $2.50 per ton. The total charge, including hauling and freight, on the average Whitehorn ore is under $10 per ton.

CLEAR CREEK COUNTY.

A Georgetown dispatch says this winter has been a hard one for the miners about Georgetown, the heavy snows and weather ranging below zero for weeks at a time having interfered with the transporting of ore from the mines to the mills to such an extent that in some cases the ore houses and sorting bins are full to overflowing, compelling the miners to use old drifts and crosscuts for storerooms. At the Seven-thirty mine every foot of space in the ore house is piled high with ore waiting shipment, and unless the weather breaks and allows the clearing of the wagon roads from snow, work will have to be abandoned by many of the leasers for lack of room to store and sort the ore. The Griffith mine is putting out about 200 tons of ore per month, and the leasers are all making good money. Cook & Materen have a streak of solid lead over 18 inches wide and running from one to three ounces gold per ton. Work on the recent strike on Bard Creek has been abandoned on account of the heavy snow, but there is no doubt of the richness of the find and it will be but a few weeks until the mine will be added to the regular shippers.

Idaho Springs *Gazette*: A carload of wolframite ore, 34,300 pounds, was shipped from Lead City, South Dakota, to the Newton mill at this place, this week, for treatment. The ore arrived Monday and is now being run through the stamps. The freight on the shipment amounted to $130.16.

The Great American and Jenny Lind Nos. 1 and 2 are being worked under lease and bond. The lodes cross each other at an angle and three adit levels have been run—two on the Great American and one on the Jenny Lind. The Great American vein runs southeast and northwest, the Jenny Lind runs directly north and south.

EAGLE COUNTY.

Heavy snows and difficulty of transportation caused the Hecla G. M. Co. to temporarily suspend operations at Holy Cross. Supt. Fulton has resigned.

EL PASO COUNTY.

At the International G. M. & M. Co.'s property near Victor the shaft has been sunk 500 feet. In the 200-foot level is 30 inches of $25 to $30 ore.

The electric hoist on the Last Chance, owned by the Mobile G. M. Co., is in operation.

Victor *Record*: There was no call on the Colorado Springs stock exchange yesterday, as the clearing house was again swamped with orders and needed a day to catch up.——The richest lot of ore ever sent out from the Orpha May has been marketed from the Sullivan lease at the 600-foot level. It was a 10-ton lot of high-grade sylvanite.——The Victor Con. on Battle mountain, under lease to McPartland & Co., has produced twenty-five tons of ore estimated to run $120 to the ton.

Post: Cripple Creek district's dividend showing for the first ten days of February is gratifying. In these ten days dividends have been declared as follows, payable in February: Gold King, $10,000; Associated, $11,000; Portland, $60,000; Isabella, $135,000; total, ten days, $216,000.

GILPIN COUNTY.

The heavy snows this winter are a source of much satisfaction to the gulch and placer miners, who realize that they will be able to pursue their avocation this year away into the fall months. Few people realize that considerable gold is taken out in the gulches and creeks of this county every year, with the aid of giants, sluice boxes and rockers. Such rich gulches as Russell, Nevada, Prosser, Lump and Gamble, as well as South Boulder, Beaver and North Clear creeks, will be worked this year and the cleanups of gold from that source ought to be quite large. The big hydraulic plant on South Boulder, operated in past seasons by the Pactolus Hydraulic M. Co, will be worked in bigger shape than ever this year.

Mgr. Lowe of the Topeka mine furnishes the *Register-Call* with the following returns from the shipment made last week: The second grade weighed 27,355 pounds gross, and gave values of 34.67 ounces gold, 12.22 ounces silver, showing a commercial value of $655.12 per ton, the shipment bringing almost $9000. The third class weighed 3500 pounds, its value being 5 59 ounces gold and 8.29 ounces silver, or $101.49 net per ton. Mr. Lowe has in the safe vaults in Denver eight sacks of the rich ore, weighing about 500 pounds, which is of the same grade as the lot which gave values of 2055 ounces gold per ton. This lot of rich ore will be treated at E. E. Burlingame's assay office in Denver.

Twenty-five men are employed on the Pederson mine on Bobtail hill; enough milling ore is shipped to keep fifteen stamps dropping.

The property of the Sleepy Hollow M. Co. in Black Hawk was sold by Sheriff Mitchell on the 11th to A. B. Seaman, of Denver, for $15,180.49.

GUNNISON COUNTY.

At Ohio City the Cortland G. & S. M. Co. has shipped thirty tons of ore which runs $60 in gold and silver and milled fifty tons saving $14.19 to the ton. Six tons were milled into one. The mill run determined that the ore will concentrate and the company intends to erect a concentrating plant.

A tunnel of 160 feet has been driven on the Magnet. At 125 feet the vein was cut and now drifting both ways upon it is in progress. About 60 feet of drift work has already been done. The principal vein shows on the Magnet and Messenger telluride or a hessite ore in character.

The Calumet, being operated by the Bimetallic Leasing Co., is shipping ore stoped from a winze in the upper tunnel. The last car shipped netted over $700.

The Ashland M. Co. is driving the Carter tunnel on Ohio creek above Ohio City. The tunnel will be driven in several hundred feet and will cut the formation at great depth.

Regarding the statement that the Lead King mine has been sold to an English Co. for $100,000 and that $5000 had been paid down, the *Silver Lance* says facts in the case are these: An English Co. has paid Burnett, Smith & Tays, the owners of the Lead King, a sum for an option on the mine until the 1st of September. The examination and report of the mine has not yet been made. The proposed purchase includes a group of claims as well as the Lead King.

On the Bear Mountain tunnel Dempke & Tichauser have big power drills driving ahead. This tunnel is now in over 400 feet, and at about 1000 feet the ore body of the Illinois mine is expected to be entered.

The Burt, on Mineral Point, which created a sensation last fall by opening up into the largest deposit of lead-copper ore ever found in that section, is working a crew of men under a $15,000 bond and lease, to be taken up next May. The mine will then pass into the control of the Indiana M. Co., present owners of the Belle of Titusville. The same company owns a concentrating plant at the base of the mountain and will enlarge it next spring and build a tramway to the Burt, a distance of 1800 feet.

The Lead King owners have given an option on that mine, as well as the entire group, of which it is a member, until the first of September; $5000 cash was paid for this option, representing a $100,000 deal.

LAKE COUNTY.

A Leadville dispatch says 100 men, armed with picks and shovels, started out on the 10th to clear the snow and ice from the Denver, & Rio Grande tracks below that city, that coal may be brought in to enable the smelters and mines to continue work, or at least to keep the pumps in operation. The Leadville Pumping Association, which is unwatering the down-town mines that have been flooded since the big strike, had then only enough coal to last twenty-four hours. The stoppage of the pumps just on the eve of completing the important work, which has been in progress for the past six months, would be a serious blow to the Leadville mining interests, so the mine and smelter managers decided to aid the railways in opening up their lines and the shovelers sent up by them will receive the same wages as when working in the mines and smelters. Business men also went along as volunteers to shovel snow.

At Leadville last week the Jonny mine manager offered the ore haulers a three months' contract to haul all the ore from that mine if they would step in and help them out, as, owing to the big snow blockade, the railroads could do nothing. The haulers held a meeting and concluded not to accept unless a year's contract was granted them.

Leadville *Chronicle*: In the Louisville and Colorado No. 2 mines on Iron hill, under the management of A. F. Wuensch, the output has been increased to about 1000 tons of silver-lead-bearing sulphides, in addition to the product of iron sulphides. In opening up the mines during the past few months a new shoot of lead ore has been opened that averages $5 per ton in gold, in addition to good silver and lead values.——At the Gambetta on Fryer hill from the bottom of the shaft, which was sunk to the ore plane last fall, at a depth of 233 feet drifts were run in two directions. From one of them a few tons of first-class lead ore is being mined and hoisted to the surface, while the ore streak is being followed up. There is 1 foot solid of it which runs 50% lead and from eight to ten ounces of silver.

PARK COUNTY.

Ore shipments to the Denver smelters have been temporarily suspended at Alma because of the big snow storm. The storage of snow in the mountains is greater than at any time; the lode miner is disgusted; for his brother, the placer man, the coming summer promises to be a golden harvest of rare extent. Yet the lode mining is not in the background, in prospective importance, for it is claimed that much increased work will be in store for these districts when spring opens up, and that present operative mines will increase their working forces.

SAN MIGUEL COUNTY.

The Telluride *Journal* reports that one morning last week in the breast of the Ophir tunnel, 3000 feet underground, two men were running a machine drill. They had put down seven holes and had just started to load, having put three sticks of giant powder into the first hole, which was being tamped, when the powder exploded. The body of one was blown 20 feet. He was killed instantly. His partner was also blown some distance and peppered with the flying rock the whole length of his body on one side. A part of one hand was blown off and it is thought one eye is destroyed. After the explosion he walked 400 feet down the tunnel, where he found a "godevil," a car used for carrying timber and supplies to the tunnel breast. Lying on this he managed to push himself some distance farther to a cross vein, where other men were at work, whose attention he attracted. The theory is advanced that the tamping bar is responsible. A steel tamping bar is used with a wooden plug in the face, to guard against the steel striking fire against the rocks. The sticks of powder are split before being put into the holes, and it is supposed that some of the high explosive, which is about the color and consistency of butter in summer, when used, stuck on the side of the hole when being pushed down, and that in tamping the bar struck a spark of fire, setting off the whole mass.

Telluride *Examiner*: The Cimarron mill is pounding steadily, although the newness is not yet worn off entirely, and hardly the full capacity is reached this week.——The snows of the present week are piling high on the mountains and the wind is doing its share in driving it deep into the gulches and ravines, where it will slowly melt during the summer months and furnish an abundant supply for mining purposes.——According to the reports of mine managers the rustling of ore has reached alarming proportions, and some concerted effort will be made to put a stop to the thefts. Many of the mines which frequently strike streaks and pockets of rich gold ore are heavy losers from the fact that much of it is stolen and carried away by the men who work in the drifts, aided by outside parties, who dispose of the stolen mineral, and there is no doubt that such mines as the Tomboy, Smuggler-Union, Silver Pick, Silver Bell and others lose thousands of dollars annually through the dishonesty of the men employed. These losses are of serious consequence to many mines which ordinarily are working veins of a value that pays but little above operating expenses, and to such an extent has this stealing grown that it is of necessity that some active plan be found to stop it.—— The successful starting and operation of the Liberty Bell mill adds a valuable producer to San Miguel's list for the coming season. The mill has ten stamps dropping and about thirty tons of ore is put through every twenty-four hours. In a few days ten more stamps, already completed, will be started and an additional twenty stamps are being put in. This will give the mill forty stamps and a capacity of at least 100 tons a day.

GEORGIA.

J. E. Black of New York and J. H. McCoy of Denver have decided positively to build a smelter in Atlanta, provided the railroads will agree to institute such freight rates on gold ore as will enable the managers of the properties to ship their output to Atlanta.

IDAHO.

The improvement in the showing on the Lombardy still continues, but ore 12 inches wide is "fat" enough that it would only concentrate about two to one—a grade of ore, which, if it shows well in silver, would almost pay to ship at the present price of lead.

At Warren little interest is taken in the Buffalo Hump country, but the miners are all interested in the river camp, or Mallick district, as it is now called. It is believed by many there that the Morning Star group in the river country will prove to be a bigger proposition than even the Big Buffalo. Warren is the outfitting point for the Mallick country, which is eighteen miles from there.

The Cornucopia, owned by E. Brooks, continues to be the big mine of the camp. At the depth of 250 feet the claim continues to have a 3-foot ledge, the ore carrying free gold.

W. H. Butters & Bros. of Spokane, have bought the Red River Meadows and are having the Bucyrus Co. of South Milwaukee, Wisconsin, build a chain bucket elevator dredge. The first shipment of 70,000 pounds is at Lewiston.

Wallace *Press*: The sand carbonate belt northeast of Murray is receiving attention, the price of lead being at a point where any kind of lead property has some value, while anything like the ores of this district means a decent fortune.

Tribune: James Healey, one of Capt. DeLamar's staff of bonanza chasers, verifies the report that the initial payment of $25,000 has been made on the deal involving the transfer of the Big Buffalo group, at Buffalo Hump, and expresses the opinion that Clark & Sweeny will experience no trouble in discharging the remainder of the payments that in the aggregate amount to $575,000. This is the group for which H. A. Cohen, former Mgr. for Capt. DeLamar, made an offer of $500,000 after Mr. Healey had completed his examination. The owners, however, held out for $575,000, and this the gentleman declined to respond to. The purchasing party is now in possession and will begin the erection of a mill early in the spring.

Mullan *Mirror*: A new compressor plant is to be put in at the Old Abe at Wardner.—— The value of the ore output of the Cœur d'Alenes is estimated at $45,000 per day.—— The Hecla, at Burke, in crosscutting, struck another vein of copper and galena 4 feet wide. ——In Wallace has been formed the Leslie M. Co.; their property consists of nine gold and copper claims just over the line on the Montana side; Gen. Mgr., Wesley Everett.—— One-half the gold from Potosi gulch is pure quartz gold, which became separated from the quartz by decomposition and oxidization very close to its source.

KANSAS.

A Galena dispatch of the 15th says: "All records were broken to-day when zinc ore sold at $47 to $50 a ton in Galena, Joplin and Webb City. The Scott M. & S. Co. was to-day offered $50 a ton for its entire output for the next ninety days. The offer was not accepted. Six months ago prices ruled from $20 to $24."

MONTANA.

At Basin, C. H. Dickie of Baltimore has an option on the Hope mine; price, $500,000. He has forty-five days in which to make the first payment of $100,000, providing everything proves satisfactory to him at the end of that time; further payments: $250,000 at the end of sixty days, $150,000 in ninety days. The 600-foot level has been reached in the shaft; a 15-foot sump will be sunk, after which a station will be cut and a crosscut driven to the lead. Ore was found to exist on the 500-foot level, and the company expects to find its continuation on the 600.

The Cable gold mines, west of Anaconda, may soon be started up again after an idleness of ten years. The principal owner is J. C. Savery. The Georgetown-Cable mining district has considerable low-grade and base ore.

At Virginia City, C. A. Damours leased the Kearsarge, at the head of Alder gulch. In '66 this mine produced nearly $500,000. Mr

Damours will unwater it and further develop the property.

The Chicago M. & D. Co. have moved their dredge—the Maggie A. Gibson—from Bannack to the mouth of Alder gulch. The Conrey Placer M. Co. will substitute for the steam shovels one of the dredges used at Bannack with such success.

In Park county, the Bear Gulch M. Co. has been employing fifty men all winter, operating its 20-stamp mill and will increase the number of stamps to sixty before the spring opens. It ships its concentrates to the East Helena smelter.

At Pony, Elling & Morris, owners of the Clipper, the coming spring will build a 40-stamp concentrating mill, to be erected near the mine and furnished with power from an electric plant on Willow creek completed last fall, and which has furnished power for the drill plant and lights the little camp, which is growing day by day with the development of the mines surrounding it. The new mill will treat the low-grade ores, the highest grade being shipped to East Helena. The old mill, which has done duty many years, will do custom work in the future.

The Garnet owners, who have a large low-grade property, have men blocking out ore for treatment next season. Their mill is run by water power and they are unable to treat their ores during the winter season. During the warm months they treat about sixty tons daily. The mill was built about two years ago and is owned by St. Louis men. One of the heaviest stockholders in the concern was a man who knows nothing about mining, but had made a fortune out of an invention of its own—a brick and bone crushing machine. He insisted that his bone crusher, which operated on the principle of a thrashing machine, with a series of small hammers on a revolving cylinder in place of teeth, would crush the Garnet ore, and as he had much money in the venture and was one of the directors, the manager was forced to give him a trial, well knowing what the result would be. The mill was built with the idea of replacing the bone crusher with stamps if a trial demonstrated its impracticability. When the mill was completed the directors came out from St. Louis to see the start. The ore was fed in and the bone crusher lasted about fifteen minutes. Later a set of stamps were installed with satisfactory results.

At Neihart, in the Galt mine, men are working on a body of manganese ore 7 to 12 feet in width. Sixty feet farther up the raise is a streak of ore which assays 300 ounces silver per ton, besides considerable lead.

The Anaconda Co., at Belt, is washing nut coal by the hydraulic process: about 1400 tons per day.

The semi-annual statement of the New Elkborn M. Co., Ltd., shows that £87,500 of the £300,000 capital stock has been paid in money, the balance being issued in purchase of the company's properties. The estimated value of the property in Montana is £15,583; that in Colorado, £268,699; cash in bank, £7642; ore in transit, £5617; total assets, £297,541. The liabilities are aggregated at £4255.

NEVADA.

The Boston & De Lamar group of mines recently incorporated and placed on the market in Salt Lake City consists of four claims adjoining the April Fool, Lincoln county, fifty-two acres in Ferguson mining district.

The Slip M. Co., at Olinghouse canyon, Washoe county, has finished crushing 100 tons high-grade ore.

Near Winnemucca T. J. Howard at the Pueblo mining district has eight claims carrying gold and copper.

The Pueblo M. Co. have ten men getting out about ten tons a day of $300 rock.

The Utah & Pacific Railroad from Milford, Utah, westward is being built.

S. P. McKnight in Esmeralda county is experimenting with Candelaria tailings.

The installation of the pressure column for operating the Risdon hydraulic plant at the Comstock is about completed; draining the flooded levels will shortly begin.

At Osceola, White Pine county, the Exchange, Crescent and Golden Eagle are sold to Salt Lake men who will take the 20-stamp mill down and set it up again ready to run in forty days. W. F. Patrick is to be Supt.

A deposit of antimony is reported discovered nine miles from Wellington. Mr. Packard of Gardnerville is one of the owners

The Wells *Herald*, speaking of the completed Golconda railroad to the mines of the Glasgow Co., says: It is predicted that during the present year the same company will construct a railroad from Wells to Cherry Creek. The managers say that the company has an immense body of ore in their mines at Cherry, so large that all the teams in Elko county will not be able to keep the chutes empty during the present year.

The *Times-Review* advises miners to keep away from Tuscarora. There are many idle men there now.

Virginia *Chronicle*: The Harris, Blood & Co.'s tailings plant in Six-Mile canyon has been sold by the sheriff and bid in for $6005 by the Bank of California for the Tahoe Lumber & Flume Co. The property sold included the entire equipment of the so-called electro per-oxygen process with the exception of the assay department. The sale of this part was posponded until Feb. 23rd, Messrs. Harris and Blood having notified Sheriff Quirk that the assay office and its equipment was not included in the tailings plant but was individual property. The assay office is considered the most valuable part of the plant and it is the intention of the mortgagees and lien holders to have the question settled in court as to whether the claim that it is not included in Harris-Blood plant is well founded.

NEW MEXICO.

At Cerillos is locally reported newly discovered silver leads of unusually high assays and fine smelting properties. This, if so, would aid in starting the proposed new smelter there and cut off the shipments to El Paso.

Silver City reports nearly 200 leasers at work on the Santa Rita copper properties. In the Montoya mine an extensive vein bearing copper was found, from which a shipment sent to the Silver Reduction plant yielded 80% of values. Thirty men are employed on the Cortez copper mine at Santa Rita. A body of rich copper ore has been found in the old Spanish workings of the Carrasco mine.

A. L. Shaw of California has bonded the St. Helena mine at Central for ninety days: consideration, $25,000.

The Old Abe Co. in Lincoln county has begun excavating for the 45,000-pound hoist. The cyanide plant is nearly completed.

OREGON.

The North Pole at Bourne, owned by Baring Bros., London, is one of the biggest producers in the Sumpter district, although the amount of their output is never made public. A 6-foot vein of $200 to $300 ore is reported to have been struck recently, which is being shipped direct to the smelter. Their ledge is from 20 to 60 feet wide.

The Columbia saves about 25% on the plates, shipping the remainder in the form of concentrates. They are piling up ore awaiting the result of the new bromine-chlorine process at the Golconda before putting up a larger plant.

The Red Boy mine, thirty miles west of Baker City, last month had a $50,000 output.

The new $100,000 mill at the Golconda mine, near Baker City, is building. The owners expect great success with the new bromine-chlorine process. They are J. G. and J. T. English of Dansville, Illinois. The mill building covers 170 by 300 feet. The complete equipment will be in operating shape April 1.

At Portland is being framed a gold mining dredge to cost $40,000, for the Pomeroy Dredging Co. of Portland. The dredge when framed will be shipped knocked down to Weatherby station on the O. R. & N., and when put together will be launched on Burnt river, which will be dammed at that point to make a pond big enough to float the dredge, which is 100 feet long and 34 feet wide. Steel buckets run on rollers to scrape up the gravel from the bottom and dump it into sluice boxes on board. It is expected to be ready to run by May 1.

SOUTH DAKOTA.

The Homestake Co. is now dropping 540 stamps, this number to be increased with better water supply. Surveyors have run new water lines from Cold springs and Spearfish creek. The latter will probably be brought into the Homestake plant at an estimated cost of $1,000,000. This will necessitate about twenty-one miles of ditching. The company is now operating 400 stamps of their own and is running the Highland mill of 140 stamps under lease. The Highland Co. in turn is operating the Deadwood & Terry mine and a 160-stamp mill.

The General Ellison will be sunk to 1100 feet.

UTAH.

The Blue Mountain country, on the Colorado-Utah border line, is attracting attention. The locations of the mines are twenty-two miles east and a little south from Vernal and extend east to the Colorado line. About fifty locations have been made. The vein is reported as being a contact vein, with a good showing on top of the ground. The assays run from $3 to $2200 per ton, the average, however, being about $50 per ton.

The Golden Wonder lode, with about twenty-five locations, lies about 600 feet south and parallel with the lode which is causing the present stir, and is 40 feet between walls. This property has been located for about a year. Development work has been done by an association of business men from Vernal, having one shaft on the vein a depth of 35 feet, with assays running from $5 to $48 per ton, being a cyaniding proposition, so pronounced by all who have examined the ore. There is plenty of timber, wood and water, and everything on and near the ground that goes to make up a good mining camp, some of the locations being as near as five or six miles from Green river.

The *Herald* reports the reorganization of the Daly-West M. Co. as an accomplished fact. The Haggin, Chambers and Tebbs interests are deeded to the company for $1,500,000, articles of incorporation of the Daly-West Co. to be filed this week. The mine, which has been idle for years, owing principally to disputes between the owners, will be reopened about March 1 and will from the start furnish employment to 100 or 200 men. The Daly-West has plenty of high-grade ore and from the day it is opened will be a producer.

Tribune: The Horn Silver of Frisco, with its record of dividends amounting to $5,210,000, is to be added to Utah's list of copper propositions, and in a few days will begin the marketing, in lots distinct and separate from that in which lead and silver predominate, ores carrying as much as 25% copper per ton.

WASHINGTON.

D. Sutherland of Silverton was recently granted a patent by the Government to a 20-acre placer claim, embracing the town of Silverton.

A strike in Republic camp is reported in the Dora. Supt. Blackburn says: "We have cut through 3 feet of this ore already, and have not as yet struck the foot wall. From this 3 feet of ore we have taken samples for an average assay, the result being $143.66 in gold and $1.90 in silver."

WYOMING.

The Colorado Fuel & Iron Co. of Pueblo has leased seventy-five claims in the Hartville district of Laramie county.

FOREIGN.

BRITISH COLUMBIA.

The new War Eagle hoist is the largest in the Pacific Northwest, and one of the largest in the world. It is 175 feet high and has a capacity of lifting 1000 tons of ore a day. With this hoist it will be possible to work the mine to a depth of 6000 feet. It is the intention to continue the deep workings of the War Eagle.

The final payment upon the Le Roi stock was made by the British American Corporation January 31st in New York. This final payment is $3 12½ per share. The following are the amounts which will be received by the shareholders, all of whom are residents of Spokane, Wash.:

	Shares	Amount
W. W. D. Turner	40,000	$125,000
W. J. Harris	38,400	120,000
W. M. Redpath	36,960	115,500
George Turner	32,000	100,000
Mrs. W. W. D. Turner	15,000	46,875
E. D. Saunders	15,000	46,875
Frank Graves	14,000	43,750

Although this is the final payment of the purchase price of the mine, it is not the last money that the shareholders will receive from the British American Corporation. In addition to the purchase price of $7.25 a share, the Turner interests are to receive the proceeds of the matte and ore in the smelter at the time the deal was closed. This will amount to $1 per share additional, making the stock net the sellers about $8.25 a share.

The St. Eugene mine near Moyie City, B. C., has been bonded by Matheson & Co. of London, England, for $400,000. The preliminary papers for the deal have been signed by the owners of the mine and the Vancouver representatives of the London company. The final papers will be signed and a payment of $40,000 made as soon as word can be received from England.

C. H. Parson of Golden has secured a lease from the Provincial Government for dredging Bull river and White Horse creek for placer gold.

The Stemwinder tunnel is in ore which is a conundrum: lead, silver, copper and gold lying in close proximity. They are also in the North Star and Sullivan groups.

MEXICO.

Nine miles from Nacosari, Sonora, the Gregg-Normire copper property, consisting of ninety-four pertinances, is reported sold to J. A. Cruse, representing the Sonora Improvement & Investment Co.; price, $45,000 in gold coin.

THE KLONDIKE.

Klondike miners are to have relief from the methods which have prevailed at Gold Commissioner Fawcett's office in the recording of claims. The records of the office were thrown open to the public on January 1st. There will be no further entrance of favored applicants for claims through the back door of the office. The new commissioner, Mr. Senkler, has changed all that. Immediately that he took Gold Commissioner Fawcett's place he announced that the books of the office would be free to all who wanted to see them. The people of Dawson expect now that there will be a much more honest and competent administration of public affairs, for the claim of every miner will be protected and every new district will be open to persons who choose to investigate. The only complaint against the Canadian Government now is the 10% royalty.

Treasurer Botsford's report of the Joseph Ladue G. M. & D. Co. of Yukon to Jan. 1, '99, shows earnings at Dawson, etc., $186,284; earnings on transportation, $54,224; total, $240,508; accounts and bills payable, $22,565; taxes, insurance and general expenses, $56,514; total expenses, $79,079, leaving net profit to date $161,409. This, however, was on sawmill, transportation, sales, etc.

The miners are leaving Atlin for Dawson, consequent upon the passage of the alien exclusion measure. The trail is in good condition. The ice on Taku Arm is 24 inches thick. Further discoveries have been made on Caribou creek, south from McKee creek.

Consul McCook writes to the Department of State from Dawson City that platinum has been recently discovered in black sand in some of the creeks there. A furnace test is said to have resulted in showing that in one ton of the non-metallic black sand there was $102 in gold and 96 ounces of platinum, some iridium and a trace of tin.

Personal.

ARTHUR WINSLOW, Gen. Mgr. of the United States & British Columbia M. Co., is in Telluride, Colo.

L. E. AUBURY has returned to Los Angeles from northern Arizona.

SAM'L NEWHOUSE has returned to Salt Lake, Utah, from New York.

J. J. CRAWFORD has returned to San Francisco from El Dorado Co., Cal.

ANDREW JOHNSON is the new Supt. of the Conger mine, Bingham, Utah.

GEO. W. DUNBAR supersedes E. C. Billings as Supt. of the Edison, N. M., G. M. Co.

T. E. SCHWARTZ succeeds S. S. Robinson as Mgr. Iron Silver M. Co., Leadville, Colo.

GRANT MOORE succeeds J. F. Fitzgerald as Supt. the Confidence mine, Quartz, Colo.

A. H. GUNNELL has been appointed assayer at the Baisley-Elkhorn mine, Baker City, Or.

D. L. BLISS JR. is to be Supt. of the railroad to be built between Truckee and Tahoe, Cal.

H. A. SHIPMAN has resumed his old time position as Mgr. Cornucopia mine, Cornucopia, Or.

W. G. STAGMAN has resigned the superintendency of the Alameda mine, Tuolumne Co., Cal.

E. A. STENT of Mokelumne Co. goes this week to Sonora, Mexico, to examine a mining property.

J. STANLEY MUIR of Denver has gone to Port Limon, Costa Rica, to inspect some mining properties there.

W. H. RADFORD of San Francisco, with surveyors and chainman, has gone to the Colorado river with A. J. Otis of the Santa Ana M. Co., on an extensive prospecting expedition.

G. L. WHITTAKER, Supt. Baisley-Elkhorn mine, Baker City, Or., has returned from Norwich, Connecticut.

J. S. CRAMPTON left Prescott on the 9th for Terra Patea, Peru, where he will be millman for the Inca M. Co.

C. LAUBSCHER, director general Santa Rosalia M. Co., Lower California, is making his annual visit of inspection to that property.

W. R. SPALDING, for seven years Gen. Mgr. Truckee, Cal., Lumber Co., has resigned and will go into business in San Francisco.

ARTHUR TUTTLE has resigned the superintendency of the German Bar and Conrey placer mining companies at Virginia City, Mont.

GEO. TALFORD of the Risdon Iron Works is at Lowden's, Trinity Co., Cal., to inspect the dredge and the new driving wheel made by the company.

WM. WATSON, late Supt. Golden Reward mill at Deadwood, S. D., has been engaged for like position at the Economic G. E. Co.'s mill, Victor, Cal.

HUGH MCDONNELL is in London, where, it is reported, he has just sold a large Mexican mining property. He expects to return to California next May.

DR. W. D. EASTLAKE, en route from New York to Japan, says an American syndicate has been formed to expend millions in providing modern electric street railroads for Japan's large cities.

S. R. H. ROBINSON at Phœnix, Arizona, has sued the Minnesota & Arizona Construction Co. to recover $20,500 salary for services as Gen. Mgr. and Supt. of construction between April 1st, '95, and Sept 5th, '98.

THOS. J. BARBOUR of the Risdon Iron Works of San Francisco went to the Comstock, Virginia City, Nevada, yesterday to be present when the unwatering apparatus begins operations in the C. & C. shaft.

MAJOR W. H. HEUER and the other members of the U. S. Debris Commission have returned from an official visit to Nevada and Yolo counties, Cal., to determine the extent and character of the proposed Government work.

J. D. BENEDICT of Santa Fe, Supt. forest reserves in New Mexico and Arizona, and F. S. Breen, supervisor of the San Francisco reserve in the northern part of the latter Territory, are gathering material for a report to the Interior Department.

"JIM" WARDNER is in Seattle, Wash., from Washington, D. C., where he has been lobbying in the interests of a railroad franchise for a short line from the mouth of the Fish river to the Omilak mines. He says "the first boat to St. Michael in the spring will take a party of surveyors and mining experts, representing Eastern capitalists, who are to build the road." (This mine is the farthest north of any metal mine in the world and is owned by T. C. Green of San Francisco.

CHARLES L. DORSON, a civil engineer who has just returned from Colon, says the French are concentrating their energies on the Culebra cut, the most serious obstacle along the whole route of the Panama canal. The company has from 1700 to 2000 laborers at work with about fifty locomotives, each of which hauls a train of from twelve to fifteen cars. Up to the present about $137,000,000 in American gold has been spent, and he believes the canal could be finished for about $126,000,000. The concession given by Colombia expired last October.

J. SLOAT FASSETT, prominent in N. Y. State politics, is in San Francisco arranging for men and machinery to work his extensive mining properties in Corea, where he has Government concessions aggregating in area nearly 100 square miles. Another American, L. S. J. Hunt, has large Government concessions there. Messrs. Schulz and Gunker, who have been at work for the latter, have returned from the hermit nation, where they had been employed by Mr. Hunt in building a stamp mill. They say he has good mining property. Prospects and assays show considerable ore going $40 to the ton. They say the best native miners, who can do as much work as an American can, cost only 10 cents per day. They think American laborers should not think of going to Corea. They could not compete with the natives. But there is a good chance for American mechanics.

F. M. SMITH, "the borax king" has returned to California. He says the fact of the consolidation of the borax interests has been accomplished substantially as stated by the dispatches published at the time. The Alameda refinery will run as before. It will not affect the California output. The Alameda refinery may be enlarged should the demand for borax require it and the demand is constantly increasing. The borax combine comprises nearly all the borax producing concerns of the world. Two are located in London, the Borax Co., Ltd., operating deposits in Asia Minor, and the Pacific Borax & Redwoods Chemical Co., Ltd., operating California deposits. There are also the Lyons (France), Co., the Empresa de Ascotan, the Carcote, the Chilicolpa, the Cosapella and the Pintades in Chile; the Ubinas and the Arequipa, Peru; the San Bernardino Co. in southern California, and the firm of Mear & Green, Staffordshire, England. The new company is to have a capital of $7,000,000 in ordinary shares, $4,000,000 in preference shares and $4,000,000 in debentures.

Obituary.

PETER NEU of the firm of Heldmaier & Neu, the San Pedro, Cal., breakwater contractors, was accidentally killed last Saturday by being thrown from the top of a coach.

Industrial Notes.

—Saloons at Dawson pay a license of $50 per week.

—The Crescent Oil Co. is boring for oil south of Oil City, near Selma, Fresno Co., Cal.

—J. H. Boyd of San Bernardino, Cal., will build an electric road from that city to Redlands.

—Traffic is so heavy on the Central Pacific that three extra dispatchers have been put on at Carlin, Nev.

—The Southern Pacific Co. pays taxes on its lines in California at the assessed value of $17,408.53 per mile.

—Last Tuesday Grass Valley, Cal., sold $40,000 7% sewerage bonds at a premium of $6560 to a Cleveland, O., firm.

—The Government, in remitting $20,000,000 indemnity to Spain for the Philippine islands, will ship the gold direct from the treasury.

—The White Pass Railway Co. has abandoned the Fantail trail from Log Cabin to Atlin City, Alaska, and will use the Too-Chi trail instead.

—The four generators at the Electric Power Works on the South Yuba are connected and can now be operated by either the Yuba river or Rock creek water systems.

—At Globe, Ariz., on the 16th, with appropriate ceremony, was driven the golden spike on the new line of railway from Bowie to Globe—the Globe, Gila Valley & Northern railway.

—The Yuba, Cal., Electric Power Co. has consolidated with others; principal place of business, San Francisco; the term is fifty years; capital stock, $1,000,000, of which $50,000 is subscribed.

—In Denver, Colo., a mortgage for $20,000,000, given to the Central Trust Co. of New York City by the Colorado & Southern Railway Co., was filed this week. The revenue stamps used aggregated $35,250.

—The gross earnings of the Union Pacific for six months ending Dec. 31st were $10,604,089, showing an increase of $591,084; operating expenses, $5,696,333, a decrease of $579,372; net earnings, $4,907,755, an increase of $1,118,457.

—On the 3rd inst. the last rail was laid in the northeastern extension of the Pecos Valley railroad, giving it direct connection with Amarillo Junction of the Colorado & Southern, Denver & Fort Worth, the Pecos Valley and the Santa Fe.

—The Oakland, Cal., Gaslight & Heat Co. is putting in force a new rate on incandescent electric lighting. A schedule has been arranged with a view to making illumination by electricity the equivalent to gas at the rate of $1 per 1000 feet.

—Engineers are surveying a line for a railroad from Green River crossing, Utah, to the gilsonite fields in northeastern Utah, to be built by the Rio Grande Western. These deposits are very large and there is growing demand for the product.

—S. D. Prather of Montague has filed a claim on 4000 inches of water from Shasta river, near Yreka, Cal. A dam 10 feet high is proposed, the water to be conducted in a canal three-eighths of a mile and then pumped to an elevation of 275 feet through 20-inch pipe.

—H. E. Huntington is on his way from New York to San Francisco with instructions from C. P. Huntington to expedite the work of filling in the gap on the coast division between Surf and Elwood, Cal., a distance of fifty miles. The estimated cost of this new piece of road is about $2,000,000.

—The financial statement of the Southern Pacific Co. just issued shows its earnings for December, '98, when the gross receipts were $5,236,805. The net receipts amounted to $1,840,897. For the last six months of '98 the gross earnings amounted to $38,735,881; total net receipts, $11,874,773.

—A British Columbia paper says: "Eighteen hundred Chinese laborers will shortly pass over the C. P. R. R. en route to Mexico. The men engage to work on railway construction for three years, for which they are to be paid $30 per month, with a deduction of $5 per month until their passage money has been paid."

—Two syndicates control all salmon traps in American waters. The Columbia River Packers' Association, representing 75% of the pack on the lower Columbia river, has been organized with a capital of $2,000,000, and a company with similar capital has secured control of every fish trap of known capabilities from Anacortes, Wash., to the Canadian boundary.

—It is currently stated that the American Steel & Wire Co. has contracted to fence a large part of Australia and South Africa with barbed wire. It has a single contract for 1000 miles of barbed wire from Australia, and is now negotiating a contract for wire for railroads in South Africa, which, when completed, will be the largest single order for wire ever known.

—From Chicago Pres. Lambert of the American Steel & Iron Works Co. announces an advance in the wages of the employes of his company, effective March 1st: Advance to all employes earning up to $1.50 a day, 10%; $1.55 to $2 a day, 7½, and $2.05 to $2.50 a day, 5%. Altogether about 36,000 employes of the company will be benefited by the raise. The advance in wages, Pres. Lambert says, will mean an annual amount between $700,000 and $1,000,000.

—For the month of December, '98, the gross earnings of the Oregon Short Line amounted to $655,509.37, an increase of $124,427.49 over December, '97. For the six months ending Dec. 31st, '98, the gross earnings were $3,972,248.27, an increase of $708,689 54 over the same period in '97. The gross for December is the highest for five years. The comparison is as follows: '94, $392,823.43; '95, $471,077.29; '96, $473,581.09; '97, $531,081.88; '98, $655,509.37, the last being almost double that of '94.

—In the California Legislature this week the Ways and Means Committee considered the bill appropriating $500,000 for the exposition to be held in San Francisco in '91, and decided, in executive session, to recommend the passage of the bill, with an amendment making it payable out of the funds of two different fiscal years. The manner of its division was left to a sub-committee, who will wait upon the State Controller and find out how much of the appropriation could be judiciously appropriated at the present time.

—E. D. Boyle will introduce in the Nevada Legislature a bill granting permission to a corporation to tap Lake Tahoe to secure power to furnish Carson, Reno, Virginia City and Gold Hill with electric power and light. The idea is to run a four-mile tunnel on the eastern slope of the Sierras, tapping the lake 6 feet below its present level, the mouth of the tunnel to be about 1700 feet above the proposed power plant. The projector figures that enough water would flow from the face of the tunnel to furnish power for the running of air compressors, machine drills and electric motors for hauling cars through the tunnel.

—A curious industry is the conversion of whalebone from its original form into the various products, useful and artistic. Most of the crude whalebone is landed at San Francisco and shipped eastward to be distributed at the various centers. Before leaving the Pacific coast the bone is split, sorted according to color and tied into bundles. After splitting the pieces are called stalks or slabs. These are from 3 to 12 feet in length and weigh from five to twenty-five pounds each. When received by the manufacturer each slab is fringed with strong, glossy black hair, which possesses a market value of its own for brushes. After this is removed the slabs are treated to a steam bath and then are ready to be split into shell or grain bone, and finally cut into stays, whipstocks, aigrettes, etc.

—"What the drought of the last few years has cost New South Wales has been estimated, and the estimate makes up a bit of very doleful arithmetic," says the *Gazette*. "The flocks of the colony have shrunk from 66,000,000 to 46,000,000, representing a loss of 20,000,000 sheep. If to this is added the loss of natural increase, the shrinkage amounts to 50,000,000 sheep; enough, that is, to equip a considerable sized colony. In addition, there has been a loss of nearly 300,000 horses and 150,000 cattle. That the colony has been able to survive these terrific losses is a striking proof of energy and resource. Translated into money, the colony has suffered a loss, due to mere inadequate rainfall, of from £12,000,000 to £20,000,000. For so much, when expressed in pounds, shillings and pence, do a few inches more or less of rainfall count! We are probably entering on a cycle of years, a contemporary thinks, when the kindly skies will pour on the far-stretching plains their benediction of rain, and these vast losses will be quickly made up."

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING FEBRUARY 7, 1899.

619,111.—CAN OPENER—W. N. Anderson, San Rafael, Cal.
618,832.—FRUIT EVAPORATOR—A. Berger, Cheney, Wash.
619,136.—PROPELLER—W. J. Carver, Tacoma, Wash.
619,140.—SEAL LOCK—A. W. Collin, S. F.
619,147.—ROCK DRILL—W. A. Doble, S. F.
619,148.—WATER WHEEL—W. A. Doble, S. F.
619,149.—WATER WHEEL—W. A. Doble, S. F.
619,046.—GAS APPARATUS—L. E. Lee, S. F.
618,893.—SCOOP AND SCALE—J. W. Miller, Los Angeles, Cal.
618,949.—SIGN—W. E. Page, Los Angeles, Cal.
619,052.—ADVERTISING DEVICE—C. S. Stafford, S. F.
619,106.—CAN HEADING MACHINE—M. A. Wheaton, S. F.
619,005.—CURRENT WHEEL—J. P. Whidden, Loomis, Wash.
619,243.—TRUNK STRAP—H. D. Wiard, North Temescal, Cal.
619,061.—FRUIT PICKERS' BAG—J. Wilson, Duarte, Cal.
618,970.—BOXING GLOVE—W. G. Wood, S. F.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Recent Mining Incorporations.

Buena Ventura G. M. Co., granted a charter by the State of Michigan; capital stock, $50,000, fully paid. E. C. Humphrey, San Diego, Cal.; A. R. Thayer and A. E. Plumer, Saginaw, Mich.

International Bureau of Mines, incorporated under the laws of West Virginia; capital stock, $50,000; $1000 paid. C. H. Sheares, G. Hipkiss, W. Robinson, B. F. Colby.

Shakespeare M. Co., San Francisco; capital stock, $6000; subscribed, $25; A. P. Ford, F. P. Howard, A. Waterman, G. Edwards, A. E. Brooke.

St. Lawrence M. & M. Co., Hanford; capital stock, $175,000; subscribed, $150,000; D. R. Cameron, P. McRae, J. W. Barbour, I. W. Foster, J. S. Robertson, J. H. Dopkins, R. E. Dixon.

Mooney Con. M. Co., San Francisco; capital stock, $30,000; subscribed, $15,000; P. B. Cornwall, H. A. Parrish, J. A. K. Lennox, A. W. Cornwall.

Dutch Flat Blue Lead M. Co., Dutch Flat, Placer county; capital stock, $100,000—all subscribed; A. J. Bruner, M. J. Curtis, G. K. Rider, W. Lampert, D. W. Carmichael, G. S. Brand.

Mountain Spring M. Co., to operate in Tuolumne county; capital stock $100,000, subscribed $80,000; H. L. Eastman, E. J. Ensign, J. H. Duncan, W. W. De Lano.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ACETYLENE GAS GENERATOR APPARATUS.—Louis E. Lee, San Francisco, Cal. No. 619,046. Dated Feb. 7, 1899. This invention relates to an apparatus which is especially designed for the manufacturing of acetylene gas, and it consists essentially in a novel arrangement of the carbide-containing chamber with means for distributing water to all parts of the carbide contained therein, means for conducting the gas to a gasometer, means for cooling the gas before it is delivered into the gasometer, and automatic mechanism connected with the gasometer and controlled by its movements whereby the supply of water to the carbide chamber is controlled, and by which it is cut off either when the gasometer is full or when the carbide is exhausted and the gasometer sinks to the bottom of the tank.

ADVERTISING DEVICE.—Chas. E. Stafford, San Francisco, Cal., assignor of one-third to Thomas Leach. No. 619,052. Dated Feb. 7, 1899. This invention relates to a device which is especially designed to exhibit advertisements or other displays which are printed or carried upon a sheet of considerable length so that the advertisements or other exhibits may be intermittently advanced, then stopped for a period of time and again advanced until the whole sheet has been exhibited, the operation continuing indefinitely. It consists essentially of a flexible sheet carrying the matter to be exhibited, drums with which the opposite ends of the sheet are connected and upon which it is adapted to coil and uncoil, belt rollers fixed to the drum shafts having a band extending from one to the other and adapted to coil alternately from one roller to the other in unison with the movement of the sheet upon its drums whereby the belt rollers are maintained constantly of the same diameter as the drums. An endless belt passes over these rollers and a roller through which power is transmitted is connected with the driving roller so as to impart motion thereto. Mechanism is provided by which the motion of the shafts may be reversed after the belt has been run out to the end, and it can then be returned to the point of commencement. The operation may be carried on by any suitable power applied to the mechanism, such as clockwork, with a suitable escapement.

Commercial Paragraphs.

THE largest inverted siphon in existence is now in successful operation at the Boise, Idaho, hydraulic mining property of the Twin Springs Placer M. Co. Almost the entire plant of this mammoth enterprise was furnished by the Joshua Hendy Machine Works, 38-44 Fremont St., San Francisco. Among other items of pipe, giants, air valves, water gates, etc., furnished the Twin Springs Placer Co. by that concern were 3000 feet 48-inch diam. pipe; 6000 feet 18-inch diam. pipe; 3000 feet 15-inch diam.; 2700 feet 11-inch diam.; nine 15-inch water gates; seven 11-inch water gates; fourteen hydraulic giants, assorted sizes, with deflectors and nozzles; about seventy air valves for pipe; four 48-inch expansion joints; three 18-inch expansion joints; one hydraulic derrick, seven tons capacity, complete.

THE Fulton Engineering & Shipbuilding Works, 15 First St., San Francisco, have finished another fine steam schooner, the Luella, which on her trial trip this week gave entire satisfaction to her owners, A. W. Beadle & Co.

POSITION WANTED by experienced cyanide man as superintendent of a mill or as assayer and chemist. Technical graduate. Will take charge of a cyanide proposition for a small salary with a percentage of the profits. Address S. C. M., care of Mining and Scientific Press, San Francisco, Cal.

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Position as Superintendent or Assistant Superintendent of Copper Mining and Smelting Works.
Competent Smelter, Assayer, etc. Understands handling men; speaks Spanish; willing to go to Mexico or South America; best references. Address COPPER, this office.

Recently Declared Mining Dividends.

Silver King, Park City, Utah, $50,000; Feb. 3; a total of $1,850,000.

Grand Central, Provo, Utah, 12½ cents per share, $31,250; Feb. 3; total, $281,250.

Swansea, Utah, $5000; Feb. 3.

Centennial Eureka, Utah, $25,000; Feb. 3.

Ferris-Haggerty Copper M. Co., Rawlins, Wyoming, $5000; payable March 1.

Isabella, Colorado, 6 cents per share, $135,000; payable Feb. 25.

Breece M. Co., Colorado, $10,000; payable March 1.

Boston & Montana Copper M. Co., $750,000; payable Feb. 20.

Central Lead, Missouri, $5000; Feb. 15.

Doe Run, Washington, $2500; Feb. 15.

Empire State, Idaho, $15,000; Feb. 15.

Highland, South Dakota, $20,000; Feb. 15.

Idaho, British Columbia, $12,500; Feb. 15.

Quincy Copper, Michigan, $350,000; Feb. 15.

War Eagle, British Columbia, $26,250; Feb. 15.

Bullion-Beck M. Co., Utah, $10,000; Feb. 15.

Gold King, Colorado, $10,000; payable Feb. 20.

Portland, Colorado, $60,000; payable Feb. 20.

New York & Honduras M. Co., 10 cents per share; payable Feb. 20.

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Are the CHEAPEST because
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Beware of Imitations.

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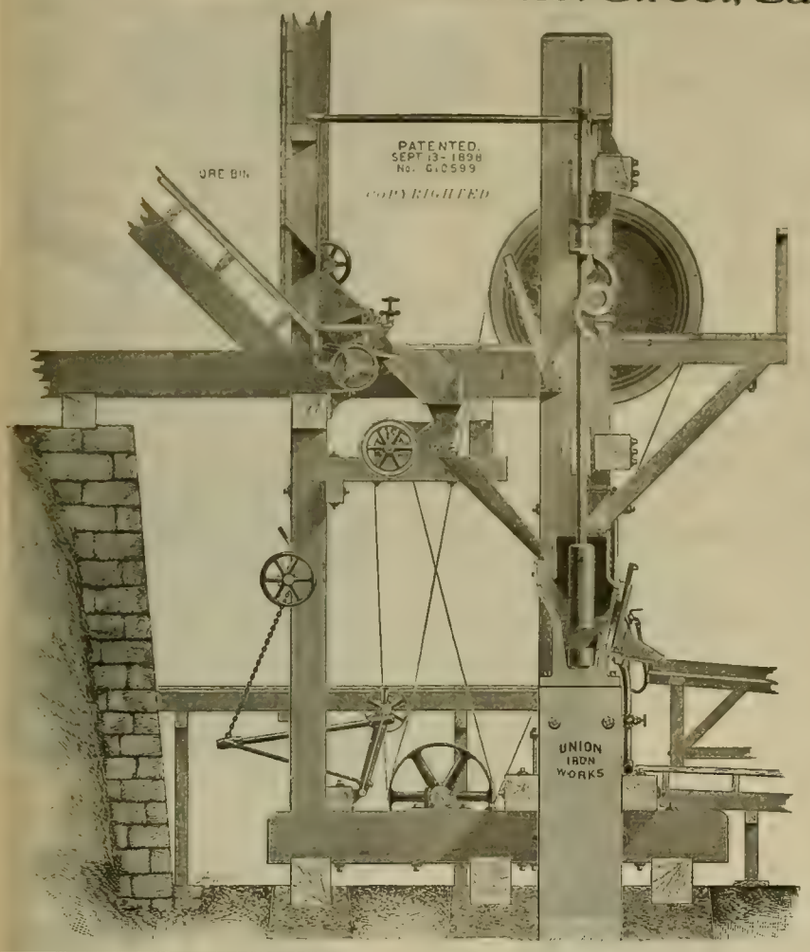

THIS ILLUSTRATION

Shows our patent Improved Stamp Mill, with Secondary Crusher, which increases the capacity of the ordinary stamp battery from 25 to 30 per cent.

We respectfully invite the attention of those contemplating the erection of new mills to this practical improvement.

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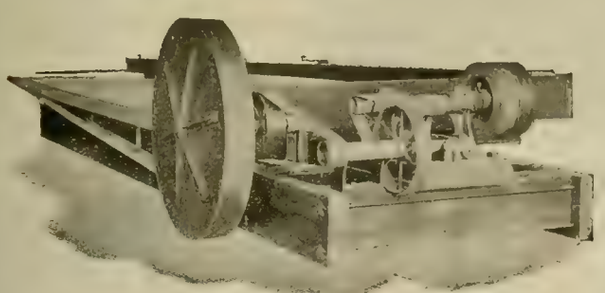

The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

PRICE, $450, F.O.B., San Francisco.

One of these machines will take the place of two or three belt concentrators of any style and do very much better work.

We furnish superior Machinery and erect Stamp Mills, Hoisting and Pumping Works operated by Steam or Water Motors. Complete Concentrating and Smelting Plants for the concentration and recovery of gold, silver, copper and lead. Improved Power Drills and Air Compressors, Wire Rope Tramways, etc.

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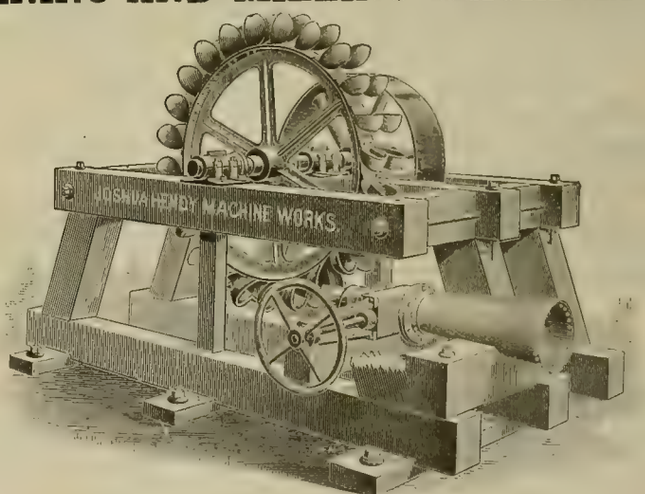

WATER WHEELS.

Stamp Mills!

"Hercules" Ore Crushers;
"Challenge" Ore Feeders;
"Triumph" Ore Concentrators;
"Hendy-Norbom" Ore Concentrators;
Boilers, Engines and Pumps;
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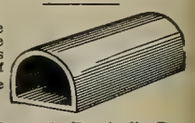

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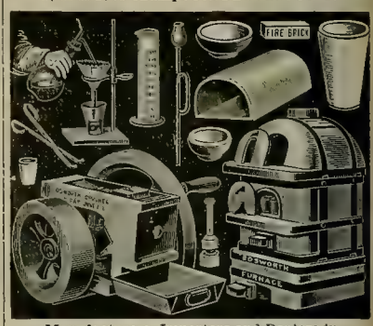
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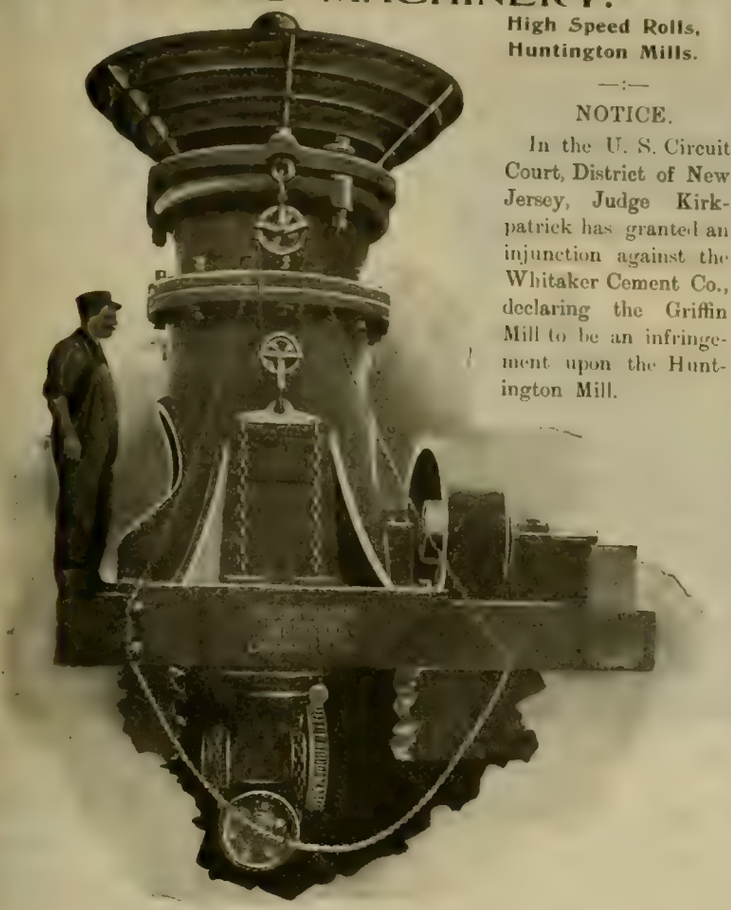

High Speed Rolls, Huntington Mills.

—:—

NOTICE.

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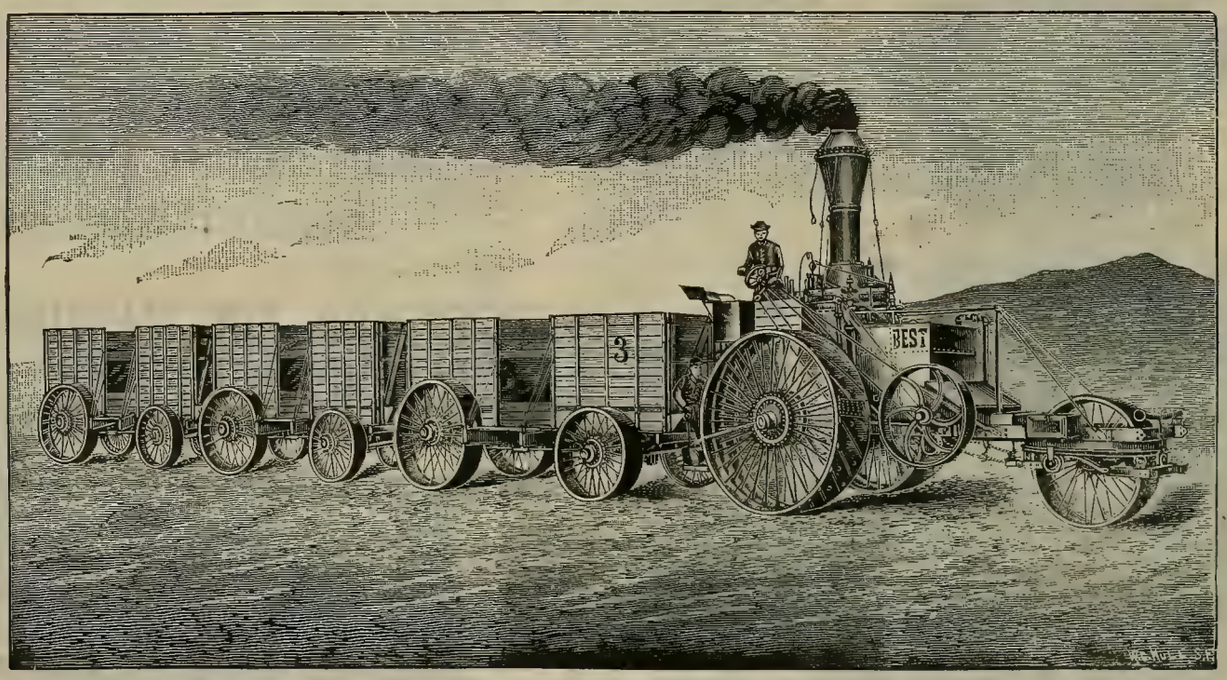

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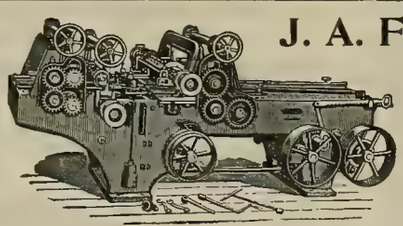

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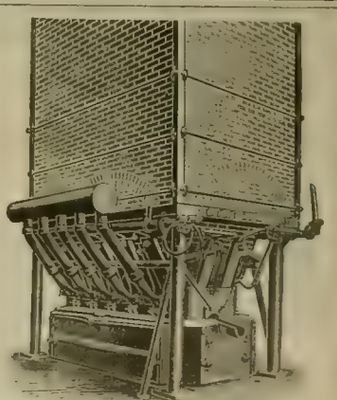

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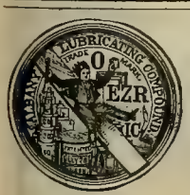

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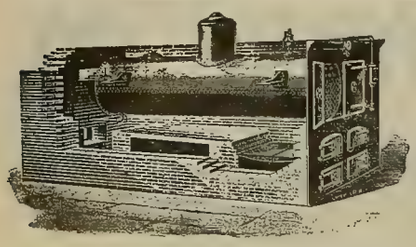

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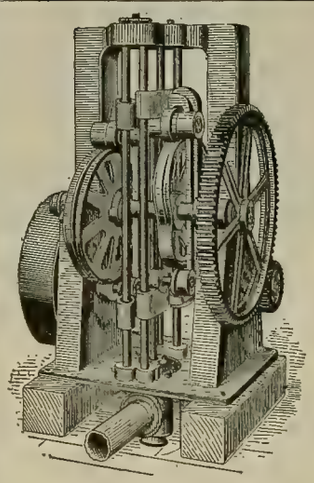
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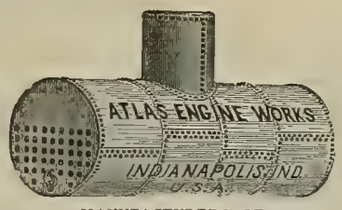

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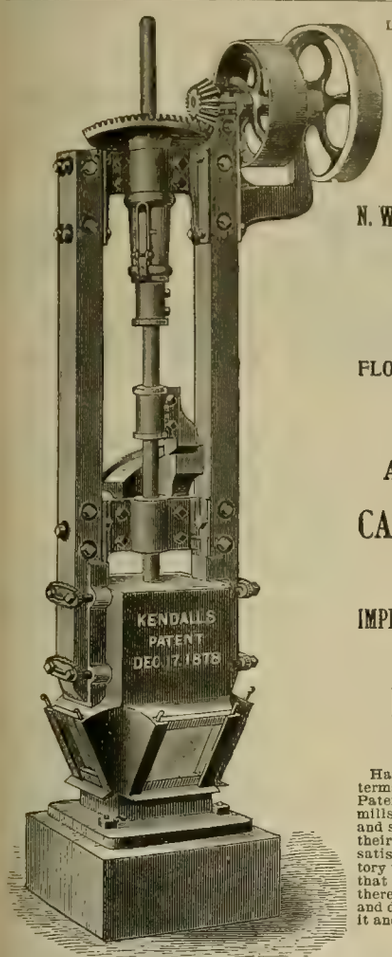

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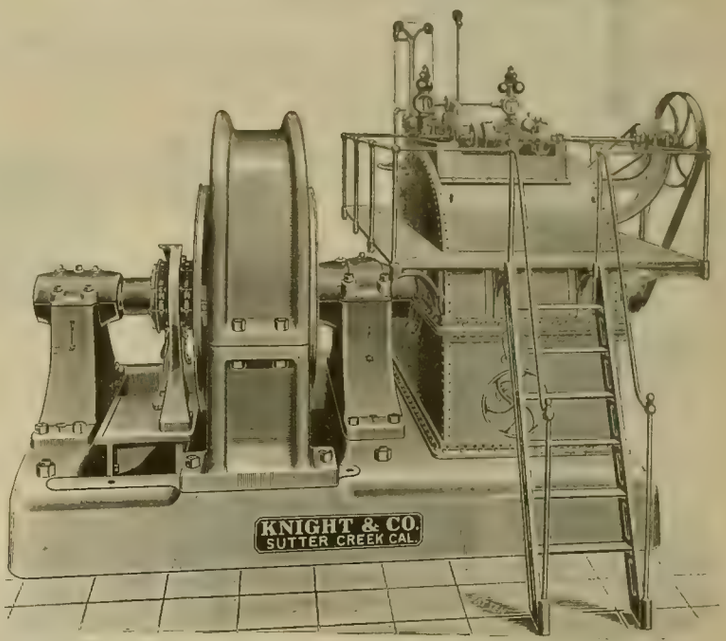

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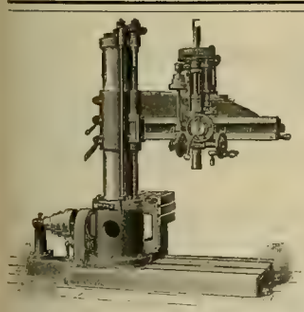

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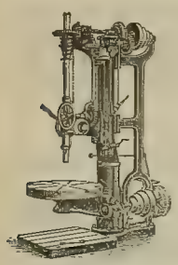

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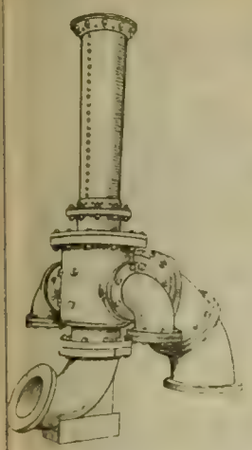

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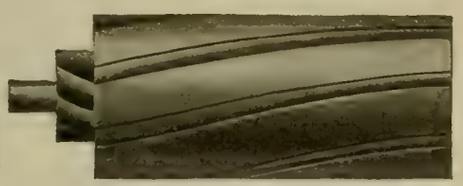
Locked-Coil  Track Cable

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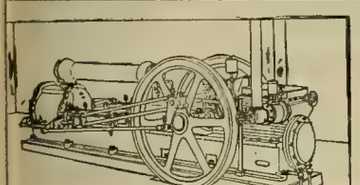

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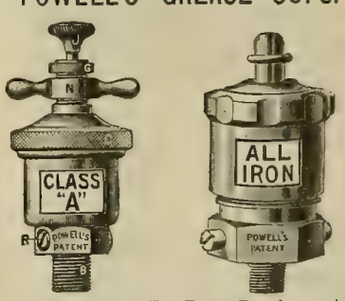

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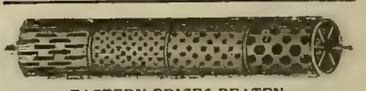

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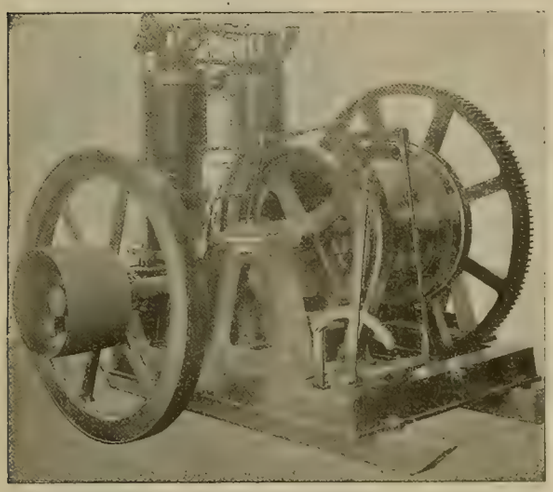

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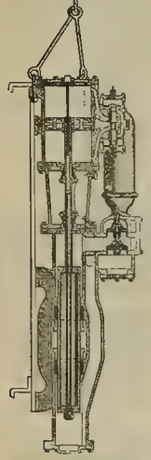

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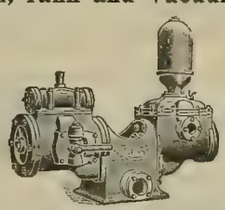

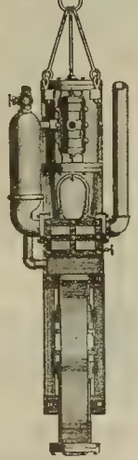

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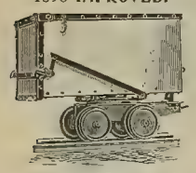

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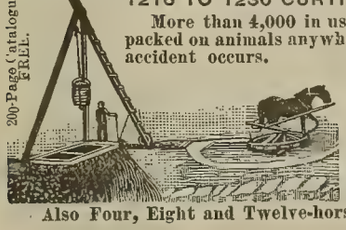

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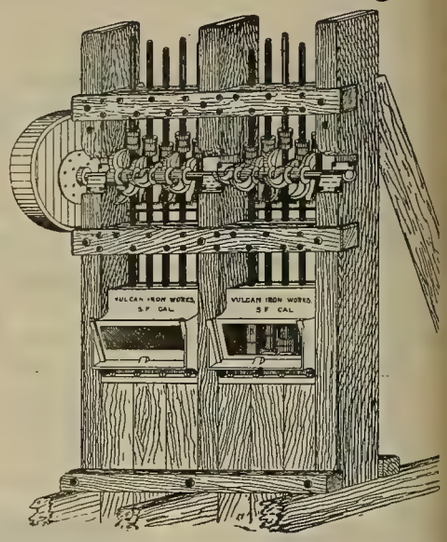

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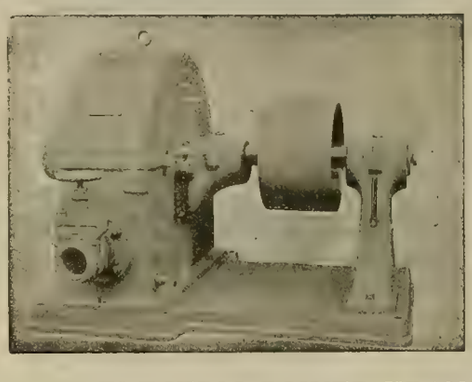

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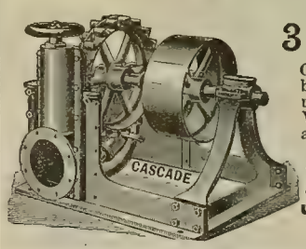

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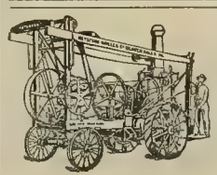

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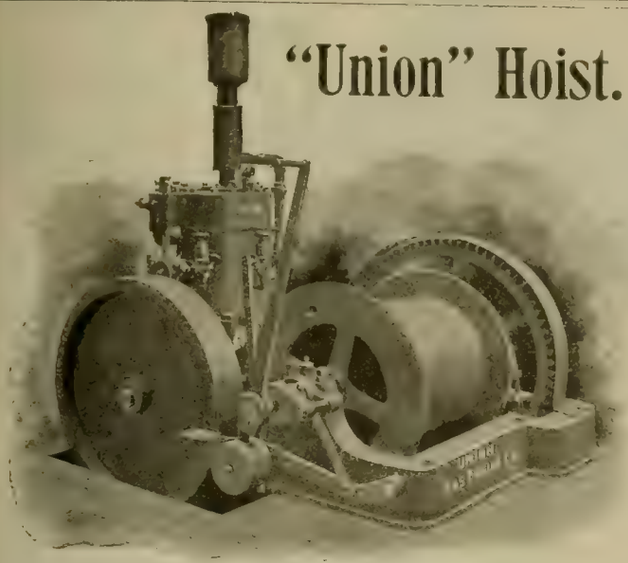

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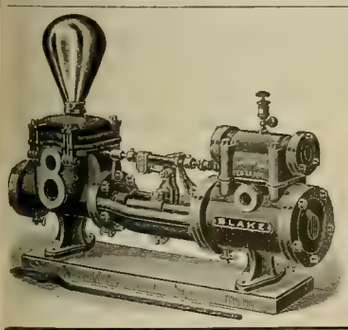

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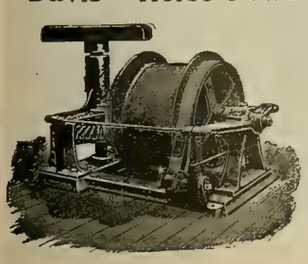

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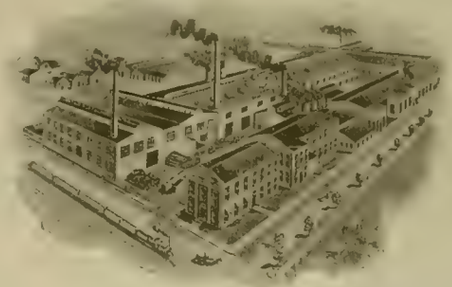

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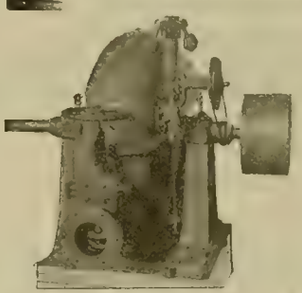

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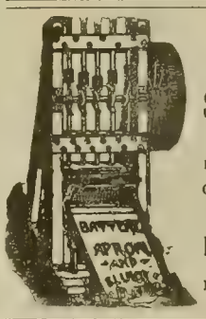

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Market Reports.

The Markets.

SAN FRANCISCO, Feb. 16, 1899.

SILVER. — London, 27⅛d; New York, 59⅝; San Francisco, 59⅝; Mexican Dollars, 47⅛@48. New York exchange, sight, 17½; telegraphic, 20 cents premium.

LEAD. — New York reports "quiet but firm," $4.50; brokers' price, $4.40.

Local, pipe, 7@7¼c; sheet, 7@8c; pig, 6¾c; bar, 7c.

COPPER.—New York reports Lake unchanged, $17.75 bid, $18 asked. Local bar, 21¼c per lb.

IRON.—American, soft, $22@24 per ton; Scotch, $27. Local bar, 2¼c per lb.

SPELTER.—10½.

TIN.—Pig, 30c per lb.; Bar, 29c. New York reports "quiet," $23.75 bid, $24 asked.

ANTIMONY.—16.

BABBITT METAL.—No. 3, 8c.

QUICKSILVER.—An advance in export is reported. Local, $42; export, $39.00@39.50; carload lots, special rates.

San Francisco receipts of quicksilver for January were 2211 flasks. San Francisco exports of quicksilver by sea for January were as follows:

	Flasks.	Value.
Mexico	310	$11,836
Central America	125	4,687
Australia	10	390
New York	8	312
Total	453	$17,225
In 1898	369	13,405
In 1897	436	14,795

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1* 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 00

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 30 @ 31c per lb.; carloads, 29c; in 10-lb. tins 37c; sulphuric acid, 2½c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9¼@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2¼c; California refined, 1⅛@1¼c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ℔ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 7¼c; 6s, 14 oz., 6¼c; 6s, 12 oz., 5¼c; 6s, 10 oz., 4½c; Granite (Mining) Candles—6s, 16 oz., 8¾c, 6s, 14 oz., 7¾c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $2.50; cut, $2.35; 10 to 20d, wire, $2.55; cut, $2.40; 8d, wire, $2.60; cut, $2.45; 6 and 7d, wire, $2.70; cut, $2.55; 4 and 5d, wire, $2.80; cut, $2.65; 3d, wire, $2.95; cut, $2.80; 2d, wire, $3.20; cut, $3.05. In carload lots, 10c per keg less.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16¾c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

CORDAGE.—

	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia ....)	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 16, 1899.

9:30 A. M. SESSION.

100 Andes	21c	700 Justice	15c
400 Best & Belcher	64c	700 Mexican	72c
100 Challenge	20c	200 Ophir	$1 20
600 Chollar	39c	400 Savage	30c
200 Con. Cal. & Va.	$2 15	200 Sierra Nevada	94c
300 Gould & Curry	45c	100 Union Con	52c
350 H. & N.	33c	100 Yellow Jacket	24c

2:30 P. M. SESSION.

850 Ophir	$1 30	100 Kentuck	12c
900 Mexican	82c	500 Belcher	27c
100 Gould & Curry	52c	160 Confidence	75c
700 Best & Belcher	71c	750 Sierra Nevada	$1 00
1450 C. Cal. & Va.	$2 30	400 Utah	22c
2400 Savage	35c	200 Overman	10c
300 Chollar	44c	800 Union Con	61c
300 Potosi	32c	100 Occidental	27c
1200 Hale & Norc's	37c	200 Andes	23c
300 Crown Point	25c	50 Standard	3 00
1350 Yellow Jacket	27c		

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.
EDW. N. BREITUNG, Marquette, Mich.
Cable address Edbee. Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. **U. S. A.**

Silver City Reduction Co.,
SILVER CITY, GRANT COUNTY, NEW MEXICO.
Purchasers and Smelters of Gold, Silver and Copper Ores.
This Plant is Owned and Operated by the Estate of the Late Senator George Hearst of California.

J. D. BETHUNE,
(Late Associate Justice Supreme Court.)
Attorney at Law,
Mining Law,
PRESCOTT, ARIZONA.
A Valuable Gold Property for Sale.

UTAH
Mines—Dividend Paying and Investment Stock.
W. E. HUBBARD & CO., 15 W. 2d So. Street, SALT LAKE CITY.

Quicksilver
FOR SALE IN LOTS TO SUIT.
Agents for Redington Quicksilver Mine.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

ANTIMONY.
We buy Antimony Ore in any quantity and pay prompt CASH for same. Write us and let us know what you have.
Chapman Smelting Works Co.,
(INCORPORATED.)
422 Battery Street.....San Francisco, Cal.

DIAMOND DRILL FOR SALE,
OR CAN BE HIRED, TOGETHER WITH EXPERT TO OPERATE IT.
Apply to J. A. MURRAY, care of Risdon Iron Works, San Francisco.

..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,
100 tons daily capacity; in first-class condition to handle Cripple Creek ores.
Plant in full running order, with all latest improvements. Address JOHN S. MacBETH, Equitable Building, Denver, Colorado.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.
CAPITAL, - $550,000.
The Original Cyanide Process.
SIMPLE. RELIABLE. ECONOMICAL.
TRADE MARK.

Gold Medal, Columbian Exposition, 1893.
MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by
The MacArthur-Forrest Cyanide Process.
Samples assayed and fully reported upon. Particulars upon application.
Advisory Board in the United States: Geo. A. Anderson, General Manager; Hugh Butler, Attorney; W. S. Ward; J. Stanley Muir, Technical Manager.
OFFICE: McPHEE BUILDING, DENVER, COLORADO.

Placer Miners' Attention
Is called to the fact that we are purchasers of
OSM-IRIDIUM
In lots of one ounce and upwards.
SELBY SMELTING & LEAD CO., 416 Montgomery Street, San Francisco.

FRESNO, June 25, 1898

Hercules Gas Engine Works, San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,
305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,
MANUFACTURERS OF DIRECT CURRENT MACHINERY
For Power and Lighting Purposes.
SPECIALTY
Direct Connected Electric Elevators.
Estimates Given on All Kinds of Mining Apparatus,
ALSO REPAIR AND JOB WORK OF ANY KIND.
Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.
34-36 Main Street, - San Francisco.

WEST COAST OF MEXICO.
WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.
Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

REPUBLIC and ROSSLAND Mining Stocks
Bought and sold for non-residents. SOLID DIVIDEND PAYERS as an investment. Prospective producers as a speculation. Write for information.
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HERRIN & REINER,
Mine and Stock Brokers.
Reliable Quotations given on all the Standard British Columbia, Washington and Idaho Mining Stocks.
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SPOKANE, WASH.

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RIO GRANDE . . .
WESTERN RAILWAY.
Two trains daily from Denver via Denver & Rio Grande or Colorado Midland and RIO GRANDE WESTERN. For pamphlets, etc., write
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The : Popular
. . . DINING ROOMS . . .
Centrally Located. 35 and 37
Prices Right. GEARY ST.
F. W. KRONE, Prop.
SAN FRANCISCO, CAL.

Assessment Notices.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of January, 1899, an assessment (No. 17) of 4 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 13th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of January, 1899, an assessment (No. 15) of Twenty cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14 Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on TUESDAY, the 21st day of February, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 13th day of March, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14 Nevada Block, No. 309 Montgomery street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 26th day of January, 1899, an assessment (No. 16) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of February, 1899, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on SATURDAY, the 11th day of March, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of February, 1899, an assessment (No. 23) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of March, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 3rd day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of February, 1899, an assessment (No. 8, new series) of seven (7) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of March, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 5th day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. P. THURSTON, Secretary.

Office—324 Pine St., San Francisco, California.

MICHIGAN COLLEGE OF MINES.

Supported by the State of Michigan. Practical work. Elective system. Special advantages for men of age and experience. For catalogues address

DR. M. E. WADSWORTH, President.
Houghton, Michigan.

DELINQUENT SALE NOTICE.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 12) levied on the 2nd day of January, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Marcus Schwab	1	500	$50 00
Marcus Schwab	64	500	50 00
Thos. Henningsen	105	100	10 00
Wm. Schmitz	140	1,500	150 00
Wm. Schmitz	165	1,000	100 00
Eberhard Spannagel	187	100	10 00
N. Rienecker	228	100	10 00
Peter Kruckel	242	62½	6 25
J. Beck	253	62½	6 25
Peter Kruckel	250	110	11 00
Andreas Kruckel	251	100	10 00
George Schafer	295	194	19 40
Chas. Strohmaier	304	200	20 00
Richard Schneider	309	100	10 00
George Schafer	323	500	50 00
George Schafer	324	300	30 00
George Schafer	325	200	20 00
George Schafer	326	200	20 00
George Schafer	327	200	20 00
George Schafer	329	100	10 00
George Schafer	333	50	5 00
George Schafer	334	50	5 00
George Schafer	342	544	54 40
Adam Miller	350	125	12 50
N. Rienecker	351	200	20 00
B. Egenberger	352	275	27 50
George Schafer	3-4	52	5 20

And in accordance with law, and an order from the Board of Directors, made on the 2nd day of January, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 237 Twelfth street, San Francisco, California, on MONDAY, the 6th day of March, 1899, at the hour of 5:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

F. METTMANN, Secretary.

Office—237 Twelfth street, San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the MARINA MARSICANO GOLD MINING COMPANY will be held at the office of the Company, 217 Sacramento St., San Francisco, California, on MONDAY, the 6th day of March, 1899, at the hour of 2 P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer books will close on Friday, March 3rd, 1899, at 5 o'clock P. M.

CHARLES BOVONE, Secretary.

Office—217 Sacramento St., San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the BOULDER MINING COMPANY will be held at the office of the Company, 163 Crocker Building, San Francisco, California, on WEDNESDAY, the 1st day of March, 1899, at the hour of 3:30 P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer books will close on Saturday, February 18th, at 2 o'clock P. M.

J. M. WILMANS, Secretary.

Office—163 Crocker Building, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from F. M. Phelps, in the Cedar Creek Mine, near Fair Play, El Dorado Co., to deposit tailings in Cedar Creek; from A. B. Jacks, in the Badger Hill Mine, near Spanish Ranch, Plumas Co., to deposit tailings in an old pit; from John H. Hoad, in the Hoad's Ranch Mine, near Merrimac, Butte Co., to deposit tailings in Haphazard Ravine; and from J. S. Mills, in the Mountain Ranch Placer Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in Murray Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on February 27, 1899, at 1:30 P. M.

The State Ore Sampling Co.

DENVER, COLO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolfram, Cobalt and Antimony Ores. With modern mills and machinery our facilities for sampling ores are the best.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

PACIFIC EXPLORATION COMPANY

Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.

W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.
29-30 Chronicle Building, S. F.

MINERS!

Have you seen our new Jackhead Pump, adapted especially for muddy water? Light, durable and strongly built.

Our 1899 catalogue tells all about pumps. Free to those interested.

W. T. GARRATT & CO.,

Office and Salesrooms, Cor. Fremont and Natoma Sts.

Pump Works, Cor. Fifth and Brannan Sts.

Weber Hoists.

6 to 100 H. P.

Cost to Run, 1c per hour per H. P.

All Latest Improvements.
Get Catalogue.

WEBER GAS ENGINE CO.,
430 S. W. Boulevard, Kansas City, Mo.

BYRON JACKSON MACHINE WORKS,

625 SIXTH STREET, SAN FRANCISCO, CAL.

—Manufacturers of—

"Whirlpool" Centrifugal Pumps

—FOR—

DREDGING, MINING, IRRIGATING, and RECLAMATION.

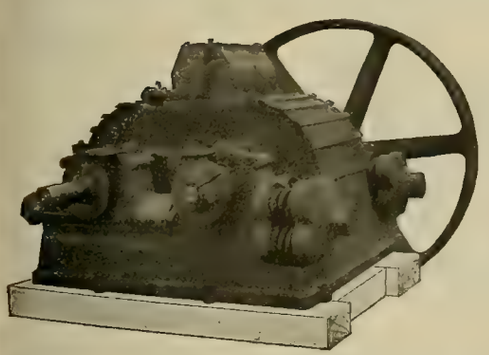
Will pump rocks as large as will pass through the pipes. Also Compound Centrifugal Pump for 200 feet or more lift.

"Whirlpool" Centrifugal for Pumping Rock and Gravel.

OIL, GAS OR GASOLINE ENGINES, COMPOUND STEAM ENGINES, HARVESTING MACHINERY, ETC.

CATES IRON WORKS.

HIGH GRADE CRUSHING ROLLS.



In competition with the best the world can offer, we have secured and shipped an order for nine sets of these Rolls (36"x16") to the Broken Hill Proprietary Mines, New So. Wales. Weight of each set, 33,000 lbs. They are built with all the care given a modern engine.

Builders of Rock and Ore Crushing Machinery.

SEND FOR CATALOGUE NO. 5.

Address Dept. UU, 650 ELSTON AVE., CHICAGO.

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leibers.

—MANUFACTURERS OF—

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines

OUR SPECIALTY.

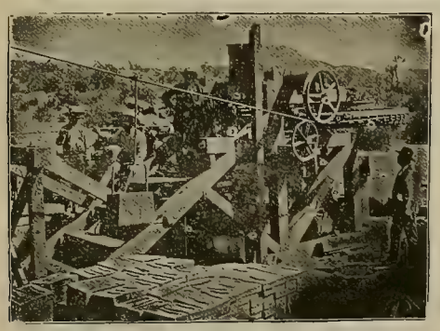
We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.
We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.
Send for Dredging Catalogues Nos. 15 and 16.

WE ALSO BUILD

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.



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For transporting Ore, Fuel, Merchandise, etc., in bulk or in packages. SIMPLE, ECONOMICAL, INEXPENSIVE, PRACTICAL.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY. **Send for Ropeway Pamphlet No. 20.**

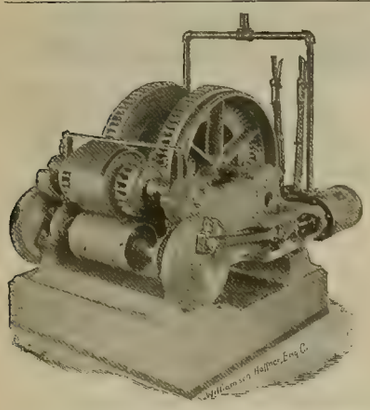
THE CALHOUN EXCAVATOR.

A COMBINED POWER-SHOVEL AND CABLEWAY.
.....Ask for Circular.....

Cableways, Double Rope Tramways, Wire Rope Transmissions, Incline Planes, Logging Machinery, Suspension Bridges,

DESIGNED, FURNISHED, ERECTED. Write for Estimates

CALIFORNIA WIRE WORKS, - 330 Market St., San Francisco, Cal.



THE STRONGEST AND MOST ECONOMICAL PROSPECTING HOIST No. 16.

— EVER BUILT IS —

The Bolthoff Combined Noiseless Gear and Friction Hoist.

A 6x8 double cylinder Prospecting Hoist of this type, suitable for sinking a vertical shaft to 500 feet, **will hoist a load of 2200 pounds 300 feet a minute.**

LOW FIRST COST. ECONOMY IN FUEL. DURABLE AND PRACTICAL.

Complete plants shipped the day order is received.

THE HENDRIE & BOLTHOFF M'F'G & SUPPLY CO.,

Cor. 17th and Wazee Sts., DENVER, COLORADO.

SIMMONS PATENT DOUBLE-JOINTED, BALL BEARING GIANTS,

With Weighting Attachment.

NO CENTER BOLT.

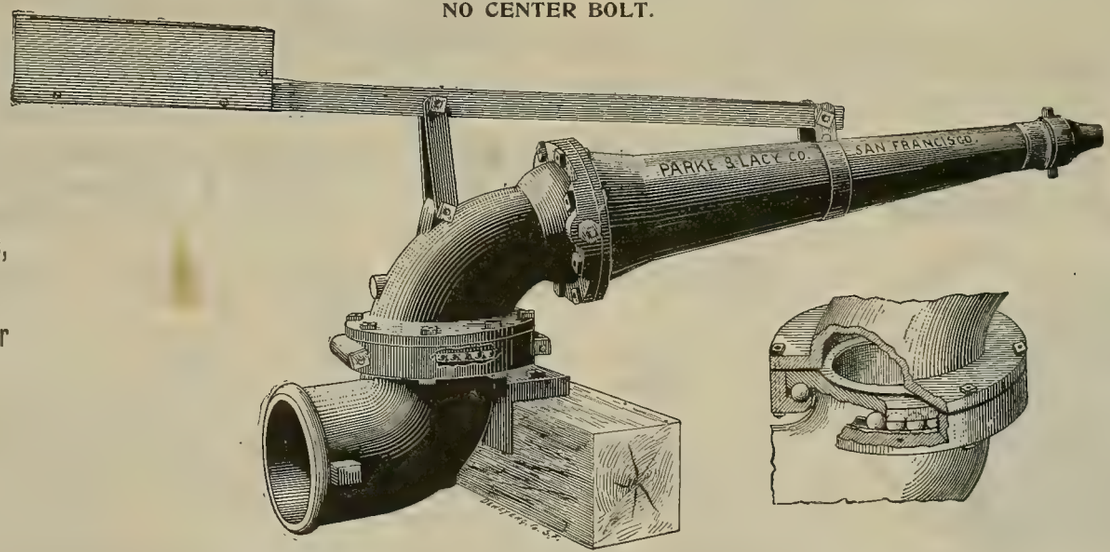
Deflectors,

Retorts,

Water Gates,

Hydraulic Water PIPE.

Valves, Etc.



Huntington Quartz Mills,

Paul Ball Mill,

Rock Breakers,

Rolls, Etc.

PARKE & LACY CO., 21 and 23 Fremont Street, San Francisco, Cal.

Agent for KNOWLES PUMPS and PULSOMETER PUMPS.

MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2016.— VOLUME LXXVIII. Number 8. SAN FRANCISCO, SATURDAY, FEBRUARY 25, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

An Idaho Hydraulic Mining Enterprise.

As in all forms of gold securing, hydraulic mining is a progressive science. Based on what was invented nearly fifty years ago in California, and accompanied by California additions and improvements in after years, there is no part of any surface gold-producing region of the earth in which the scientific evolution of the California hydraulic methods is not in operation. The skill of the engineer, with the sums at the disposal of modern mining corporations, successfully solve problems that once seemed insuperable, it often appearing that the greater the obstacles the greater the incentive to overcome them.

Recently appeared in these columns a technical, illustrated account of the great hydraulic enterprise which a French company had successfully completed in Trinity Co., Cal. A similar work, just completed in Idaho, appears to deserve as wide publicity. In the Boise basin, Idaho, the Twin Springs Placer Co. has expended several hundred thousand dollars in preparatory work of unusual magnitude, interesting in its construction to mining engineers. Among other problems presented was the task of successfully carrying a necessarily large volume of water through an unusually large pipe over a depression of 350 feet. Thirty years ago Jos. McGillivray brought a 15-inch pipe over a depression of 240 feet and across the Trinity river, Trinity Co., Cal.; twenty-eight years ago the Spring Valley Mining Co. put in a similar

INVERTED SIPHON OVER BOISE RIVER, TWIN SPRINGS PLACER COMPANY, BOISE, IDAHO.

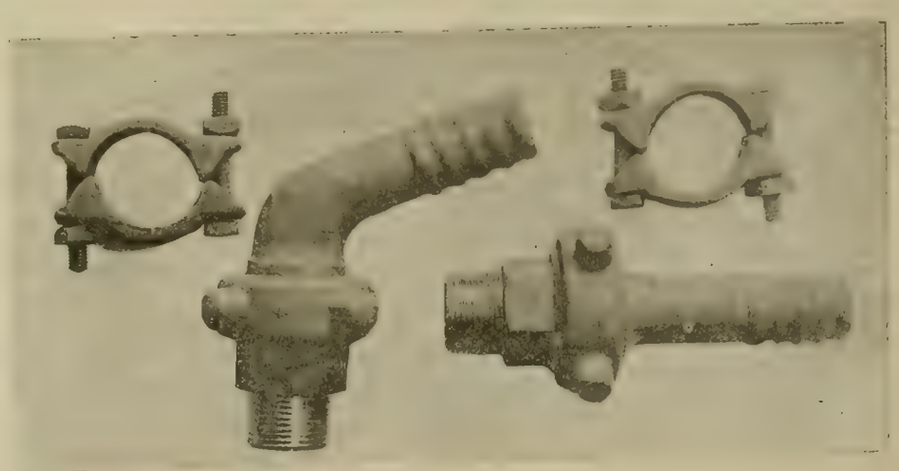
VIEW OF FLUME AND HYDRAULIC WORK, TWIN SPRINGS PLACER COMPANY, BOISE RIVER, IDAHO.

contrivance at Cherokee, Butte Co., Cal.—a wrought iron, riveted, 30 inch pipe, 14,000 feet long, across a depression of about 950 feet. To this latter enterprise was first applied the term "inverted siphon." Such aqueducts do not work on the principle of the siphon, and are thus far misnamed. They utilize the pressure of the water at the inlet to maintain a regular, steady flow, forcing the water of the outlet branch or arm of a V-shaped pipe line out at a point slightly below the level of the inlet. In this way water is carried at great head and tremendous pressure, in considerable volume, in large pipes across rivers, up and down the sloping sides of canyons, to where its use is desired.

Herewith are two engravings from photographs taken especially for this article, the first graphically portraying the transit of the water of Sheep creek in the big pipe, down to and across the Boise river, and up the precipitous slopes, on, over the crest of the ridge, and down to where the extensive gravel deposits of the company are to be worked. That portion of the pipe constituting the "inverted siphon" is 1700 feet in length and 48 inches in diameter. This pipe is made with an expansion joint, one of these joints being placed between each two elbows. It is calculated that the pressure per square inch in the lower portion is 167 pounds. The pipe was laid and the work finished last August. Since its completion, hydraulicking showed the profitable character of the ground, which is locally reported to average about 40 cents per cubic yard, the duty there of 1 miner's inch of water being 2.3 cubic yards per twenty-four hours. The company has eight placer mines in the Boise basin, and from Aug. 16th to Nov. 16th, '98, cleaned up an average of nearly $1000 per day therefrom.

The Reardon Patent Air Hose Coupling.

The accompanying illustration shows the Reardon patent hose coupling, especially designed for coupling air drill hose to rock drills, made in either straight or bent form. The bent form does away with the breakage of the hose close to the coupling, caused by the weight of the hose when attached to the drill by the old style straight coupling; it is easily connected, cast with a round thread on one end, which screws into the hose. A special band is bolted around the hose above the threaded part of the coupling and securely clamps it, preventing the couplings working loose. When the hose is disconnected, the face or joint of the coupling is protected from damage by a heavy coupling collar. The straight form is made for use at the other end of the hose, where it is connected to the main air pipe. It is made by the Compressed Air Machinery Co., 11-13 First street, San Francisco, Cal., and is a ready seller.



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TRADE follows the flag—sometimes; but it always follows the price list.

THE California effort to create the office of mine inspector has failed. Several of the mining States have such officers, and the appointment would have been in line with needed progress.

IN connection with electrical requirements it is probable that one of the first results in a further advance in the price of copper would be an effort at reduction of cost of producing aluminum, that metal having been proved by recent experiments particularly adapted to the economical transmission of electrical power.

THE statement that no paying mines exist in Colorado below 7500 feet altitude is noticeable. High altitudes prevail throughout all Colorado, and the paying mines are located above the altitude indicated, this condition being in contrast to other mining regions. Only a few of California's large mines are found above 2500 feet altitude, and most of them are but 1000 to 2000 feet above the sea at the surface, their lower workings extending in many cases several hundred feet below the level of the sea.

THE Colorado decision noted at length last week has resulted at Leadville in claim jumping on a large scale. According to reports, stakes were being driven in 5 feet of snow and nearly 100 acres of valuable mining territory in the heart of Leadville has been staked out by representatives of one mining company. These locations in the snow are made because of the Mt. Rosa decision, in which it was held that a lode location on a placer claim could be only 50 feet wide instead of 300 feet wide. Mining men there are greatly disturbed over the decision and considerable resultant litigation is expected.

THE Circuit Court of Appeals this week decided the suit between the Boston & Montana and Montana Ore Purchasing Companies, reversing the decision of the lower court which had granted the injunction prayed for and ordering the suit dismissed. The B. & M., plaintiffs, claimed that defendants, M. O. P. Co., were extracting ore from their claim, and asked for $500,000 damages. In March, '97, the Montana court granted the injunction asked for by plaintiffs. In April, '98, the Circuit Court of Appeals at San Francisco, Cal., set that injunction aside, alleging no jurisdiction on the part of the lower court. Plaintiff amended complaint, the Montana court again granted the injunction, and again the Appellate Court sets it aside, this time ordering the case dismissed on the ground that no federal question is involved.

Lead Miners and Smelters' Rates.

Several letters are received this month, inquiring as to phases of the lead market, and the considerable figure the smelters cut therein, and a few general statements on that whole subject are deemed advisable.

The Canadian Commission has been unsuccessful in an effort to get lead on the free list: on all lead in ore, or lead ore imported into the U. S., there is a duty of 1½ cents per pound. There are several large concerns engaged in the business of smelting lead ores, not exclusively, but in connection with the smelting of other metals. The largest on the Pacific coast is the Selby Smelting & Lead Works of San Francisco. Among the largest smelters operated in Colorado is one by the Kansas City Consolidated Smelting & Refining Co. at Leadville.

Whether the lead ore be shipped from Mexico or Canada, or be of domestic production, its two principal domestic markets are St. Louis and New York City. The Colorado and coast smelters buy on the New York quotations, current; that is, whatever smelter quotations of lead—"brokers' prices"—are in New York the day returns are made from the smelter, govern the price paid. The returns are a very variable quantity, being determined by the ore itself, and the ruling market rate. Usually Colorado smelters produce pig lead on a basis of so much per unit on a $4 price per 100 pounds, the difference between that and the current quotation governing the per unit price. The "unit" means one per cent. If a smelter pays so much per unit, it is a trade way of saying so much for every one per cent in the lead ore. Suppose it is an 18% ore: then, if the smelter pays 25 cents per unit, that would be $4.50 per ton for the lead in the ore; "25% ore" means that in a ton of that ore there would be 500 pounds metallic lead; in the case mentioned that would mean $4.50÷500—.9 cents per pound.

All this is a sort of kindergarten proposition to smelter men and sellers of ore, but there are others to whom a few figures are interesting. Among the letters referred to is one from two Colorado men saying that in their experience with smelters they got "very little credit for the lead" in their ore, and implying that the smelter people are in some way getting the best of them. This is unlikely, but, if so, the Colorado shippers have the remedy in their own hands. There is as much competition and close figuring in the smelter business as in any other line, and the shipper will naturally go where he can get the best returns. New York quotations govern the price; ofttimes the freight and treatment charges eat up considerable of the margin of possible profit to the producer, though in most smelting establishments treatment charges are largely determined by the amount of lead in the ore, and it is not infrequent that because of this the shipper gets more for his ore than would appear, the treatment charges being modified by the amount of lead in the ore, thus constituting an indirect payment therefor.

Taking up the Colorado method as between the miner and smelter, the former can easily find out what the latter will pay. His ore may go 15, 25 or 40 units; the smelter replies to his inquiry with a schedule, saying, virtually:

We will pay for lead ores as follows, $4 basis New York quotation day of settlement, ore containing lead from 10% to 15%, inclusive, 20c per unit; 15% to 20%, inclusive, 25c per unit; 20% to 30%, inclusive, 35c per unit; 30% to 45%, inclusive, 45c per unit; 40% to 50%, inclusive, 55c per unit.

Of course, as hitherto noted, the higher the percentage the less the proportional cost; there are certain fixed charges that must be met, whatever may or may not be in the ore, but it being usually a self-fluxing proposition the treatment charges are less, proportionately, as between dry and wet ore.

Assuming for illustration that the Colorado shipper has made up his mind where he wants to send his ore with best possible returns to himself, taking into consideration freights, etc., and that he has sent lead ore that contains 40%, he will get thereon 45 cents per unit on a $4 basis. The New York quotation on the day of settlement is another factor in the result; assuming that it was $3.85, the difference would be 15 cents, one-fifth for treatment is 3 cents, which, taken away from 45, leaves 42 cents, the net price. This, multiplied by 40, gives $16.80 per ton for the lead in the ore; the 5 used for dividing the 15 is represented by the fact that the smelter's quotation to the miner is on the unit or 20 lbs., while the New York quotation is five times that, or 100 lbs. All this on a $3.85 basis. Lead has advanced—quoted to-day at $4 20, or 35 cents more. Now, if at $3.85 the net unit price on a 40% ore would be 42 cents, at $4.20 it would be 49 cents, the last number being found by adding to the 42 one-fifth the advance in the price.

There is nothing new or original herein; it is merely a compilation of statements from several sources, being an effort to state plainly the facts.

Temperature of Battery Water.

"The temperature of battery water" is receiving the attention of many mill men, and from the variety of opinions published herein, based on personal experiment, it would appear that other conditions than the temperature of the water are important factors in amalgamation of gold ores in batteries and on plates. At the Homestake mills, Lead City, S. D., the superintendent after a series of careful experiments lasting a considerable period determined to his own satisfaction that the best results were accomplished at a temperature of 52°. The temperature is obtained during winter by heating the water and in summer by pumping it to a tank located in a tower from which it was allowed to fall through screens, and exposed to the draft of revolving fans which reduced the temperature to the desired point. It may be that although 52° is the proper temperature at the Homestake mine, that this temperature would not be found to give the best results in Arizona or in California or Colorado.

That the character of the ore is an important factor there is little doubt, and there is reason to believe that the size of the gold particles may also have an important influence on the behavior of the quicksilver. In some ores the gold is in an extremely fine state of division; in others it is comparatively coarse and it is not to be expected that two such widely different ores would act similarly even were the temperature of battery water the same in each case. Many mill foremen take careful note of the result of the operations in their mills under varying conditions; some are satisfied to let well enough alone and often claim they are accomplishing the best possible results, when they really do not know such to be the case.

THE location of numerous claims by single individuals in any one district is a subject for legislation. In a single district in San Diego county, California, one man had located 160 claims. These required by law the performance of $16,000 in labor or other improvements annually, but the claim holder did not spend $160 on the entire lot, still he could and did keep other men who were willing to work from locating any of his claims. This wholesale location of mineral ground should not be permitted. Of course the new ninety-day law is calculated to make this impossible, but most men prefer not to undertake the location of a piece of ground in the face of an adverse claim and possibly expensive litigation, which is almost certain to result should he find a valuable ore body.

FROM nearly every elevated part of this west half of America come reports of unprecedented snowfall; in some parts of Colorado and Utah there was so much as to occasion serious financial loss and, in two or three instances, loss of life. The great snowfall insures a prosperous mining season everywhere that it made its temporarily unwelcome presence felt. In California considerable snow has fallen in the high Sierras, and should rain to any extent fall in the next ninety days in the foothill region, that comonwealth will share in the mining prosperity of its sister States during the remainder of '99.

THE Franklin Institute, Philadelphia, is preparing its 30th exhibition. It deserves respectful recognition for its great work through the century in fostering and chronicling the industrial and scientific achievements that have placed this country in the van. Every advance in knowledge made by man since 1826 is recorded in the archives of the Franklin Institute.

Concentrates.

SPOKANE, WASH., is about to organize an open mining stock exchange.

THE Red River, N. M., *News* says "every idle man in the camp is at work!"

A MINER'S inch of water is usually required for each battery of five stamps.

QUARTZ ROCK in place in the vein measures about 13 cubic feet to the ton—when broken 20 cubic feet to the ton.

A RECENT advance of 15% in the price of antimony leads to renewed interest in the Nevada and California deposits of that metal.

THE third session of the Mining Congress is to be at Milwaukee, Wis., next August. The first was in Denver, Colorado, July, '97; the second, Salt Lake City, Utah, July, '98.

THE mine tax proposition in Arizona now assumes the phase of a bill to tax mines in that Territory having a product of $50,000 or over per annum, a sort of income tax that would not abide.

WASHINGTON State papers justly argue that the levy of a mine assessment should be made a matter of sufficient publicity to insure knowledge of the fact on the part of the stockholders.

SINCE the stimulus of sulphur prices by the late Spanish war the U. S. sulphur output has been increased in a manner that appears to warrant permanency, being profitable even at peace prices.

THE new Washington State county of Republic, carved from Stevens Co., has a population of 2000, with Republic the county seat. It is claimed that there are 500 patented mining claims therein.

IN the mines of Cedros island, off the coast of Lower California native sulphur is found containing gold to the amount of $100 per ton. This sulphur has without doubt been derived from auriferous pyrite.

SINCE '93 little has been done in silver production in California; the largest silver-producing mines are in Inyo, Kern and San Bernardino counties; except as a "by-product," nothing is being done therein at present.

A MINING ENGINEER of Johannesburg, S. A. R., was recently sent to examine some mining properties near Gwelo, in the interior. He reports being unable to find the property at all. Similar occurrences have been heard of in America.

OF the $275,000,000 output of gold of the world during '98, A. Sauerbeck estimates that the United States has between $180,000,000 and $200,000,000. The large banks of England, Germany and France hold something less than $50,000,000 as compared with their holdings at the close of '96.

A BILL introduced in the California Legislature by Assemblyman Blood makes it a felony to make false oath setting forth the performance of $100 worth of labor on an unpatented mining claim. The punishment for such false swearing is fixed at one year's imprisonment in the county jail, $100 fine, or both.

SEVERAL of the largest smelters throughout the country are reported about to consolidate with a $50,000,000 capitalization. It is understood that as between the combine and the smelting establishments not included therein, existing arrangements regarding interchange of business, etc., will not be disturbed. Among those specified as being about to enter the combination none west of Utah are so far mentioned.

THE recent increased demand at the San Francisco and Philadelphia mints for $20 gold pieces is ascribed to a change of custom in Europe. Formerly gold bars were asked for by those who had shipments of large amounts to make to Europe, as the gold coin sent there was melted and recoined. Now the double eagles are kept. Russia alone has twenty million dollars in $20 gold pieces in her treasury and the Bank of England has a large amount.

SUCCESSFUL mining is neither the result of practical nor theoretical considerations separately and distinctly, but of both combined; for the theoretical man without practical knowledge is in the same position as the practical man without theoretical knowledge—both would be better with the combination. Practical men usually make the best theorists, for they know when a theory is required and the purpose it is intended to accomplish.

THE minimum diameters of sheaves over which steel wire ropes can be safely bent should be equal in inches to the diameter of the rope in inches multiplied by 50, and for pulleys for hoisting the minimum size should be equal to the diameter of the rope in inches, multiplied by 100. When the diameters of the sheaves are too small, the rope is injured and the lifetime of its use greatly shortened. When a hoisting rope is too heavy, it increases the difference of balance, and is subject to a wave movement caused by the load not keeping it taut, the result being that the cage jerks and jumps, the frame vibrating.

A CONTRIBUTOR furnishes the following decision of the State Supreme Court, omitting, however, to specify date and particular suit: "An appropriation of water by means of a ditch is not measured by the capacity of the ditch, but is limited to such quantity, not exceeding its capacity, as the appropriator may put to a useful purpose; and no matter how great in extent the original quantity appropriated may have been, any amount less than the whole amount appropriated, which has not been devoted to a beneficial use at some time within five years, is lost and forfeited as against a subsequent appropriator thereof."

TWO DISTINCT TYPES of distribution are used for incandescent lighting in this country, the single-phase alternating current and the direct current three-wire system. The former does not usually permit the supplying of power. As alternating distribution is at high potential, it does not permit the location of the station where the conditions of maximum economy can be fulfilled. The three-wire incandescent system, using low voltages, may be used for supplying motors, but the amount of copper necessitated by the low pressure has caused such stations to be located near the center of distribution, irrespective of the best conditions for the economical operation of the plant.

WOLFRAMITE is a native tungstate of iron and manganese, is generally a brownish or grayish black and has a reddish brown streak. The specific gravity, 7.2 to 7.5, is nearly equal to that of metallic iron. It occurs crystallized, also massive with lamellar structure. It is the ore from which the metal tungsten is usually obtained, and is often associated with tinstone. The metal tungsten is used to improve the quality of steel by being added in very small quantities. It is chemically related to molybdenum and uranium. The consumption of wolframite in the United States during '98 was about eighty tons. The ore has a market value of $17.60 per kilogram for lump and $42.84 for powdered ore—nearly $1.50 an ounce.

CAST IRON may be silvered without the intervention of copper or other primary coating by proceeding as follows: Dissolve thirty parts of crystallized silver nitrate in 150 parts of distilled water. Dissolve sixty parts of potassium cyanide (commercial 75%) in 100 parts of water and mix the solutions. Dissolve fifty parts of sodium chloride in 750 parts of distilled water, and to the solution add that of the silver cyanide, in a thin stream with constant agitation. Plunge the iron to be silvered in nitric acid of 1.20 s. g., and let remain for four or five minutes, and remove directly from the bath, after letting drain to get rid of surplus acid, into the silvering solution. Silvering is instantaneous, but the metal may be kept in the fluid for a few minutes. Remove, rinse, and with a burnisher rub down the surface.

FROM Jas. Arthur, Cornucopia, Or., is received an excellent sample of mica, of unusual size—5x6 inches. Mica is valued largely as to the size of the sheets procurable. Sheets 3x3 inches are worth $1 per pound; sheets 6x6, $10 per pound. The following in New York City deal in mica of marketable quality: J. D. Hague, E. V. Munsell, A. O. Shoonmaker, the Palermo Mica Co. Mr. Arthur says one sheet taken out is 22x26 inches. If so and the mica is of good commercial quality the depsit is a valuable one. He says the sample mailed is from one of seven claims in Idaho, seventeen miles from N. P. R. R. The mine has been developed by 2000 feet of tunnel on various claims and "1000 feet of shafting." An extended illustrated article on the mining and marketing of mica appeared in the issue of Nov. 26th, '98.

THE rich telluride ores of the Terry Peak region in the Black Hills of South Dakota occur in the Cambreo-Silurian (Potsdam) formation at several horizons and usually in the quarzite. These ore deposits almost invariably have a direct association with intrusive dykes of trachite, phonolite and other eruptives of somewhat similar type, and are frequently overlain or underlain by sheetlike masses of trachite or rhyolite, evidently forming a part of the great masses which have been erupted about Terry Peak. These ores are highly silicious, and usually of fine granular texture, no free gold can be obtained as a rule, though perhaps, exceptions occur. One of the most interesting occurrences of gold in that region was found in '81 in cherty masses (flint) in the limestone of the Pocahontas mine at Squaw creek.

TO ETCH an autograph on a silver plate, cover the plate with wax, etcher, varnish, or paraffin, making a thin and even coating of the protecting agent. Then, with an etching needle, or other agent, write the words to be etched: then make a solution of fifteen grains of chromic acid in eighty parts of hot water, add fifteen to twenty parts of sulphuric acid, and pour this over the plate or apply it with a pencil. As soon as it begins to act, a deposit of red chromate of silver will form. Examine the plate from time to time, rinsing off with flowing water, by holding under the tap for a moment, and applying fresh acid each time, until the etching is sufficiently deep. The chromic acid solution, unlike nitric and hydrochloric acid, does not have a tendency to spread or corrode under the protecting layer, and if care be taken, will leave a very fair etching.

RUSSIA permits all machines used in connection with the mining and reduction of gold ores to enter without the payment of duty. The Russian Minister of Finance has prepared a list of machines which, under this decision, is imported duty free. Machines used in gold washing, as pumps, water pipes, machines for the hydraulic treatment of gold, hydraulic pumps, dredges, amalgamators, etc., for the treatment of gold-bearing sands, machinery for the treatment of gold ores for the extraction of gold by the wet process, all kinds of furnaces, cyanide and chlorination plants, dynamos for the electrolytic separation of gold from cyanide solutions and machinery used for mining in general. Among such machinery are included dredgers, drilling machines, transporting apparatus, water pumping machinery, ventilators, and all kinds of mining apparatus.

COMPRESSED AIR can be transmitted with a smaller loss of useful effect when the pressure is high than when it is low; where equal weights of compressed air are transmitted through pipes of equal diameters, the resistance due to the transmission of the fluid varies inversely as the density. When the absolute pressure of air is doubled, the resistance due to its transmission is halved. High pressure steam, as well as air and other gases, are all subject to the same laws of resistance when in motion. The transmission of electric energy is also subject to the same laws of resistance as gases. When a powerful electric current is transmitted through an electric conductor, if it be desired to reduce the resistance, the voltage or electric pressure is increased; as the higher the voltage the lower the resistance, and, conversely, the higher the amperage or electric quantity the greater the resistance. A statement that includes electrical transmission and the transmission of fluids may thus be made: The resistances vary inversely as the pressures, and directly as the quantities.

A REMARKABLE occurrence of crystallization of minerals is found in the old Etta tin mine in the Harney Peak region of South Dakota. The hill rises—a conical mass of granite—in a formation of mica schist. The granitic mass is in the form of a lens, being at the center more than 100 feet wide, in length several hundred feet. In this mass of rock the minerals have a rudely concentric arrangement. In the outer layers occurs a development of crystallization, masses of feldspar and greisen, in which are crystals of spodumene from 12 inches to several feet in diameter and 10 to 50 feet in length. As exposed in a large open cut on the west side of the hill, these crystals remind one of great timbers which have fallen with the debris in a caved mine. The spodumene crystals are inter-penetrated with hexagonal crystals of tourmaline, apatite and other minerals. There are also crystals of black tourmaline of every size, from slender needle-like prisms to those over a foot in diameter having three curved sides. Masses of bluish-white and rose-colored quartz also occur nearer the nucleus of the great dyke. The cassiterite is found in the feldspar, greisen and quartz. Wolframite, columbite and tantalite also are found in this hill. This exceptionally coarse crystallization of minerals is common throughout the region, but nowhere on so great a scale as at the Etta mine.

A MEETING of the executive committee of the California State Miners' Association was held on the 21st inst. at San Francisco to take action relative to certain proposed mining legislation. The Association will ask the repeal of that portion of the State law requiring prospectors to record their preliminary notice of location. A committee was appointed by the president to visit the State capitol for the purpose of endeavoring to secure a liberal appropriation to give California mines proper representation at the Paris Exposition. In response to the invitation of the Association to the American Institute of Mining Engineers to hold their next meeting (probably in October) in San Francisco, a telegram from R. W. Raymond, secretary of the Institute, was read, announcing informally that the invitation would be accepted by the council at its next meeting. This will be the first meeting the A. I. M. E has ever held west of the Rocky mountains.

Les Mondes thus describes a process for metallizing wood: The wood is immersed for three or four days, according to its permeability, in a solution of caustic lime, at a temperature of from 75 to 90° C. From there it is placed at once in a bath of calcium hydrosulphate, to which, after twenty-four to twenty-six hours, a concentrated solution of sulphur and caustic potash is added. This bath lasts about forty-eight hours, at 35° to 50°. Finally, the wood is treated for thirty to fifty hours to a bath of acetate of lead, also at 35° to 50° It will be seen that the process requires considerable time, but the result is surprising. After having been dried at a moderate temperature, the wood thus prepared shows, when polished, a brilliant metallic luster. This luster can be heightened still more by rubbing the surface with a piece of lead, tin or zinc, and then polishing it with a glass or porcelain burnisher. The wood surface then assumes the appearance of a genuine metallic mirror, and is compact.

THERE is no more risk in the storage of calcic carbide than there is in storing any other inert material, provided it is packed dry and warm in hermetically sealed drums, so as to render it impossible for it to come in contact with water or moist air. The real risk is in the removal or redistribution of the material, as, after opening a drum, it may not be again properly closed, and if the drum be left in this condition in the moist air of an ill-ventilated cellar it is quite possible for a slow generation of gas to take place, and for an explosive mixture to be formed by its accumulation. All carbide stores should be thoroughly well ventilated and above ground, and when this is the case all danger is practically done away with. For the carriage of carbide it is important that not only should the drums be air-tight, but that they should be of sufficient strength to resist the rough usage incidental to the handling of a heavy product. Where tins are used, they should always be protected by an exterior wood case.

THE bill introduced in the California State Legislature by Curtin of Tuolumne, entitled "An Act for the better protection of persons employed in mines, providing for the appointment of an Inspector of Mines, and defining his duties and fixing his compensation," was referred to the Committee on Mines, Drainage and Debris. It provided for the appointment of an Inspector of Mines, "who shall visit every mine in the State, employing five men or more, at least once a year, and shall devote his entire attention to the duties of the office. His salary is to be $3500 a year, and his deputies, not to exceed five in number, will each receive $2100 for their services. Reasonable traveling expenses are also to be allowed. The inspector or deputy is to be admitted to the workings of any portion of any mine he may desire to examine, and shall note particularly the condition regarding the property that might affect the health or safety of employes. A complaint in writing, signed and verified by the oath of three or more persons, shall be sufficient demand on the inspector for an immediate examination and if found justified that portion of mine or machinery complained of must be at once put in good condition; the same rule also to apply to inefficient employes, the demonstration of whose inefficiency must result in dismissal within ten days." A proviso of the bill was that "neither inspector nor deputies shall in any manner disclose any information they might gain regarding the workings or character of rock in any mine. The inspector must file a bond for the faithful performance of his duties in the sum of $10,000 and each deputy $5000." The bill will not pass.

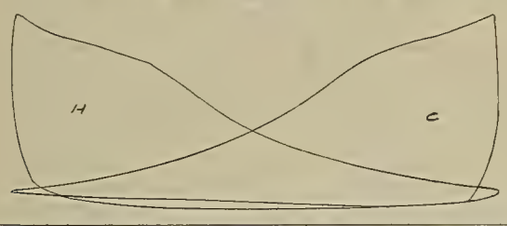
THE deposition of copper on iron may be accomplished either by dipping or by galvanoplastic methods. If iron be thrust into a solution of copper sulphate in very dilute sulphuric acid and left to remain for a short time, it is evenly covered with a thin but firmly adherent coating of pure copper. If allowed to remain longer the deposition of copper continues, but the plating becomes porous and less firmly adherent. This is, however, remedied, in the industries, by passing the plated surfaces between heavy steel rollers. From three to four ounces of the sulphate and a similar amount of the acid to the gallon of water are sufficient. Where the article is of a shape not easily compressible with the rollers, or where the surface has to stand much service, the electroplating process is in every way preferable. To plate in this manner, make a bath as follows: Into a suitable vessel put one part of crystallized acetate of copper and moisten it with sufficient water to make a paste. Add to this paste one part of sodium carbonate and five parts of water and stir until a light green precipitate (copper carbonate) is formed. Then in thirteen parts of water dissolve one part of sodium disulphite and mix the two liquids. In eighteen parts of water dissolve one part of potassium cyanide, and add the solution, under constant stirring, to the former mixture. The liquid should now be clear and colorless. If the potassium cyanide is, however, not up to full strength, it may have a dirty yellowish hue, to correct which more of the cyanide must be added. This had best be in the shape of a concentrated solution (though a small excess of the cyanide is rather a benefit), which must be added a little at a time and well stirred in, until the liquid is colorless. For very fine work the mixture should be filtered, but for ordinary work this is not necessary. The bath being now ready, an anode of pure copper, with a surface equal or nearly equal to that to be plated, is put into it, and the article to be plated is attached to the cathode and suspended in the bath so that it touches nothing. A current of medium intensity is requisite for good results in this process.

A Remarkable Hoisting Engine.

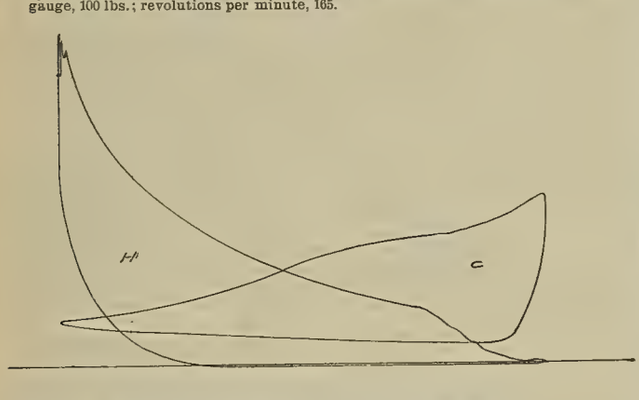
Written for the MINING AND SCIENTIFIC PRESS by GEO. S. BINCKLEY.

Hoisting engines are generally admitted to be the hardest worked of all the machines that are employed in mining operations, and, considering the severe duty that they are called upon to perform, it is surprising that the builders of these machines keep on designing them on the same lines, and with the same factors of safety, that are employed in the design of engines for ordinary duty where the power demanded, if not constant, is at least limited, and the changes from full load to no load is always comparatively gradual and the speed practically constant.

In the hoisting engine of the direct or first-motion type, the load, of course, varies at each trip from no load to full load, and, as will be seen from the diagrams herewith, the strains during the "plugging" of the engine while at full speed are enormously in excess of the ordinary working strains, and there is reason to believe that in most of the direct-acting hoisting engines in use these strains, if not neglected entirely, have been greatly underestimated by the designers.



NO. 1.—Diagram from double reel hoisting engine at Bell mine, Butte. Diameter of cylinder, 20 in.; stroke, 48 in.; date, Oct. 2, 1898; scale of spring, 60 lbs; boiler gauge, 100 lbs.; revolutions per minute, 165.



HEAD AND CRANK END TAKEN 3 SECONDS APART.

NO. 2.—Diagram from double reel hoisting engine at Bell mine, Butte. Diameter of cylinder, 20 in.; stroke, 48 in.; date, Oct., 9, 1898; scale of spring, 80 lbs.; boiler gauge, 100 lbs.; revolutions per minute, 165.

At the Bell mine, one of the properties of the Anaconda Copper Co., there is an engine in use which, in the matter of rotative speed and general performance, is probably one of the most remarkable engines in existence, and, although it has been in use for some years, twenty-four hours a day, there has been no accident due to the abnormal speed or sudden stopping of the machine, which, considering the fact that it is designed with no greater factors of safety than an ordinary Corliss engine, supposed to run at a speed of, say, seventy revolutions per minute, is remarkable and instructive, for it indicates how far the accepted factors of safety may be reduced and still leave a reasonable margin. In a good many cases a precedent like this is valuable, for when for any reason it becomes necessary to increase the amount of work, even for a short time, on a machine that is already installed, in the light of such a case as the one under discussion, much less uneasiness will be felt even when the amount of work done and the speed employed is far above that which would be allowed by any accepted formula.

The engine at the Bell mine is of the double-cylinder, direct-acting type, having cylinders 20″ x 48″, and is fitted with steam-actuated reverse gear, post brakes and clutches, the whole controlling gear being handled from the elevated platform that is occupied by the "runner." It has a Corliss valve gear of the Reynolds type, and is arranged so that the cut-off is regulated by the movement of the throttle lever, the cut-off coming into action when the throttle is full open, and allowing the valves to travel full stroke when the throttle is in any other position.

The post brakes were formerly applied by the direct application of steam pressure, but soon after the engine was erected the steam was accidentally shut off the whole engine while the cages were hanging in the shaft, with the result that both reels ran away and tore the reels, brakes and brake wheels all to pieces, luckily causing no loss of life.

The brake engines were then remodeled to the gravity system, in which the brakes are applied by heavy weights, and relieved by lifting the weights with the brake engines—this being a perfect safeguard against the repetition of such an accident and the method now generally used in connection with steam-actuated brakes.

The clutches are of a peculiar type, steam actuated, and having multiple jaws of steel, so arranged that the clutch may be thrown in at any position, by the movement of the reel through a very small angle. It is a rather complicated, but very satisfactory, arrangement, and as it is positive, it is somewhat more desirable on the score of safety than a friction clutch, even of the most approved kind. The reels are about 11 feet in diameter and will carry about 2000 feet of 4½″ flat rope. Double-deck cages are used, and each car carries a ton of ore of the ordinary grade, the weight of the car being about 950 pounds, and the two decks of the cages weigh about 4500 pounds, making the total load, exclusive of the rope, 10,400 pounds. This engine was designed by Hermann Unziker of Chicago, and was exhibited at the World's Fair at Chicago and afterwards sold to the Anaconda Co.

To fully understand the performance of this engine, it is well to bear in mind the wonderful skill of the "runners," for it is only by their marvelous control of the flying machine that such work can be accomplished. It is a pleasure to watch these men at the throttle, as they instantly interpret the complicated signals, and, with an incredible rapidity and exactitude, drop the cage from one level to another, setting it on the station chairs as easily as a passenger elevator, first the bottom and then the top deck, then, when the bell is given to hoist, starting promptly but gently, yet having the throttle full open before the engine has made two revolutions—waiting then until the engine has almost reached full speed, which occurs in a few revolutions, and then throwing in the cut-off, which is set for the maximum speed of the machine under full load. Then, while it seems to the observer that the engine is running away, such is the speed, the "runner" suddenly throws over his reversing lever, and the engine is "plugged," acting now as an air compressor, drawing in air through the exhaust ports and forcing it back into the steam pipes to the boiler. It is at this stage of the trip that the strains are abnormally heavy on the whole machine, as will be seen by reference to diagram No. 2, which was taken at a speed of about 165 revolutions per minute, with the cages running counterbalanced in the shaft at a speed of somewhat more than a mile a minute.

A rotative speed of 165 per minute, giving a piston speed of 1320 feet, would be sufficiently remarkable in an engine built with special reference to the conditions, but when it is considered that this engine is not built any heavier than the one that is accorded a maximum speed of about 80 revolutions, it becomes an instructive example of what may be done in the way of speed with an ordinary engine, when well built and erected. The fact must also be considered that in the case of a mill engine there is no "plugging," consequently an engine of 4-foot stroke, running at a speed of 165 per minute, would be well within the limits of safety when the performance of this engine, which has run under these severe conditions for years, is taken as an example. Another notable feature in the performance of the machine is the fact that the Corliss valve gear acts perfectly at this high speed, although it is not of any special type, and the dash-pots, hooks, etc., are not specially proportioned for extraordinary work. As will be seen by reference to diagram No. 1, the steam is somewhat wire-drawn during admission, and the back pressure is excessive, owing, in the first case, to the fact that the ports are not proportioned to the piston speed, and that the pipes are rather small, and, in the second case, the same remarks will apply, with the added disadvantage that the exhaust pipe is not very short, has several elbows and has to exhaust through a heater that is not of adequate size.

Both of the cards shown were taken at a speed of about 165 revolutions per minute, as near as could be ascertained without an instrument, this speed, of course, being maintained for but a small fraction of a minute, for the average hoisting speed of the cages in the shaft, from the 1600 level to the top, including stopping and starting, is over 45 feet per second. This is an almost incredible speed, especially when it is considered that the shaft is very crooked, owing to the bad character of the ground passed through, and the fact that it is continually moving. In connection with the crookedness of the shaft, it is interesting to note that more accidents occur when running at a low speed than when the speed of the cage is high, it evidently passing the kinks and tight places better the higher the speed. Wrecks in the shaft are rather frequent, but are rarely the cause of loss of life, although the speed at which men are handled in some of the shafts takes the breath away from anyone unused to this mode of travel and makes one wish for "dry land."

It will probably be considered by engineers who see these cards that an unjustifiable abuse of the engine is practiced, but it must be borne in mind by designers of this class of machinery that the conditions to be met are not determined by the limitations of the machine, but by the requirements of the mine upon which the machine is to be used, and that, if it is to be a success, the designer must not expect that a set of conditions to suit the ordinary engine will be provided by the mine, but he should ascertain accurately the conditions under which the engine will have to operate, and make his machine conform to them, even at the expense of his most cherished ideals of proportion, and in defiance of his most respected authorities. The writer ventures the opinion that if the designer of the machine described had fully realized the conditions under which it would have to work, he would never have ventured to use the proportions that exist in it now—no sane engineer would have done so, the conditions being fully understood—yet the fact that it has been successful is highly instructive, and merely emphasizes the fact that the conditions are not generally understood by the designer, and that it is more by good luck than calculation that the engines hold together. It will be seen from diagram No. 2 that when the engine is "plugged," the pressure reaches 160 pounds per square inch at the end of the stroke—a pressure that the designer certainly never intended to come on the cylinder. The practice of "plugging," however reprehensible it may be from the standpoint of the designer, is, however, one of the necessary conditions for rapid work, and a condition that must be met by the designer, whether he like it or not, if he wishes a consistent machine and one that will have as high a factor of safety as ordinary practice requires. The average mine superintendent requires that his hoist shall be able to take out the whole amount of the ore that his mine will produce, in a few hours each day, the rest of the time being taken up with the handling of timbers, waste and men, and a hoist that would be powerful enough to take out the ore in a short time, running at the ordinary speeds for a stationary engine of the same size, would be ridiculously out of proportion to the work of lowering men and timbers, and would be cumbersome and wasteful into the bargain, not to mention the extra expense in first cost and maintenance. The small appreciation that many designers have of the conditions under which these machines work is strikingly illustrated in some of the engines in use by the Anaconda Co. The builders have used their standard design of Corliss engine; but although the engines are all fitted with reversing gear, all of this make—in fact, all of the Corliss hoisting engines—are provided with a regulation hook-rod from the rocker to the wrist-plate! This, while harmless in itself, simply goes to show the blind adherence to tradition, so evident, though many other requirements are far more important as regards the safety and efficiency of the machines.

The little engine described above, although one of the smallest on the property, is certainly one of the most efficient and satisfactory engines that have ever come under the writer's observation, and although, as pointed out, the conditions are really normal, and the design of the engine does not strictly meet them, great credit is due the designer and builders, for the machine is an excellent example of good workmanship, handles with great ease, and has an unexceptional record for work performed. It cannot be denied that it exceeds the ordinary limits of safety, but the result is creditable and highly interesting and instructive to the engineer, for it indicates the lines upon which the design of this class of engines can be materially improved and rendered consistent with the work to be performed.

The performance of many other engines in use in Butte would be considered remarkable, but, in the writer's opinion, the instance given is the most striking and deserves the attention of engineers interested in the correction of the defects that commonly exist in this class of machinery. It is the writer's opinion that in engines of 48″ stroke there is no good reason that the high rotative speeds instanced above should not be employed in hoisting, as the advantages of a reel of small diameter are great when repair work, sinking and timbering is done with the assistance of the main engine, as the small reel allows of much easier handling, and, in addition to the lower first cost of the small engine, its economy in operation running at a high speed, is far superior to the large engine with slow speed, and the loss of steam by radiation from the jackets, and while handling, is correspondingly reduced. For depths up to 2000 feet, where double-deck cages are used, or an equivalent load is raised with skips instead of cages, an engine 20″ x 48″ is plenty large enough for the work, and if it is designed to meet severe conditions, and with sufficiently large port areas, there is no reason why an average rope speed of 45 feet per second should not be attained with a correspondingly high rotative speed of the engine, and a very high

economy in operation. In Butte maximum rope speeds of nearly 6000 feet per minute are successfully employed, and there are few accidents from this cause. The whole problem would be greatly simplified if it were convenient to use round ropes and drums of small diameter, for in that case very deep mining could be carried on with engines of small size and high efficiency. Several devices for overcoming the necessity of very long drums have been suggested, but so far the problem is unsolved, for a drum of sufficient capacity, if the diameter be small, becomes entirely too long to lead well over the sheaves.

Although the subject is a difficult one, there seems to be more room for improvement in hoisting machinery and methods than in any other class of mining machinery, and the increasing demand for more efficient machinery in every branch of mining must result sooner or later in the development of a new system, or, at least, important modifications of the present system, of hoisting and handling ore.

The Genesis of Petroleum and Asphaltum in California.

NUMBER IV.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

Fossil bitumens are found in California in the unaltered rocks which exist in a strip of land adjoining the coast of the Pacific ocean, being from sixty to seventy miles wide and extending from Del Norte county on the north to San Diego county on the south, a distance exceeding 700 miles and covering an area exceeding 40,000 square miles.

These fossil bitumens occur on the surface in the form of gas, oil and tar springs and bituminized shale and sandstone.

In the succeeding pages the phenomena attending bituminous deposits in general will be given, and then descriptions of different deposits, showing that these phenomena are applicable to all deposits.

Anticlines, synclines, monoclines, centroclines and quaquaversals, and also faults, exert a great influence in the accumulations of gas, petroleum oil and water. Especially is this true in California, where the dips and undulations along the strike of the anticline are exposed and well defined.

Although a description of the different inclinations and curvatures of strata would seem elemental, a thorough knowledge of the effect of these inclinations are necessary for an understanding of the laws governing the accumulations of bitumen in California. In the Eastern States the slopes of the domes frequently do not exceed 20 feet to a mile, whereas in California the strata stand at a very steep angle with the horizon, frequently being overturned.

When a group of strata is bent into a curve like a saddle, with its convexity turned towards the earth, it is called an anticlinal curve. Such a condition of strata is shown in Fig. 1 above the word anticline. A synclinal curve is exactly the opposite of an anticlinal curve. When the strata is folded or curved so as to form a trough, the concave side of which is turned from the earth, it is called a synclinal curve. This is shown in Fig. 1 above the word syncline. In both anticlines and synclines the line in each bed along which the change in the direction of the dip takes place is called the anticlinal or synclinal axis of that bed, and the planes containing all the axis of an anticlinal ridge or a cynclinal trough are called axis planes. The axis plane usually approaches verticality. Anticlines and synclines frequently nose out, or coalesce.

When an anticline undulates along the line of its axis dome-like elevations occur, from the summits of which the beds dip away in every direction. In this this case the strata is said to have a quaquaversal dip. An anticline is an elongated dome.

A quaquaversal, or dome, is a nest, usually of a great number, of different strata composing numerous overlying, gigantic, inverted funnels, the strata of the formation forming the sides of these rock funnels, all of which tend to guide and convey the ascending gas and oil to the apex of the dome.

When a syncline undulates along the line of its axis basin shaped depressions occur, towards the bottom of which the beds dip from all sides. This is called a centroclinal dip. A syncline is an elongated basin.

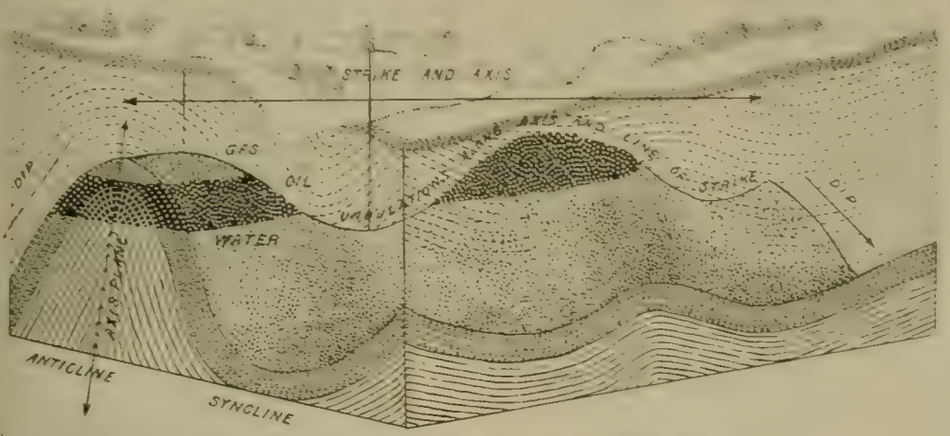


FIG. 1.—PLANO-SECTION SHOWING INCLINATIONS.

A fault or dislocation is a fissure or crack in the crust of the earth, accompanied by the elevation of the mass upon one side of the fault, while the other side remains stationary or sinks down. Anticlines and synclines are often truncated by faults, and may be so faulted as to form the segments of a sphere or cone. If an oil-bearing bed ascending to the north be interrupted by an east-and-west fault, the further ascent of the oil northwards will be arrested, and then an abundant supply of oil may be obtained by boring on the south side of the fault, while, for a considerable distance to the north, water will occupy the formation to the exclusion of the oil. This is more apt to be the case where the throw of the fault is sufficient, so that the edges of the porous strata are covered by impervious strata. Selvage frequently occupies the line of faults generally caused by the movement of the two sides of the fault on each other, which have ground up the materials of the rock, forming a sheet of matter impervious to the flow of oil or water, or the faults may be filled up with mineral matter of various kinds, which are also impervious to oil or water.

FIG. 2.—BITUMENIZED SAND FORMING AN ANTICLINE.

When a formation contains permanent water, the accumulation of petroleum oil will be found near the upper part of the dome, as is shown in the plane section, Fig. 1. The oil floats on the surface of the water, and if natural gas is present it will be found above the oil. These three substances arrange themselves according to their specific gravity, the lightest on top.

Fig. 2 is a view of an anticline. The camera was pointed in the direction of its strike. The white line represents the plane of bedding, which was once horizontal, but is now curved in the form of an arch.

(To be Continued.)

Experiences of a Working Miner.

Written for the MINING AND SCIENTIFIC PRESS.

In my last letter I promised to tell you about some peculiarities I have seen in mine timbering, and shall do so, but before entering upon that subject I want to say something more regarding transportation and handling of ores. I think one of the worst cases that has ever come under my observation was that of the C. I. Co. They shipped their ores, and while necessarily an expensive proposition, it was made much more so by the manner of handling the ores. The mines were situated half a mile or more (according to the location of the several workings) from the ocean. The ore was delivered at the mouths of the several tunnels, where it was sacked and stacked up in large piles. At some convenient time these sacks of ore were placed in a chute and went sliding down the mountain side with accelerating velocity, landing at the bottom of the slide like so many cannon balls. Often sacks would burst and required resewing. This might have been prevented by flattening the lower end of the chute, which would have landed the sacks at a much lessened rate of speed and without material damage to the sacks. From the bottom of the slide the sacks were "packed" by burros to the shore, and here they were again piled in neat stacks until some day a vessel hove in sight and anchored a hundred yards off shore. A scow was then employed to transfer the ore to the vessel. A sufficiently good pier could have been built at small cost and soon paid for itself. The vessel then sailed away to a foreign port and unloaded the ore on the docks. Flat cars could have been obtained and the ore placed immediately upon them. When the ore was eventually placed on the railway flats it was taken several miles to the reduction works (a small concern leased by the company), and here it was again piled up on the ground as neatly as before, with aisles between for tracks. Here, again, a saving might have been made by unloading from the flat cars onto a platform of equal height, having trap doors at regular intervals, so that small mine cars might be run underneath and the ore dumped into the cars before sending it into the mill—for it was not a reduction works at all, but called so out of courtesy. From the piles of sacks on the ground two men lifted three sacks onto a small trolley car (or flat), pushed the trolley from 100 to 300 feet to a small platform scale, where each sack was carefully weighed—why I do not know, as after weighing fifty sacks they could have found an average sufficiently close for all purposes. Having weighed the sack of ore, the two men lifted it bodily, cut the string, and dumped the ore into the car. When the car was filled it was trammed into the mill, run onto an elevator and slowly hoisted to the ore floor and dumped. I must not forget to mention that at this mill they had one of those elevated rock breakers referred to in my last letter—but, then, this might have been expected. Perhaps the worst feature of the whole business was that they were unable to save much above 50% of the value in the ore. This mine didn't pay. Whether it could have been made to pay under judicious and experienced management or not I cannot say, but I am sure I can see several "leaks" in the profits, and so, doubtless, can you.

L—— owned a large and profitable mine and he ran it on a broad gauge basis—so he thought—but I know of other mines that are better handled. The S—— mine had a great reputation, and it was a well-earned reputation, too, but L—— had some queer ideas about how his mine should be worked, and also some equally queer ideas as to how it should be timbered; or, perhaps, he didn't have any ideas at all on these subjects. But if not, then some one else about the place conceived these remarkable notions and L—— sanctioned them. The vein was large and the walls firm and solid—particularly the hanging wall—and a sort of "square-set" system of timbering was invented, and it was in this square-set that one of the remarkable notions showed itself. The timbers were framed in such a manner that the caps did not meet on top of the posts; nor did the tenons of the posts fill the space. Sometimes this space was filled with a block and very often it was not. One day I asked why the timbers were not framed in such a manner as to form a most rigid support to the ground until filling could be run in. The bit of information I got in answer to this question convinced me that argument would be useless. "Don't you know," said L——, "that it is proper to frame the timbers in such a way as to let them 'give' a little?" "What for?" I asked. "Why, to keep from crushing the timbers," replied L——. The only reply I could make was: "Don't you know that in one of your wide stopes the timber 'giving,' as you call it, say 2 inches on each set, will allow the hanging wall to settle over 2 feet (I have seen the hanging wall standing in great slabs, parted from the main hanging country, 5 feet and more in this very mine), and that once started it is not only very dangerous and more difficult to hold, but also will eventually make it far more expensive to continue mining operations, and that you will lose lots of ore?" "No, he replied, "I don't know anything of the sort, and I won't."

But he did, just the same.

MINER.

Temperature of Battery Water, Etc.

To THE EDITOR:—I have noticed in recent issues a number of articles on the temperature of battery water, and also on amalgamation and the general treatment of plates, etc.

Having had some years' experience in this work, the articles mentioned have proved of much interest to me.

I have experimented to some extent with the temperature of battery water, having had a range of from 40° to 80°, and I have found that better results were obtained with the temperature from 60° to 70°. With the lower temperature there was a noticeable tendency of the mercury to flour, and our loss of mercury during the use of cold water was higher than with the warm water, as was also the tailings. With warm water a much smaller quantity of mercury is required to amalgamate the gold, heat seemingly aiding the formation of the gold-mercury alloy and decidedly aiding concentration. The warm water softens the rubber belts of the concentrator and the concentrates show less tendency to work down toward the tail of the machine, apparently clinging to the belts. With warm water I found it very difficult to get the battery men to curtail the use of mercury to meet the increase in temperature, as at first they were inclined to use too much mercury and cause a dripping plate; but this difficulty was soon overcome and our results were very satisfactory indeed.

I quite agree that the use of acids on silver-plated plates is the worst practice possible. A solution of caustic potash or a very weak solution of cyanide should be used, and the latter very sparingly.

One of your correspondents condemns the lengthwise sweeping of the plates. I have found, in some cases, that in cross-brushing there is an accumulation of very fine sulphides, which prevents the proper contact of the gold and amalgam. The contention may be that these were a very high grade sulphuret, but I will say that a very careful sizing and assaying of the concentrates produced at this time showed the fine sulphurets to be by far the lowest grade of sulphuret produced.

I also found that as sparing a use as conditions would admit of water, both in the batteries and on the plates, gave the best results; and in the use of mercury to feed as little as possible in the batteries, using the bulk of it on the plates.

I fully realize that there is a difference of conditions in different localities, and that no hard and fast rules will govern the subject.

I see much has been said regarding screens. I have been using them—punched tin screens—where we have been crushing a little over three tons to the stamp. Considerable quantities of chips and sticks come up from the mine, which very much shortens the life of the screens. In the use of 63 screens, unburned, the average life was 12½ days. The average life of the same number of screens, the tin having been burned off, was 15 7 days. The longest life of any individual screen was 45 days. Of course, the holes were worn quite large, but I wished to see how long it would last. The average life was considerably lessened, as the sticks would often punch a screen out in a day or so, and a more proper average life would be about three weeks. H. S. C.

Greenwood, El Dorado Co., Cal.

Electrolytic Production of Zinc in 1898.

The chief event of 1898 in the electrolytic zinc industry has been the definite abandonment of the Ashcroft zinc extraction process, after lengthy trials at Newcastle, New South Wales. The failure of the process is attributed by the inventor to three causes: (1) diminished metal value of the ore sent for treatment; (2) difficulties due to the accumulation of manganese; (3) lack of necessary financial support. The failure of the process has obliged the Sulphide Corporation, which purchased the patents, to write £137,500 off its capital account, and has led to much mutual recrimination. Four wet extraction processes are still in operation, but only two of these are working upon a commercial basis. The Hœpfner process is operated at Winnington, in Cheshire, and at Fuerfurth, Germany; in 1897 1200 tons zinc were produced by this process at these works. The Dieffenbach process is worked at Duisburg, in Germany, and is stated to be producing about 90 tons zinc monthly. Both of these processes utilize zinc chloride solutions as the electrolyte, and it is questionable whether they would prove profitable in the absence of the chlorine liberated at the anode. The Cowper-Coles extraction process is in experimental operation at Hayle, in Cornwall. At Lipine, in Silesia, the Nahnsen process is reported to be still in use.

Many believe that the solution of the problem of zinc recovery from refractory sulphide ores will be solved by a dry or fusion process, belief shared by the writer; and on this account the Swinburne sulphide ore process is of exceptional interest. The trials to be made during the present year with this process will show whether the expectations formed by its inventor as regards its practicability and economy are justified. Another fusion process—the Fry process—has emerged from its experimental stage during 1898, and works are now building at Manchester on a very large scale for industrial operation of this process. It is not, however, an electrometallurgical one, and it is only mentioned because its operation will probably cause a serious fall in the price of zinc, and leave but slight margin for profits to the wet-extraction processes.

In the electro-galvanizing industry there is not much to report. The Cowper-Coles process is employed by several firms in this country; the Greenwood process is also in operation. Abroad, the Alexander process and the Richter process are used. There are no figures available from which the output of galvanized iron work by these various firms can be ascertained.—J. B. C. Kershaw in Electrical Review.

Cheap Mining in Australia.

Some of the large low-grade gold mines of Victoria, Australia, are making notable records for cheap mining and milling. The London *Mining Journal* says:

Quartz mining in Victoria is now being carried on in a very economical manner. The methods of mining the stone underground and bringing it to the surface have been reduced to a science, and it is probably nowhere more economically done than in Victoria. There is much room for improvement, though, in the method of milling the ore.

The half-yearly statements of several of the public companies, recently issued, give interesting details, and show what can be done by systematic and economical management. Anything over 3 dwts. to the ton would be regarded as comparatively rich. The Central Ellesmere crushed for the half-year 6900 tons for 911 ounces 1 dwt., an average of 2 dwts. 15 grains per ton. This gave a profit on actual working expenses of £1030 17s. 1d. The cost of treating the stone had been only 6s. 9d. per ton, against 7s. 0¾d. the previous half-year. The Thomas United, though their stone averaged under 2 dwts. per ton, from 4147 tons came out with a profit for the half-year of £510. This company has acquired a good winding and crushing plant, and opened up the mine to a depth of 130 feet without making calls.

More remarkable figures are shown by the Stewart's Extended, which company has no battery, and has to cart and pay for crushing. Its average was 2 dwts. 7.2 grains per ton, and on a yield of 219 ounces 19 dwts. 11 grains from 2778 tons, a profit of £34 3s. 7d. was obtained. The Stewart's United, which in December declared a dividend absorbing £300, had an average of less than 2 dwts. per ton for the half-year's work, 4881 tons being treated for 476½ ounces. This company has paid nine dividends on crushing stuff averaging all through considerably under 3 dwts. per ton.

When we consider that the mills at which the stone is crushed are far from being up to date, and contain neither rock breakers nor self-feeders, it must be admitted that the work is carried out in a very economical manner.

An Arizona Necessity.

To an observant and experienced mining man who visits the various mining plants of the country, nothing presents itself so forcibly as the general absence of complete concentrating attachments. Go even to the latest introduced enterprises and the management seem content with the most limited devices for saving the plate waste and base values from the ores. It is too bad that this is true, and yet it is practically a universal fact in this country, and it is practice that is readily accounted for. The seductive enchantment of Yavapai's rich pockets of free ore has extended so potent an influence in shaping local mining opinion that it is proving a slow and difficult process to bring our miners to a realization of the extent that this Territory's mining future depends upon the successful saving of values in its ores that cannot be secured by ordinary amalgamating processes. At Ward, Colorado, a base pyrite ore is extracted, hauled by a wagon to a mill and concentrated at a total expense of $3 25 to $3 35 per ton. This ore, exclusively a concentrating proposition, averages a saving of $4 per ton, leaving a net profit to the operators of about 70 cents per ton. Of course such a proposition as this must be based upon large ore bodies and cheap mining, but Arizona has as good a claim as any section to the probability of such mineral bodies. I wish to insist and to "harp" upon this theme—this neglect of the base and unplatable values in the ores of this country. It is now generally conceded that the most free of local ores carry a per cent of gold that quicksilver will not retain, while much of the mineral of our veins carry high per cents of the yellow metal in such form. Still our mill men, almost without an exception, seem satisfied that what two or three vanners will not catch is not worth saving. This is a bad mistake and should be corrected.—W. E. Mendenhall in the Prescott Courier.

Co-operation in Mining.

Where the system of co-operation has been given a fair trial it has proved a success. Many a miner works underground for six months in the year to save up enough to prospect in the hills during the summer season. Some are not fortunate enough to secure work during the winter months and to defray their expenses sell their claims for very little.

Mining is a branch of business in which co-operation would be advantageous. Instead of scattering in all directions, it would be better for a few practical men to get together, pick out the most promising claim on their list and co-operate in working it for all it is worth. At present they often sell their claims for a few dollars, the property passes into the hands of another, who accordingly turns it over for four or five times the price paid, and so on until finally it comes into the possession of some syndicate that reaps the profits that might go into the pockets of the original locator and would be his if he but conducted his business on the co-operative plan. Instead of selling undeveloped properties for a mere trifle he might, on this plan, develop them and get more. Such a system would also be beneficial to the country at large and tend to its speedy development.

One developed property in a district does more to establish a reputation than a score of prospects, however good they may be. It does not require more capital than the ordinary miner or prospector generally possesses to go into a scheme of this sort. When men show their faith in a property by devoting all their energies to its development they naturally gain the confidence of capital. Practical men will know a good thing when they see it, and if it be their own they will work it more energetically and economically than if it were in the hands of some corporation. Sufficient work can generally be done by hand and a cheap plant installed to demonstrate the value of a property before heavy and expensive machinery need be introduced. Mining is essentially a business adapted to the co-operative plan. A dozen men or so, bound by ties of self-interest, if nothing else, could accomplish much in this way. The idea is worthy of consideration.

Iron and Steel Market.

A rumor extensively circulated is to the effect that the iron and steel market is dangerously affected by the scarcity of material.

One prominent dealer says: "While it is true that the price of iron has risen, there is enough iron ore in this country to supply the market, and more, too. The fact that there is a delay in the delivery of special orders does not imply a lack of crude material. It simply means that the capacity for putting out the finished article is inadequate to the demand. Another reason is the fact that the manufacture of iron has not been upon a paying basis. The laborer's wage has been too low, and prices correspondingly so. There have been dull times in the iron business, as in everything else, and then the prices dropped and left the manufacturer between the horns of the dilemma. One proposition was to close his works for the time being and throw thousands of men out of employment, cut off his profits, and yet be under the expense of keeping up his business until times grow better. Afterwards he would have to break in a new force of men. The alternative which was more logical, and at the same time a more humanitarian view, was to run his business at a loss and use foreign countries for a dumping ground. In most cases this was done, and thus prices were cut to pieces. Now, when home consumption is sufficient to consume the output, wages will regain a normal standard and iron will naturally increase in price. The foreign market will suffer and exportation of iron and steel will be cut in two, but the European buyer, and not the American manufacturer, will suffer by the changed conditions.'

A Great Many Say So.

The MINING AND SCIENTIFIC PRESS of California is the leading mining paper of the world.—Creede, Colo., Candle, Feb. 18th, '99.

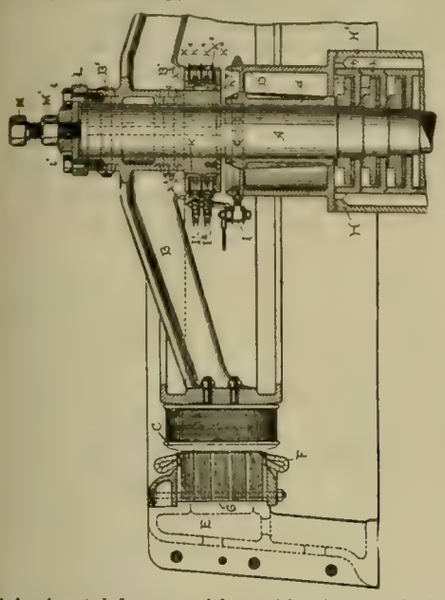
EXCHANGES report the death of several miners in various parts of the country the past week from falling into shafts, in most cases, from stations underground. While miners, as a class, become careless by constant exposure to the dangers of their business, it would seem that many such accidents as above referred to could be prevented by proper precautions on the part of the mine owners by the construction of guards about the shafts at stations.

Latest Mining and Metallurgical Patents.

Patents Issued February 14, 1899.

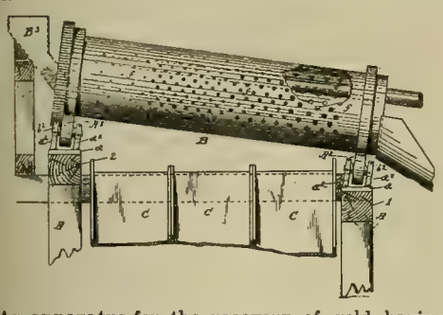
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

DYNAMO ELECTRICAL MACHINE.—No. 619,296; S. S. Forster, Schenectady, N. Y.



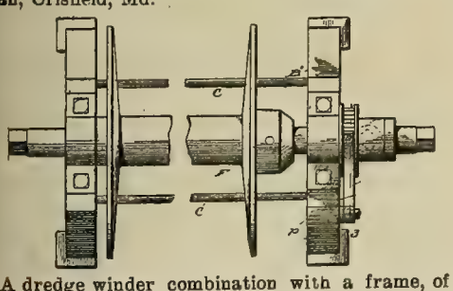
A horizontal dynamo with combination of split-hub spider, a collector fixed to one side of the spider with a space between the other side of the spider and the collector, means for securing the hub to a shaft, a supporting bearing, and means for adjusting the position of the spider without disturbing the collector when for any reason, as by wear of the bearing, the spider is out of its proper position.

ROTARY GRIZZLY OR SEPARATOR.—No. 619,341; Robt. H. Postlethwaite, San Francisco, Cal., assignor to the Risdon Iron Works, San Francisco, Cal.



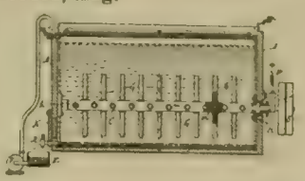
An apparatus for the recovery of gold, having a combination of a rotary cylindrical grizzly of approximately uniform diameter throughout its length, the perforations therein being arranged in sections and increased in size from the feed end toward the discharge end, with separating tables below the grizzly, means for rotating the grizzly and a tapering water supply pipe extending into the grizzly with the small end nearest the feed end of the grizzly, and provided with outlet openings so arranged that the outlet of water will be proportioned to the discharge of material from the various sections of the grizzly.

DREDGE WINDER.—No. 619,591; Maddrix & Godman, Crisfield, Md.



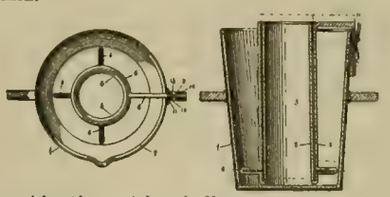
A dredge winder combination with a frame, of a winding shaft mounted in bearings to rotate and slide longitudinally, a winding spool or drum mounted loosely on the shaft and provided at one end with clutch teeth or lugs, a clutch head fixed to the shaft and adapted when the shaft is slid longitudinally to be engaged or disengaged from the teeth of the spool to hold the same rigidly in engagement with the shaft, a sleeve loosely mounted on said shaft adjacent to the clutch head and provided on its interior with spiral grooves and on its exterior with an annular series of ratchet teeth and circumferential limit flanges arranged at opposite sides thereof, a pin fixed to the shaft and having its opposite ends projecting into and adapted to traverse the grooves in the sleeves, and a pawl pivoted to the frame and engaging the ratchet teeth on the sleeve adapted to prevent backward rotation of the sleeve.

EXTRACTING GOLD FROM SLIMES.—No. 619,349; H. Riecken, London, Eng.



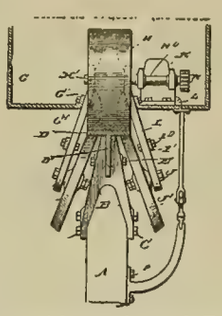
An electrolytic process of extracting precious metals from ores or slimes, consisting in agitating a mixture of the ores or slimes and an electrolyte in the presence of an anode, causing a stream of mercury to descend in a thin film over a metallic surface forming a cathode, passing a current through the pulp to the cathode and thereby amalgamating the precious metals and depositing them in an adherent layer upon the cathode, collecting the descending mercury and reconveying it to the top of the metallic surface.

FOUNDRY LADLE.—No. 619,431; D. W. Nash, Eastlake, Ala.



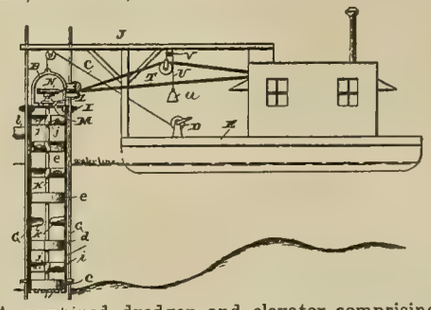
A combination with a ladle of a hollow bottomless cylinder placed therein and arranged to seat on the bottom of the ladle, the connecting arm attached to the head and having an apertured stem extending downwardly on the outside of the ladle, the eccentric cam operating in the aperture formed in the arm stem, the nut to clamp the cam.

AERIAL RAILWAY.—No. 619,536; Jno. Bond, Turlock, Cal.



A combination with an elevated T-rail, of a carriage comprising bearing plates carrying a roller to bear upon the upper surface of the T-rail, bevel rollers to bear against the under surface of the T-rail, the plates inclining laterally and downward, straddling the tops of the poles; a balloon or airship supported upon the carriage and carrying a motor, curved brackets on the sides of the poles, a line wire supported therefrom, and a trolley pole depending from the carriage and carrying a trolley wheel in contact with the wire.

DREDGER AND ELEVATOR.—No. 619,675; A. W. Cram, Haverhill, Mass.

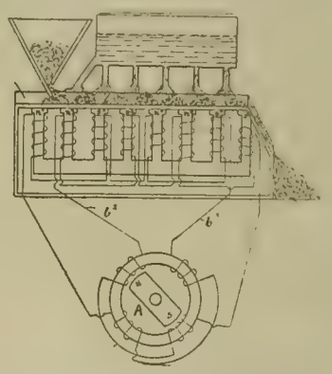


A combined dredger and elevator comprising a propeller tube, a centrally and longitudinally arranged shaft within the tube, a combined cutter and propeller secured to the lower end of the shaft within and at the lower end of the tube, a plurality of propellers attached to the shaft and concentrically arranged within the tube one above the other, and a plurality of oppositely inwardly extending blades attached to the tube and arranged between the propellers, and an operating mechanism. The elevator tube has an open lower end; the propeller blade has at the center of its lower side cutting blades *h*.

APPARATUS FOR PLACER MINING.—No. 619,647; G. Wetherby, Duluth, Minn.

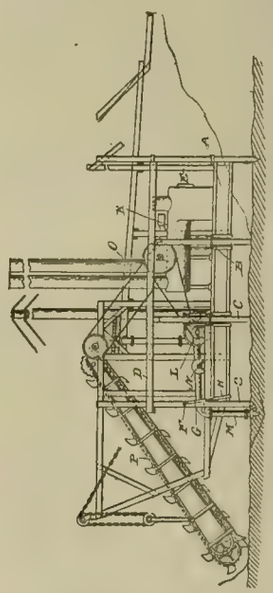
An apparatus for use in placer mining for loosening dirt or disintegrating hard or frozen earth by means of steam, the combination of a suitable steam supply and a conveyor or hose for delivering steam to the desired point, with a hose support consisting of a rod *d* having at each end thereof semicircular holders *e*, *e*, a forked leg *d'* and a sliding brace d^2 connecting said rod *d* and leg *d'*, and the extensible legs d^5, d^5.

APPARATUS FOR SEPARATING MAGNETIC MATERIALS.—No. 619,636; O. A. P. Trustedt, Stockholm, Sweden.



A magnetic separator with a combination of a series of electromagnets, a stationary non-magnetic covering on the magnet poles and a source of multiphase alternating currents of which the windings of each phase are connected to different magnets in the series.

DREDGING APPARATUS.—No. 619,901; A. McDougall, Duluth, Minn.



A mining apparatus with a scow *A* provided with adjustable legs or spuds *C*, having pins *F* passing through each with adjustable turnbuckles *G* thereon, the lower ends of which are connected to a strap *H*, secured to the scow.

IGNITER FOR GAS ENGINE.—No. 619,396; W. L. Crouch, New Brighton, Pa.

In a gas engine, the combination with the cylinder, of an ignition tube upon the exterior of the cylinder, a non-conducting cover inclosing the ignition tube and arranged to leave a space between the cover and tube, the cover being provided at or near its top with an opening, a removable cover adapted to close the opening, a strip or body of material capable of being heated to incandescence suspended within the ignition tube and a burner communicating with the space between the cover and ignition tube.

Some Notes on Alluvial Mining in New Zealand.

Written for the MINING AND SCIENTIFIC PRESS by JNO. W. GRAY.

According to the report of the Department of Mines for the year just past, the interest in alluvial mining continues unabated. The following notes are mainly taken from information given in the Government report and will probably be of interest to those in any way connected with this class of mining:

In the provinces of Otago and Southland claims are taken up not only on the rivers but on the terraces and flats adjacent, and also on the alluvial flats where depth of ground has hitherto been the obstacle to the ground being worked by older methods. Dredging is the popular method of mining and operations are being carried on in the swift-flowing streams such as the Clutha, Kawarua and Molyneux; also in the lesser rivers, smaller streams and old river deposits. The material is elevated from 25 to 30 feet in the rivers and from 6 to 30 feet in other places, requiring dredges of modified construction according to the peculiar conditions of the different localities.

It has been demonstrated that dredges can be successfully handled with very limited water supply. A large paddock is first excavated of sufficient dimensions to float the dredge. Operations are then begun on one side, the gravel being discharged behind the dredge by flume or an elevating conveyor. The fine gravel only is discharged without being elevated. If the water becomes thickened by continued use, as is generally the case, it is partially cleared by such small continuous or intermittent flow as is obtainable. A very moderate quantity of water is thus found able to keep the paddock water in a satisfactory condition for working purposes. The water is continuously used and such operations have proven successful. Prior to being worked land may present a level appearance. Afterwards, though not so level, it is left in such a state that it can be harrowed and sown to grass, no great permanent damage being done to the land and the streams are not polluted to any extent nor filled up as in ordinary sluicing.

The marked advantage claimed for the dredging operations as compared with sluicing is that it enables large quantities of material to be elevated and then deposited at a less cost than by any mechanical process now in use.

In the matter of dredging, however, the public is warned not to fall into the error that has sometimes attended quartz mining, namely, the construction and erection of costly machinery for the treatment of material, the quantity and value of which has not first been ascertained properly. Systematic preliminary prospecting is recommended, of so complete a nature as to fully establish the quantity and value of the material to be handled, as well as to determine the conditions of working, so that the machinery to be used can be properly designed for the work to be done.

The great area of river deposits in Otago and Southland, which are known to contain small quantities of gold, are thought to be worthy of careful prospecting, with every reason to expect the discovery of localities where the gold occurs in payable quantities and which will give promise of profitable dredging work.

A large number of dredges are said to be in more or less successful operation in the many localities where work is now being carried on. Complete returns of the gold won by these operations are, as is usually the case, not obtainable, as the owners in many instances are unwilling to have their yield of gold published. Partial reports, however, show that eighteen dredges yielded during the past year, ending March 31st, 1898, 10,909 ounces, an average of about 606 ounces each. The highest yield was that of the Clyde Co., operating at Alexandra, viz., 2224 ounces. Returns from the great majority of the dredges are not given. Improvements are constantly being made in dredge building and equipment, different engineers vieing with each other in producing more powerful and effective machinery. The following brief description of two new up-to-date dredges may not be out of place:

Magnetic Company's dredge—Length 109 feet, width of beam 25 feet 6 inches, depth 7 feet. The ladder is 75 feet long and is designed to dredge to a depth of 50 feet from the surface of water. The buckets are 5½ cubic feet capacity. The engine is one of Marshall's 16 H. P. compounds, and surface condensation is effected by water raised for gold-saving purposes. The winch is driven by a pair of horizontal engines fitted with reversing motion. The boiler is a Cornish multitubular; working pressure 150 pounds per square inch. The ladder is raised and lowered in the usual way from the winch. The buckets are put in motion by the tumbler driven by gears and rope drive from the engine. The material is delivered on a drop plate and thence into a perforated screen, the fine stuff falling through onto the gold-saving tables. The material is washed by perforated pipe running through the screen, and the tables are supplied with an additional supply by branch pipes. Water is supplied by a centrifugal pump, driven from engine by a belt. The coarse material is delivered directly into the current or elevated by a traveling conveyor. This dredge will be the largest afloat in the province of Otago.

Unity Company's dredge—Length 85 feet, width 26 feet 6 inches, ladder 60 feet, buckets 4½ cubic feet capacity. The engine is a 16 H. P. compound with surface condenser. Centrifugal pump and air pump are placed below deck. The winch is driven by worms and worm wheels, the power being supplied by a pair of vertical engines with reversing gear. The boiler is a Marshall's 20 H. P.; working pressure 140 pounds per square inch. The ladder is raised and lowered in the usual manner. The material is delivered from the buckets into a revolving screen, the fine stuff being distributed over a double set of tables leading each way from the center of the screen. The coarse material is elevated and dropped astern.

The coming year, it is said, will see important additions to the number and character of the dredges operating in the colony.

On the west coast dredging has not yet become so general or popular as in the provinces above mentioned. There are evidences, however, that many of the flats containing auriferous gravels will be so worked. In several localities small dredges are doing prospect work preliminary to larger operations.

The company operating on the Buller river is having a new, large and powerful dredge constructed, capable of handling 100 yards of material per hour. The work of this company is said to have given profitable results.

The success that has attended dredging in Otago, in places where no large stream is available, has proven the possibility of working large quantities of gravel with a limited water supply, and this fact has increased the interest in such operations in other localities where the conditions are similar.

In the ordinary work of hydraulic mining no special changes have taken place during the year. The Government has somewhat enlarged and repaired some of the more important water supply races, and is pursuing its plan of investigating the possibilities of water conservation and distribution for the benefit of the mining industry. The communities depending upon alluvial mining are as prosperous as usual, and the year generally has been a busy one.

As illustrating the operation of gravel elevating in the colony, some data relating to two of the most important plants may be given.

At the Blue Spur Cons., Otago, the following table shows the work done during the year 1897-98:

	Hours Sluicing.	*Cement, Cu. Yds.*	*Gold, Ozs.*	*Value per Cu. Yd. Gr.*	*d.*
No. 1 Division	2,636	70,177.6	1,085.7	7.43	14.68
No. 1A	571.5	10,001.2	24.7	1.19	2.34
No. 2	1,146.5	38,178.4	555.8	6.94	13.80
No. 2B	2,807.5	84,225.0	1,497.7	8.53	16.86
	7,161.5	202,522.2	3,163.9		

No. 1 elevator lifts 68 feet. No. 2B works in series 43 feet and 69 feet, making a total lift of 112 feet. No. 1A and No. 2 represent development and stripping. Total yield of gold was 3163 9 ounces, which at £3 19s per ounce = £12,497 8s. The cost of production was 50.15% of the gold won. The two main items of expense were labor and explosives. About 7500 pounds of roburite were used, and the cost per ounce of gold, for labor and explosives alone, was £1 8s 5½d.

At the Round Hill Co.'s property, Southland, extensive operations are carried on by elevating and sluicing. The banks average 40 feet in height with a slight depth of auriferous wash dirt lying upon sandy and hard clay bands constituting false bottoms, and on a main bottom of igneous formation. Elevators of 13 inch pipe are used, with patent oval seats 16″x 10″, having throats 3 feet high and 6 inches diameter. These, with a properly regulated water and dirt supply, are capable of lifting seventy tons per hour to a height of 50 feet. Air injectors are attached to cause a body of air to accompany and surround the water forced up the elevators, thus diminishing friction and otherwise aiding the work of lifting. The average number of Government heads to each elevator is 5.434, each head being equal to 1 cubic foot per second, and on each piping nozzle on face 3 63 heads.

The average gold recovery has been 1¾ grains per yard, valued at 3½ pence or about 7 cents per cubic yard. Details of cost of operation are not given, but it is said that the company makes a fair profit with the yield as above given.

A Montana Miner's Tools.

In Anaconda, Jas. Bray has seven tools made by himself, three being pole picks of the kind used to break off samples of rock and four candlesticks. The eyes and straps of two of the picks are forged from one piece of steel, the wood of the handles worked into the straps. One of the candlesticks is made so that it can be taken apart and fits into the end of the handle of one of the picks. Another has a pistol grip in place of the ordinary loop or ring, and can be closed up something after the manner of a clasp knife. A cover working with a spring fits over the socket into which the candle is inserted, and is so arranged that as soon as the candle is consumed even with the top of the socket the cover flies forward and extinguishes the candle. In addition, Mr. Bray has still another folding candlestick, made to be carried in the pocket. It is so arranged that either the hook or spike can be used, or both can be folded back and the stick carried in the hand. Another stick has a knife attachment connected with the hook for cutting fuse, an arrangement for splitting the fuse and ripping open the paper that covers giant powder in case it is found necessary to crowd it into a small hole, and also an appliance for crimping the cap. This stick is also provided with the automatic extinguisher.

The "Electro-Zinc" Process, and Experimental Researches Which Led to Its Development.

NUMBER II—CONCLUDED.

By W. BETTEL, Johannesburg, S. A.

Although the commercial use of sodium amalgam dissolved in excess of mercury for gold precipitation seemed out of the question, as it took 40 ozs. sodium to precipitate 1 oz. of gold, yet I availed myself of the reaction to rapidly assay cyanide solutions by shaking up in a stoppered cylindrical separating funnel from 200 to 1000 c. c. of the liquor to be tested with from 5 to 20 c. c. sodium amalgam, free from gold, containing 0.1% of metallic sodium for 20 minutes. The mercury separated from the solution was then dissolved in nitric acid until a final globule was obtained which was then cautiously parted in nitric acid, the residual gold washed, dried, and ignited in a porcelain crucible and then weighed. From a number of experiments made by dissolving weighed quantities of gold leaf (of known fineness) in cyanide solution, I was enabled to check the evaporation and fusion method of assaying solutions, and, finding this process reliable, I checked the sodium amalgam wet assay method. I found that, approximately, 98% to 95% of the gold was precipitated from solutions of an ounce down to 5 dwts.; 95% to 90% from solutions of 5 dwts. to 1 dwt., and, approximately, 90% to 80%, from solutions of a value of 1 dwt. down to 0.1 dwt. fine gold per ton, the latter solution being assayed by shaking 2½ litres with two consecutive lots of 10 c. c. sodium amalgam in a stoppered "Winchester quart." A suitable correction was made on weighing the gold. I found the method very useful, and the corrected results accurate enough for ordinary purposes, being within 2% plus or minus of the truth. In fact the process compares very favorably with the usual method of evaporation and cupellation and is extremely rapid.

Being convinced that electricity produced by the contact of dissimilar metal in cyanide solutions effected precipitation of gold and silver in the extractor boxes, I made many experiments on electrical precipitation, using both "local action," and electrical currents derived from extraneous sources. The first experiment made in '92 was with coarsely powdered zinc amalgam. The action was very good, only 1.5 grains gold per ton being left in a solution originally containing 1 oz. gold per ton, but the rapid decomposition of water with accompanying oxidation of the zinc speedily rendered the amalgam useless, when treating weak solutions. The next experiments were made with zinc shavings made into galvanic couples as directed by the discoverers (Dr. Gladstone and the late Mr. Tribe) with copper, lead, bismuth, mercury and silver, by dipping the shavings into soluble salts of these metals dissolved in water. Being anxious to try the precipitation process by "local action" on solutions from slimes treatment, I erected, at my own expense, a small experimental plant to prove my work on a 100 ton scale, at the New Primrose G. M. Co.'s works, in Sept., '94. In this plant I had the following novel arrangements:

1. Flocculation of slimes and collection of so-called "float" gold, by addition of lime water to the slimes pulp.

2. Continuous settlement of pulp in a dam with sloping sides and pointed base (a rough spitzkasten) with equalizing launder and baffle boards, for inflow, and discharging launder for overflow.

3. Pumping up settled slime with centrifugal pump aided by air agitation into a launder, into which was also pumped weak cyanide solution (waste liquors from cyanide works). This is the so-called "trough lixiviation." The pulp ran into tanks for settlement.

4. Air agitation in settling tanks.

5. Decantation of clear solution by decanting pipes (so-called floating syphons).

6. Precipitation of gold from solution by means of local electrical action embodying experiments with zinc-lead, zinc-copper, zinc-mercury, zinc-silver, zinc-carbon and charcoal.

When the solutions were clear and the couples clean the precipitation was excellent, a well-authenticated case giving only 0 25 grain of gold after precipitation. Charcoal also gave good precipitation

so long as hydrogen remained occluded in the pores of the charcoal, giving a hydrogen-carbon couple. The combined effect of oxidation of the zinc (in experiments with zinc-couples) precipitation of lime as carbonate, of zinc as hydrate, carbonate, and complex ferro-cyanides, and of slimes in suspension, caused the precipitation to slacken and then stop sooner or later. The oxidation effect induced me to make experiments with zinc-shavings in metallic contact with the negative pole of a small battery giving 6 volts pressure against a suitable resistance, the positive pole being connected to an arc-light carbon placed inside a porous pot filled with weak salt solution. So long as the battery was active the zinc-shavings kept clean and effectually precipitated the gold from solution. This was the experiment which led me to devise the "electro-zinc" precipitation process.

Before describing this process let me say that the New Primrose G. M. Co. paid me about £35 for the gold I won by means of "local action" (principally from "zinc-lead" couples) from solutions obtained in treatment of 99 tons of slimes, assaying 2.67 dwts. fine gold per ton.

I can, therefore, fairly lay claim to have been the first to precipitate gold (and silver) from weak solutions of cyanide produced in slimes treatment by local galvanic action, although this honor has been claimed for other and later experimenters.

The galvanic couple methods for precipitation of gold having inherent disadvantages, I set to work to remove them by taking as a starting point the experiment I made with zinc-shavings and gas-carbon as the cathode and anode respectively of an electrolytic cell.

I had before me several difficulties: First, the selection of a suitable anode; second, construction of and material for a porous cell; third, construction of the box for commercial work.

The Anode.—The employment of gas carbon or arc light carbons as anodes, either plain or coated with spongy platinum, failed on account of their disintegration and the formation of oxidation products.

Peroxide of lead plates, as used in accumulators, were out of the question on the score of expense, and the difficulty of handling large plates. Lead, in an alkaline solution, was found to be oxidized to a non-adherent protoxide of lead which left the plate open to continuous attacks by the nascent oxygen produced during the electrolysis of the solution. After numerous experiments which I need not detail I hit upon the idea of employing an insulating varnish which was thoroughly oxidized, and on which the weak current of electricity I proposed to use had little action, and making that a vehicle for holding plumbago in such a way that it acted as a conductor of the positive electricity from the lead to the solution.

This arrangement, I found, answered perfectly if a current not stronger than 0.4 ampere per square foot of anode surface was employed. A stronger current oxidized the varnish, exposing the lead plate to oxidation to peroxide with eventual disintegration.

The best varnish I find to be linseed oil (which has been boiled with litharge to form linoleate of lead) mixed with twice its bulk of brunswick black varnish (a solution of asphaltum, etc., in turpentine); turpentine is added to thin the mixture, and an amount of plumbago equal to one-third the bulk of the whole. This, placed in a shallow vessel, is painted onto the lead sheets with an ordinary paint brush, the mixture being continuously stirred to keep the plumbago in suspension. The varnish is then allowed to dry and a second coating is subsequently given.

The varnish when dry is flexible and is not readily removed except by scraping or scratching.

Porous Cells.—Being convinced by my experiments that the evolved oxygen from the anode should not be allowed to mix with the cyanide solution and so come in contact with the cathode (zinc shavings), it was necessary to devise a porous cell of sufficient strength to withstand the rough usage it would undoubtedly get from Kafirs, and at the same time be efficient. Earthenware and biscuit-porcelain plates were thought of and discarded as being too expensive; asbestos cloth was found to be too porous; animal membranes were not reliable; and parchmentized paper cotton waterproofed with di-nitrocellulose in acetone (collodion) and sundry other materials proved too weak to stand rough usage, and were too expensive.

I ultimately tried and adopted "14 oz." "cotton duck" made waterproof with either, 1, tannate of albumin; 2, tannate of gelatine; 3, chromate of albumin; 4, chromate of gelatine; 3 and 4 being rendered insoluble by exposure to sunlight.

Any of these substances as "pore-fillers" acted so perfectly that a box divided longitudinally into parallel watertight compartments with the prepared canvas would hold, in alternate compartments, weak acid and alkaline solutions without any appreciable diffusion, a solution containing 0.03% calcium hydrate passing through the box side by side with dilute sulphuric acid (.03%) in adjoining compartments, did not lose strength appreciably during the time taken to flow through the box (two hours). Electrolysis, however, was found to be quite practicable, the resistance to the passage of the current being very small.

The Alkaline Solution.—As the action of electricity on cyanide solutions at the positive pole is one of decomposition, and as, under the influence of the current an alkaline salt splits up into an acid which remains in the anode compartment (or escapes as gas such as CO_2) and alkali which (electrolytically) diffuses into the cathode cell, I used a mixture of carbonate or bicarbonate of soda with any other alkaline salt in sufficient quantity to render the solution passing through the anode compartments as good a conductor of electricity as the gold liquor to be precipitated. About .02% solid matter in solution proved to be a workable strength.

The cathode (zinc shavings) calls for no description, but the metallic cage of perforated zinc, holding the shavings and making connection, must now be described. The cages are rectangular, divided down the center by a sheet of perforated zinc soldered to the top, bottom, and ends (also of perforated zinc). There are four trays, making, with the bottom, six compartments, the edges of which are stiffened with angle zinc. The sides are formed of coarse sacking bound round the edges, fastened at the bottom by cord to the cages and at the top to each other by bands fastened by carriage hooks and eyes. The cages are electrically connected to the negative pole of the dynamo so as to collect the electricity from the zinc shavings as evenly as possible. The box consists of ninety compartments, fifty of which are narrow and canvas-framed for anodes, and forty (wide) for holding cathode cages containing zinc shavings. At the head of the box, the "alkaline" solution flows into the five smaller subdivisions or tubes in the transverse partitions, the gold solution flowing into the four larger tubes. The solutions flow up and down, precisely as if there were nine boxes, in a row, five of which were only 4 inches wide and four 1 foot 1 inch in width. In consequence, the box is rather expensive to construct, but in another installation I propose to simplify the apparatus so that without detriment to the precipitation the original cost of the box will be materially reduced.

Electrical Connections.—The box is wired in parallel (as series wiring does not seem to answer), the anode connections being soldered to strips of copper attached to the positive conductor and the cathode wires clamped between tinned copper strips 2½x1½x 1¼ inches, with screws and hexagonal nuts. The clamps are securely fastened by soldering to copper tapes connected to the return (negative) conductor. These connections have given complete satisfaction, the electricity being evenly distributed.

Current.—The current used has varied from 150 to 300 amperes at 5 to 8 volts, with an average of 200 amperes and 6 volts. In future installations the resistance of the box will be materially lowered so that a pressure of not more than 3 volts will be required.

I regret my inability to supply drawings for publication, as the process has not yet been patented in other countries, but I shall be pleased to show the box, which has been working at the Geldenhuis Deep, by appointment, to anyone desirous of learning further details.

The precipitation in this box has been excellent, a six weeks run showing an average of 1.28 grains per ton of solution after precipitation, and, on cleaning up, a small plus extraction was obtained.

Cleaning Up.—The zinc being kept clean (thereby differing from the zinc-lead method I first introduced) and active by the current, it may, with economy and satisfactory results, be transferred to the ordinary zinc precipitation boxes in sands plants, or, as the precipitation will be perfectly satisfactory, at the rate of 100 tons of solution per day passing through a small box (of 9.6 tons cubical capacity) for fully six months, the precipitation may be allowed to proceed for any convenient length of time (say 3 months) and the precipitated gold recovered by a sulphuric acid cleanup, properly conducted, followed by fluxing with a calculated quantity of an oxidizing agent and other fluxes, producing a slag which is slightly alkaline. The slag so produced yields 90% of its (small) gold contents by amalgamation in a barrel, the material being previously crushed to pass a 900 mesh screen.

Costs. — Under the above conditions (a three-monthly cleanup) the costs based upon figures obtained in actual practice will be approximately 1.93d per ton of solution treated. To this must be added interest on plant which, at 20%, will amount to .78d per ton, of solution and royalty 1.8d per ton, or a total of 4½d per ton of solution. Taking two tons of solution precipitated per ton of slimes treated, this will equal 9d per ton of slimes.

This cost will be considerably reduced by using boxes of larger size, one of which would be sufficient for a slimes plant attached to a 100-stamp mill.

I estimate, as the result of my trials, that this process will give at least 6d (per ton of slimes treated) more profit than any other process at present existent.

THE Manhattan Elevated (N. Y.) road is to change its motive power from steam to electricity, a work of enormous magnitude.

Notes on Experimental Metallurgy.*

NUMBER II.—CONCLUDED.

By J. E. CLENNELL, Salt Lake City, Utah.

Where the panning test shows clean coarse gold, amalgamation naturally suggests itself. Various more or less ingenious devices have been proposed for imitating, on a laboratory scale, the action of the stamp battery with amalgamated plates, or of the process of pan amalgamation. I do not know of any, however, which is generally satisfactory—they are all either too bad or too good. The proposals made from time to time by so-called practical assayers, and which are occasionally published by the mining papers, are sometimes almost ludicrous. One man grinds his ore in a mortar for several hours (often with addition of cyanide), pans out the residue, and collects his floured mercury by doctoring the concentrates with nitric acid. He then proceeds to "retort" his amalgam by heating it in a procelain capsule over the flame of a spirit lamp, or in the muffle—presumably the inevitable losses in the latter part of the operation are intended to counterbalance the illegitimate gains in the nitric acid treatment. Others agitate amalgamated copper strips in bottles with ore and dilute caustic soda, trusting in Providence to prevent the amalgam being scoured off by the action of the sand. A method which seems promising, is to wash the ore, crushed to a suitable degree of fineness, over a shallow copper dish, amalgamated all over the inner surface except at the rim. The ore is added spoonful at a time, washed backwards and forwards for a few moments, so that it spends out in a thin layer, then washed off and a fresh spoonful added. The difference in the assay of the originals and residues indicates the amount extracted by amalgamation. The difficulty with this method is to keep the plate bright. It must be very carefully cleansed with caustic alkali, cyanide or salammoniac immediately before using, and unless the ore is absolutely free from base metal compounds, tarnishes rapidly during the progress of the test. I am induced to think the results of this and other methods, where an attempt is made to wash the ore over an amalgamated plate, are considerably lower than would be obtained by actual plate amalgamation on a working scale with the same ore. Comparatively few laboratories are able to include a small stamp mill or grinding as part of their outfit, but some such appliance would seem to be the only reliable means of making an amalgamation test.

For reasons above given, an investigation of the merits or demerits of the cyanide procees as applied to the ore under consideration, will almost always form an essential part of the experimental treatment, and it will be worth while to discuss in greater detail the methods of examination to be adopted.

In cyanide treatment there are so many factors capable of modification, that it is seldom, if ever possible to determine, off-hand, what is the best system, or indeed whether the ore can be treated at all.

Nevertheless we have found that a system of preliminary qualitative tests often gives a large amount of useful information. These tests are simple and can generally be executed in half an hour or so; they often go a long way towards deciding whether we have to deal with a cyaniding ore, or not. It would be beyond the scope of this paper to go into minute analytical details, with which most of you are quite familiar, but I may mention that the tests we have found most useful are made on two portions of the crushed ore, one of which is agitated with water, and the other with cyanide solution of the strength commonly used in pratice, say from .1 to .2%. These are then filtered after standing a few minutes and the two filtrates examined for various substances in solution.

The water filtrate will of course be examined for soluble salts of iron, iron, copper and other base metals, for acidity and for soluble sulphates and chlorides. These tests will show whether a preliminary waterwash is necessary or advisable.

The cyanide filtrate should be tested especially for soluble sulphides, ferrocyanides, sulphocyanides, copper, zinc, and for reducing power. I will here detail a few tests which we are in the habit of making with this liquid, and which may possibly not be familiar to all of you:

1.—On adding hydrochloric (or any other) acid a white turbidity is frequently observed. This is sometimes given as a test for alkaline sulphides, but a similar turbidity may occur when no sulphide is present, for example, with certain compounds of zinc or copper.

2.—If after adding hydrochloric acid in slight excess, disregarding the white turbidity formed, a few drops of dilute potassium ferrocyanide be added, a characteristic reddish brown tint or precipitate occurs when copper is present even in very small quantity. A white flocculent precipitate formed under these circumstances, and soluble in alkalis, often indicates zinc.

3.—A solution of lead tartrate in excess of caustic soda is a convenient reagent for detecting soluble sulphides in cyanide solution. Ordinary lead salts

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*Journal of the Chemical and Metallurgical Society of S. A.

give a white precipitate of lead cyanide, often obscuring the sulphide reaction when the quantity of sulphide is small, but the tartrate solution gives no precipitate with pure cyanide. Very small quantities of alkaline sulphides are, however, detected by the black or brown coloration.

4.—The test for reducing power is made by acidulating some of the solution with sulphuric acid, and adding a few drops of dilute permanganate. In some cases this reaction can be applied quantitatively, but it is well to remember that this reducing action may be due to a variety of causes, and it is produced by ferrocyanide, sulphocyanides, sulphides, organic matter, etc. Where this reaction is strong, oxidation will probably be necessary, either before or during cyanide treatment.

Having, by these preliminary qualitative tests determined the general behavior of the ore towards dilute cyanide solution, we next proceed to make a series of small scale quantitative tests, in order to obtain definite information on the following points:

1.—What is the most economical degree of fineness to which the ore may be crushed for subsequent cyanide treatment?

2.—What is the best strength of soultion to use?

3.—What is the best proportion of solution to ore?

4.—What length of time is necessary for satisfactory results?

5.—Is it necessary to use alkalis?

6.—Is it necessary to give oxidation?

7.—Is it necessary to give any preparatory treatment?

In many cases these questions may be answered with tolerable accuracy by means of tests on a scale of two pounds, made in the manner which I shall presently describe. It is always best, however, to confirm the result on as large a scale as possible, as the conditions of practice may be much more closely imitated when operating on a ton of material than when only two or three pounds are handled. Some of you may ask—"Why not make the tests on a large scale at once?" This would doubtless be the best course to take if we had command of unlimited material, labor, time (and last but not least) cash. It will easily be seen however, that if we use up the whole of our available material in a single tests, and the result is not satisfactory, we have no means of trying the effect of some different system of treatment. Experience has, in fact, shown us that it generally pays to make the small scale tests first, as a large number can be made simultaneously with far less expenditure of labor and money than a single large scale which ought in all cases to follow. It must be distinctly understood, that the small scale results are not to be taken as an exact indication of the behavior of ore in practice.

The general method we have adopted in carrying out the small scale tests is as follows:

The charge, generally consisting of two pounds of the material to be tested, is placed in a wide-mouthed glass jar, capable of being fastened water-tight by means of a glass stopper provided with an india rubber ring. When the jar is closed, the stopper is held tightly in place by a wire spring fastener. After adding the required amount of solution, the jars are agitated for several hours by any convenient mechanism, such as a Kafir. Where a number of tests have to be made simultaneously, a simple and effective arrangement is as follows: A wooden disc is caused to revolve by means of a belt connected with some source of power. Holes are cut in the disc to receive the jars, in which they are secured by elastic bands passing over suitably arranged hooks. As the disc revolves, each bottle describes a complete circle, and by properly regulating the speed a thorough agitation is secured, each test being treated exactly alike. After agitating for as long as may appear necessary, the jars are allowed to stand until the contents have settled, and the clear liquid then drawn off by means of a glass siphon.

If it is desired to continue the treatment, a fresh wash is given, and the jar closed and agitated as before. If the test is to be brought to a conclusion, the contents of the jar may be transferred to a large funnel and washed with water, or they may be diluted by stirring in a bucket, with a large volume of water, allowed to settle, and the clear liquid decanted. The latter method would naturally be adopted when it is desired to ascertain the "total undissolved values" in the residue.

In all cases the residue is dried and assayed, and the result thus obtained compared with the assay of a carefully selected average sample of the original ore. Sometimes it is advisable to check this result by evaporating the whole, or a measured fraction, of the liquid siphoned or filtered off, and determining the gold and silver in the evaporated liquid.

In the first instance the ore is crushed only to such a degree that a thorough mixture can be made and a proper sample taken. A series of tests can then be arranged under any required set of conditions, *e. g.*:

1.—Ore crushed to 10, 20, 30, 40 and 60-mesh respectively, treated in each case with same strength of solution (which should be rather stronger than will probably be required in practice), the same quantity of solution, and for the same length of time.

2.—Ore crushed to the mesh found most advantageous in the previous series, treated with solutions of .01, .05, .1, .2, .5% respectively, other conditions the same in each test.

3.—Ore crushed to suitable mesh, treated with solution of strength found most advantageous in previous test. Solution added in the proportion of 1, 1¼, 1½, 2, 3, 4 tons per ton of ore, other conditions alike. In this case, where the volume of solution to be used is large relatively to the amount of ore, the liquid would naturally be added in several successive washes, settling and siphoning off between each.

4.—Ore crushed to required mesh, treated with required amount of solution of required strength. Treatment stopped after 1, 2, 3, 4, 7, 14, days contact.

The qualitative tests above described will enable us in some measure to decide whether alkalis, oxidation, or preliminary washing are required. When such a course appears advisable, a similar series of quantative tests may easily be arranged using varying quantities of lime of different oxidizing agents, etc.

These bottle tests furnish a large amount of interesting and sometimes valuable information, and occasionally reveal unsuspected peculiarities in the ore which require careful attention when it is to be treated on a larger scale. One fact which is likely to be forced on our observation, is that the strength of solution is of far less importance than the proportion of solution to ore and the time of contact. This point is clearly illustrated in what I may be permitted to call the classical series of experiments made by your member Mr. W. A. Caldecott, and detailed before the society at your meeting of November 21st, '96.

On some future occasion I may have the opportunity of describing our methods of treating ores experimentally on a larger scale, and the system of hydraulic separation adopted for slimy ores; the question of determining cyanide consumption by laboratory tests is also a subject on which I have not touched, but I fear I have already exceeded all reasonable limits, and have perhaps already laid myself open to a fusilade of criticism.

When experimenting on a larger scale, say from 300 pounds to one or more tons, we aim at imitating as closely as possible the conditions of practice, using leaching or agitation tanks which are in all essential respects models of those employed in the commercial treatment.

Some factors, as for example, the depth of overlying material in sand tanks, which may in some cases exert an important influence on the extraction from the bottom layers of the charge, cannot of course be reproduced on the experimental scale, but in the main the results of such tests are comparatively safe guides to what may be expected in practice.

If in what I have laid before you I have in any measure removed the stigma which unfortunately still attaches itself to the results of experimental metallurgy, I shall feel amply rewarded.

Latest Progress in the Application of Storage Batteries.*

NUMBER III.—CONCLUDED.

By JOSEPH APPLETON.

We will now consider the use of storage batteries in connection with isolated plants in large office buildings and stores using electric elevators.

The modern office building, with its fifteen or twenty stories, together with the demand for quick elevator service, has greatly increased the use of high-speed electric elevators. The nature of the work the elevator has to perform, and the fact that the power required to start it is from two to three times the hoisting power, cause the elevator load to be an extremely fluctuating one, no matter how carefully the operation is watched.

The Commercial Cable building in New York City is an excellent example of what can be done with the operation of an electric plant of this description. The building is wired for about 3500 16-candle power lamps, 240 volts, and has six screw type high-speed elevators. The generating plant consists of two 300 H. P. water tube boilers, two 225 H. P. engines directly connected with two 150 kilowatt generators, and the storage battery consists of 120 cells, each containing twenty-seven plates. The capacity of this battery is as follows: At 260 amperes, 1620 ampere hours; at 520 amperes, 1040 ampere hours; at 650 amperes, for the one hour rate.

Before the battery was installed it was found necessary to run one generator for the lighting circuit and one for the elevator circuit, the fluctuations of the latter causing the lamps to be unsteady if both were run from the same machine. The method of operation is as follows:

The elevator circuit is connected directly across the terminals of the battery and the battery is being constantly charged by means of a constant current booster which boosts the current from the lighting generators. By a special winding on this booster the amount of current it allows to pass from the generator to the battery and elevators is maintained practically constant.

Of course, when there is no elevator load, which occasionally happens (all the elevators standing still), the entire amount of current passed through the booster is used for charging the battery. When a heavy elevator load comes on, this boosted current is diverted from charging the battery into the elevator circuit, the battery discharging in parallel with it as may be required. In this installation the booster is passing about 250 amperes; thus when the battery was discharging at 350 amperes the total elevator load was 350 plus 250, or 600 amperes.

The centralization of generating plants, and their location in districts where the facilities for obtaining coal and water are good, has developed the system of high tension alternating transmission, and the distribution of direct current through rotary converters. This seems to be the one which will be employed in most of the large engineering undertakings to be solved during the next few years. The advantages of direct current for distribution over the alternating are so marked that, at least until further improvements are made in alternating current distribution, the direct current will undoubtedly be the one most generally used. With this system of large central power house and substations for distribution through rotary converters, storge batteries are almost essential. They reduce the size of the generating plant in the first case, and also the size of the rotary converters, and enable them both to be operated with a much greater load factor than would be possible without. The installation of the Hartford Electric Light Company was the first of this description in this country, and has proved the many advantages which were claimed for such a system.

Most of the plants dealt with so far have been those of a large size, supplying a large amount of energy. It must not be imagined that storage batteries are applicable only to these large stations, the results obtained from their use are just as satisfactory in the case of smaller stations, but I have referred to the larger ones as being of more interest. I will, however, give the results obtained in one of the smaller type.

The Claremont Electric Light plant, Claremont, N. H., is a small plant operated by both water power and steam. The plant consists of two Edison bipolar dynamos running on the three-wire system and an arc light service supplied by fifty lights and Thomsom-Houston dynamo. In connection with the Edison dynamos, which are operating on the three-wire system, there is a battery plant of 134 cells containing eleven plates in each cell, 10″ square. These batteries are operated directly in parallel with the Edison dynamos, and relieve them of a portion of the load during the time of heaviest amount. They also help out steam plant, enabling the water power to be used to its fullest advantage.

Take, for example, the following figures for the month of January, 1896; before the batteries were installed it was found necessary to run an auxiliary engine 180 hours to supplement the water wheel. During the same month in 1898, after the battery was installed, the same conditions as regards water power prevailing, the station load was 33% heavier, and it was only necessary to run the auxiliary steam engine 133 hours during the month.

The plant itself is not elaborate, but nevertheless satisfactory results are obtained, which show that the storage battery is an economical adjunct in stations of this sort.

There is one application of storage batteries in connection with central stations which I believe will in time become very general, but which at the present time has only been tried in a few instances. It is the use of storage batteries in office buildings, stores, etc., instead of the usual isolated plant or direct supply from the central station. The method of operation is as follows:

During the few hours of maximum load at the central station the storage battery supplies the entire current for the building, it being disconnected from the street mains. During the hours of light load the building is connected with the street mains and the battery charged from them. By this means the central station can take as customers these buildings, and only have them on their system during the hours of light load. This is a class of customers which is not profitable for the central station in the ordinary way, as they have a large number of lamps which are only used for short period, and that at a time when the station has its maximum load. This means that they have to provide capacity for these lamps, and yet the plant is only needed for an hour or two a day. By this method a central station can also take customers having a fluctuating power load without feeling its disturbing effect on the system, the battery maintaining an even pressure at all times. This is particularly advantageous when the fluctuating load is some distance from the power house and the feeders are not large.

*Condensed.

AT Redlands, Cal., on the 11th inst., E. L. Crawford, while standing upon an iron transformer struck his head against a live copper wire carrying 30,000 volts of electricity to Los Angeles, making a short-circuit and blowing out the fuses at the power house in Santa Ana canyon, but received no further injury than a slight burn on the scalp and a stunning fall to the ground.

Mining Summary.

ALABAMA.

Alabama mine inspectors report that for the year 1898 Alabama produced 6,504,960 tons of coal, an increase over the previous year of 611,189 tons. During the year the miners worked six days every week. There were no labor troubles nor prospects of any. Miners are considered certain to get an advance of wages with the advance in the price of iron predicted for March 1.

ALASKA.

The Treadwell store on Douglas island has outfitted several prospectors. Some interest is occasioned over the reported discovery of placer diggings four or five miles back from the shore.

The *Record* reports a strike on McDonald creek in the Atlin country. The creek is but five miles in length and is on the American side near the boundary. Claims are 250 feet square.

ARIZONA.

J. A. Fleming of Phœnix is reported to have refused $750,000 for a half interest in the Black Warrior copper mine in southern Arizona.

At Ehrenberg the placer mines of Polomas district are reported taking more money out of the gravel now than for many years; in Ehrenberg a strike has been made yielding from $10 to $15 per day.

Lindstrand & Hemple, owners of the Hard Trial mine, three miles from Crowned King, will this season run a 10-stamp mill.

A river dredging scheme is in progress to work the bed of the Colorado river above the Grand canyon, Arizona. The company formed for this purpose has laid claim to 150 miles of the river above Lee's Ferry. A dredge is in course of construction which will be operated by electricity. R. B. Stanton is in charge of the work.

Journal-Miner: M. S. Taft is shipping ore from the Sterling mine on Big Bug.——The drift on the 500-foot level of the Crowned King mine in the Bradshaw mountains has been run for 15 feet through the ore body recently discovered. The ore extends both above and below the drift.

Tempe *News*: M. McLeish has purchased a large dump of tailings at the Mammoth mine at Goldfield, forty miles east of Tempe, for cyaniding. There are 30,000 tons of tailings in the dump.

Prescott *Courier*: At the Senator workmen are engaged in lowering the floor of the tunnel preparatory to sinking the shaft below the intersection of the crosscut with the vein. When this is finished the hoisting plant is to be placed at the intersection and power for the underground workings of the mine will be directed from this point. It is expected that two months will elapse before the shaft sinking will be under way.

CALIFORNIA.

Amador.

The Peerless G. M. Co. will operate near Jackson.

The Pocahontas at Drytown shipped its first bullion last week from eight tons of sulphurets. When the west ledge is tapped on the 700-foot level ten stamps more will be added to the mill.

Supt. Voorheis of the Lincoln mine, at Sutter Creek, reports that the present company was incorporated February 12, 1898; active work commenced March 4th. A new steam hoist was erected; work of cleaning out and retimbering the old shaft began July 4th. On December 4th the shaft had been sunk and retimbered down to the water level, 465 feet from the surface. The reason the shaft was dry to this depth was that the water had run to the Mahoney mine on the south through the old drifts made in the early workings of the two properties. From the 500-foot level down the old timbering was in good condition to the 800-foot level, which point was reached Jan. 17th, '99. When the water was encountered at the 465-foot level a small steam pump was put in position and the water pumped into the large skips and hoisted to the surface. Forty-three days were consumed in unwatering the shaft to the 800-foot level, during which time 2,979,000 gallons of water and 682 skips of waste were hoisted to the surface. All of the old center braces were removed and new ones put in, as the position of the old braces made the compartments too small for the large water skips to run in. The old wooden track was also taken up and removed and heavy iron T rails put in. Three old style 8-inch Cornish pumps were taken out. The sump is being cleaned out and preparations to sink the shaft 400 feet deeper are being made. Statement of receipts and disbursements shows: Received from the stockholders, on eleven calls, $33,000; cash from 213 tons of rock crushed at the Zeila mill, $9213.66. The disbursements aggregate $40,762.10; balance cash on hand, $1451.56.

The new vertical shaft of the Wildman-Mahoney at Sutter Creek is down 400 feet, with work progressing as rapidly as possible. The new reservoir is completed and 4000 feet of water pipe is in, completing their system for water power throughout the property.

The shaft in the Amador Queen No. 2, near Jackson, which is now down about 800 feet, has been cutting some valuable stringers of ore.

Record: The Pocahontas at Drytown shipped its first bar of bullion last week.——The 10-stamp mill on the Allison mine northwest of Plymouth is to start up March 1st.——The shaft of the Bay State, now down 750 feet, will be sunk to 1000 by contract.——The dumps of the old Pacific mine at Plymouth are to be run through Huntington mills. There are many thousands of tons of this material.

Butte.

The Enos Co. fired their drifts at Cherokee last Sunday. There were three drifts 60 feet in length and 40 feet apart, under a bed of gravel 50 feet deep, with an immense pile of boulders on top, and when J. Enos rammed the plunger the whole mass of from 7000 to 10,000 tons of gravel and boulders rose several feet in the air. The Costa mine is near by and each is working fifteen men. Both mines are worked on the co-operative plan.

The Platt dredge was launched last week south of Oroville. The dredges now running there are reported taking out from $150 to $300 for each twenty-four hours for each boat.

Calaveras.

At Camanche the Eastern Co. which has been boring for gravel has, after four months work, struck the channel at a depth of 150 feet. Steam power is used in boring. The superintendent is H. McSorley.

The copper mines at Campo Seco, idle for a long time, are again in operation. On the Constellation mine, owned by C. Boerger, a new hoist has been erected, the Higby shaft has been retimbered and preparations are being made to sink several hundred feet.

Echo: L. P. Drexler has brought suit against W. S. Edwards et als. for $9673, alleged balance due on price of Mayflower mine at Murphys. It is stated that defendants bought the mine for $14,000, paid $4327, leaving $9673 due.——Thirty stamps are reported at the Thorpe mine at Fourth Crossing.——Most of the Utica Co.'s mines and mills are running.——The electric motor for operating the machinery at the Lightner mine is ready to be put in place.

Del Norte.

The black sand mine at Crescent City is being operated. The old style of boxes and copper plates is the method employed in extracting the gold. The *Record* says this method has proven superior to any of the innumerable fine gold saving machines that have been put up on the beach.

El Dorado.

A 5-stamp mill is being built on the quartz mine of F. Thomas & Co. near Gold Hill.

The German mine below El Dorado worked by P. C. Dubois for the past year or so is being developed. A 10-stamp mill has been running for some time and the company is now adding ten stamps more.

Lack of water prevents work at the Gopher-Boulder.

At the German mine below El Dorado the company is increasing the capacity of the mill to twenty stamps.

Kern.

John G. Stephens, a miner working in the Yellow Aster mines, fell from a ladder last Monday with fatal effect.

C. J. Berry, the successful Klondiker, who recently bonded Amador Co. property, is now in Bakersfield with others to lease the asphaltum beds in the vicinity of Asphalto.

At Johannesburg the Red Dog mill is running on ores from the Gold Coin, Annex, Kinyon, Sunshine and Pinmore mines. They have begun work on their 20-ton cyanide plant, to be in operation April 1st.

The Amarita mine at Randsburg is reported sold.

Randsburg *Miner*: In the Minnehaha mine a 5-foot ledge has been struck that is good for $20, and in the middle of this ledge is a 6-inch vein worth $200 per ton.——The Warrington mine at Havilah has been sold to the Warrington M. Co. by G. C. Kirby. As there are $30 worth of revenue stamps on the document, it is probable that the price paid was $30,000.

Los Angeles.

Mining Review: Dr. G. P. Gehring of Los Angeles has purchased the old Escondido mines near Acton.

Madera.

At the Gambetta mine at Grub Gulch the new shaft is to be 1000 feet deep.

The Flying Dutchman mine at Coarse Gold has been bonded; the main shaft, now 200 feet deep, is being sunk deeper.

Mono.

The Par Value M. & M. Co. has incorporated at Bridgeport; capital stock, $50,000—$6500 paid up. The mine is eight miles from Bridgeport. This spring the owners will build a mill.

Nevada.

Judge W. B. Wallace of Visalia has bought the interest of D. R. Bullard in the Gravel Hill hydraulic mine.

Locklin's mill, in Willow valley, is crushing twenty-five tons of ore from La Belle claim, on Deer creek. J. L. Postlewaite has charge.

Hecker & Coughlan are reopening the Locklin ledge in Willow valley and are hauling a crushing of twenty-five tons to the Locklin mill. They are working through a tunnel over 300 feet long. The ledge is from 12 to 15 inches thick. Ore taken from this claim thirty years years ago paid from $75 to $80 per ton.

The Champion M. Co. has forty of its seventy stamps going.

Herald: The California mine, on Gaston Ridge, contains two great quartz ledges from 5 to 9 feet thick, and the ore runs from $6 per ton up to fancy figures.——J. G. Cohoe has taken a bond on the Grey Eagle, at Maybert. He intends putting in a machine and driving the tunnel 500 feet farther.

Placer.

Operations in the Azalea mine were resumed last week.

W. McDaniels is taking out some rich gravel at the McDaniels mine near Rich Flat. One pan of gravel is said to have been worth $53.

There is being hauled to the Crandall mine, North ravine, 2000 feet of 10-inch sheet iron pipe.

Work has been resumed at the Blue Canyon Co.'s mine.

The Bear River Hydraulic Co.'s mine near Colfax has just commenced operations on a small scale.

The Big Dipper mill is being repaired.

Riverside.

(Special Correspondence).—The population at Virginia Dale now numbers 150. This camp is on the Colorado desert fifty miles northeast of Walters station on the Southern Pacific railway and about thirty-five miles south of Cadiz on the Atlantic and Pacific. The mills are on a dry lake north of the Monte Negras hills at an altitude of about 1500 feet. There are four stamp mills—three of two stamps each and one of one stamp. Water is obtained by sinking in the Dry lake to a depth of about 100 feet. The group of hills lying southerly from Virginia Dale rise 1500 feet above the valleys, are absolutely destitute of verdure of any kind and are blackened by the burning rays of the sun. The formations in which the veins occur are diorites of many textures and colors from rather coarse gray to dense black varieties. The larger masses are light colored and are traversed by the smaller green and black dykes and it is with these latter that most of the veins are associated. Some occur at contact of the dykes and massive rocks and others are wholly within the dykes themselves. The veins are fissures of probably great depth and continuity. Many of them outcrop boldly for hundreds of feet. The croppings usually contain large amounts of iron oxides, limonite and hematite, but in depth sulphides of iron, copper and zinc appear. The fissures range from a few inches to 6 feet in width and the ore is high grade, running from $10 to several hundred dollars per ton. Gasoline engines are used for power. This is one desert camp where success is being made, and there are still good opportunities. On the south side of the range, about seven miles from Virginia Dale, are a number of very promising prospects which require some capital for their further development.

Virginia Dale, Feb. 20th, '99.

Shasta.

At the Mount Shasta Gold Mines, Ltd., they are down over 200 feet, stoping and developing in the several drifts. Forty men are employed; the number will soon be increased to sixty. The hoist is run by a gasoline engine. They are turning out from ten to fifteen tons daily, and as soon as the output is increased a more extensive hoisting plant will be installed. W. G. Scott is Supt.

What appears to be a quicksilver prospect has been located on Gold Hill, east of Millville.

The Golinsky copper property near Kennet is being developed under a bond by W. Kemp for the Lewisohn Bros., New York City.

The Bayha copper property at the head of Stillwater is to pass into the hands of German parties.

Sierra.

It is again locally rumored that the Alaska mine, so long idle, is to start up under a new management, the mine to be drained by a siphon.

About fifty men are now employed at the Mountain mine at Sierra City.

At Pike City, because of the scarcity of water there is little mining going on. The recent storms only soaked the dry ground and did not increase the springs to any extent. F. M. Thomasson contemplates putting up a mill.

Enterprise: The Oriental mine, at Alleghany City, closed down last week to wait for spring.

Siskiyou.

The Cape mine on the north fork of Greenhorn has started up. G. E. Ward is the new superintendent.

E. Wallace has bonded most of the Yreka creek property and expects to put in a dredge.

H. Harris, Humbug, has struck a 3-foot ledge on the Mocking Bird claim.

Journal: E. T. Wallace has bonded ground along Yreka creek to a new company, who intend putting in a dredge to work it next summer.——G. Simmons will work the Quinne & Simmons mine at Hawkinsville. Water is pumped from Shasta river to the top of the hill, over 400 feet, and emptied into a ditch running towards Hawkinsville to supply giants used in sluicing down the banks.——The Jillson & Roberts quartz mine at Henley has been paying handsomely.——Rich quartz mining property has been discovered by G. Carr and others near the head of Union creek in the Coffee Creek mining district, on both sides of the Trinity and Siskiyou county boundary line at the headwaters of the Salmon river tributaries above Cecilville, where considerable mining will be carried on during the coming summer.——The new quartz mill near the Cherry Hill mine on Cherry creek has started up.——Dredging of Yreka creek from the boundary of Yreka to Shasta river will be an extensive enterprise, as the introduction of a steam dredge will cost about $40,000. It will scoop up the gravel down to bedrock, and there will be an abundance of water at bedrock to furnish a good head for sluicing. The dredge system is now being worked on the beds of various streams throughout the State with good success, and will no doubt prove profitable in Yreka creek.—The Minetta B mine, on Klamath river, in Happy Camp district, is being energetically worked. The giants are supplied by a ditch running 2500 inches of water, carried across the Klamath in a large pipe on a bridge held up some 10 feet above the stream by 3-inch wires. In place of the building of long ditches from streams as heretofore, for conducting water to irrigate and mine, the new system of electric pumping power is much cheaper and more advantageous. With a fall of a few feet by damming or building a short ditch at a stream sufficient power can be gained to operate an electric dynamo, by which pumps can be worked for raising the water into flumes or ditches close to where needed, thereby saving loss by evaporation and seepage in building long ditches around mountains and on high lands for grade, with more crooks and turns than the most crooked rivers.——D. B. Provost is at Jenny creek superintending the putting in an assay plant and the construction of buildings necessary for the prosecution of prospect work on the quartz claims.

News: The old Wright & Eastlick mine, at Oro Fino, started one giant last week. They shut down on the 3rd inst. on account of the freeze-up.——The Campbell placer mine, near Oro Fino, has started up.——The Beaver Creek mine, near Helena, will be operated extensively the coming summer. C. L. Knapp is Supt.——At the Albert Winder power claim near Orofino Bar nuggets of pot metal are occasionally found.——The Siwash Co. expect to crush 500 tons of ore.——The Schell & Gardner hydraulic mine at Oro Fino will start up as soon as they get sufficient water.——At the Spencer mine, on Humbug, the crosscut tunnel is being run as fast as a double shift can do the work. It is now in over 500 feet, and it is expected to cut the ledge at 700, which will give them a depth of about 400 feet.——The Gray Eagle M. Co have thirty men employed at their Quartz Valley mine. They are sinking on the ledge from the crosscut tunnel and are now down 80 feet. A tunnel is being run on the ledge from the 50 foot level of this shaft. Stoping is going on.——The Good Ball mine is working a furnished force with good results.——At the Black Bear mine they have opened up some rich rock in the southern part of the mine.——Hickey Bros. are developing the White Swan mine.——H. Foxley is running the Lanky B. o. on Eddy's Gulch.

Journal: The San Francisco Co., working the old Eastlick and Wright mines at Oro Fino, are now running their giants under a full head of water in the ditches fed from the snow-covered Salmon range, and the creeks leading therefrom, and will have a good supply for several months.——The new quartz mill at Cherry Creek is running on ore from the Cherry Hill mine of Hunter & Co.——The new company bonding the Yreka Creek ground from Yreka northward to Shasta river, will soon prepare to set up the dredge.

Stanislaus.

Oakdale *Leader*: The Alta mine, near Knight's Ferry, operated several years by T. M. Lane, has been closed down, but will soon be reopened on an extended plan for further developments. A 60-stamp mill is to be built.

Trinity.

The Van Ness placer mine at the Feeney place, Trinity river, created a sensation there, a leaser having taken out a chunk of gold weighing a pound and another weighing sixteen ounces and $30 worth of fine gold, all in one wheelbarrow full of gravel.

At New River miners are not idle because of lack of water; but as is usually the case, many did not have flumes and bedrock ditches in working condition when the water came. In other instances snow is an obstruction to work, but the outlook for a good mining season is better than it has been for years. Little work is being done in the Ridgeway and other quartz mines on New River.

Tuolumne.

The App mine near Quartz has closed down. Lack of water is given as the cause.

The Golden Gate mine at Sonora also shut down this week on account of lack of water.

The Santa Ysabel mill cleaned up $11,000 net gold in twenty-two days in January. Gen. Mgr. Buckminster will investigate the question of adding twenty stamps to the mill.

Union-Democrat: The Dreisam shaft near Arrastraville is down 230 feet and sinking is in progress. A drift is being run at 200 feet both ways from the shaft, now in 150 feet each.——Sinking is in progress at the Confidence mine at Confidence.——At the Buchannan the new shaft is being sunk to reach the vein 200 feet under the deepest old workings.——The Hope mine, a claim on the Bonanza vein, has 100 tons of ore out which will be crushed in Mason's mill.——The Black Oak, Soulsbyville, has completed a 10-stamp addition to its mill and will add an additional ten stamps, making a total of forty stamps. The duty of the stamps is about one and one-half tons per twenty-four hours, a 60-mesh screen being used.——Machinery for the Lost Fox mine on the east lode near the Buchanan mine is being shipped in.——Grading on the Sierra Railway is now in progress east of Sonora, and the extension in the direction of Summersville will be built this season.

Jamestown *Mountaineer*: F. M. Miner, who has been superintendent of the Valparaiso mine at Tuttletown for the past three months, has left for Chicago, the company he represents having thrown up their bond on the mine.——At the Excelsior mine above Confidence three shifts are being worked.——Work on the new 20-stamp mill for the Bown M. Co. at Tuttletown progresses.——The 1800-foot tunnel on the Old Tuolumne mine at Wet Gulch is being retimbered throughout.——The additional ten stamps being put in at the Black Oak mill, Soulsbyville, are ready to begin. A canvas plant is being erected.——The Philadelphia gravel mine, operated by the Stockton Gravel M. Co., is ready to start up.——At the Deadhorse mine, Carters, operations were resumed last week.

COLORADO.

BOULDER COUNTY.

The Modoc shaft at Ward is to be sunk 200 feet farther. It is now 340 feet.

A strike of gold ore is reported in the Mamie Watson claim in Camp Dewey.

From the Golden Age mine, Jamestown district, a recent shipment of seventeen tons yielded $17.30 net. The high-grade ore ran 696 ounces in gold and 560 ounces in silver to the ton, the second class 1½ ounces gold and 22 ounces silver.

CHAFFEE COUNTY.

The Sedalia mine near Salida is reported producing twenty tons of ore a day, which at the present price of copper nets about $450. Twenty-seven men are employed at the mine; the payroll amounts to $2000 a month.

The Queen and Queen of Hearts mines, copper properties, are being developed. They have recently cut two veins in the Queen 20 to 25 inches in width. Tests give a good per cent in copper and $17 in gold.

CLEAR CREEK COUNTY.

In the Anchor mine near Freeland in Fall

River district has been found ore running $375 to the ton.

EL PASO COUNTY.

At Victor the National Gold Extraction Co. is incorporated by Messrs. Tutt, Penrose and McNeill. At the same time, says the Victor *Record*, the purchase of the Kelton sampler at Goldfield and the Kelton reduction works at Florence was consummated by the same parties. It is the intention of the new company to increase the capacity of sampler and mill to sixty tons per day. The operation of these plants will not conflict with the Cripple Creek sampler and Colorado-Philadelphia reduction works at Colorado City, owned by the same people, the former institutions are on the narrow-guage road and the latter on the broad-guage.

The Kelton mill and sampler were completed one year ago at a cost of $107,000 and operated only three months.

The Vindicator at Cripple Creek is shipping 50 to 100 tons of ore daily.

Zeigler & Wilson on the J. I. C. on Battle mountain, Cripple Creek, have struck at 80 feet in a crosscut run from an old abandoned shaft a 2-foot vein of quartz which assays $18 to $160.

In the Favorite at Cripple Creek at the 400-foot level a sylvanite streak which has been followed in an upraise 50 feet from the shaft has widened to 18 inches, carrying values of three ounces to the ton. A find has also been made in the third level on the McPherson lease, where 12 inches assays as high as $72.

A. J. Austie has made an important find on the Pointer, south of Cripple Creek, on Gold hill. A few feet of work opened up 3½ feet of ore which will average $50 in carload lots.

Returns from a car of ore recently shipped from the Gold Dollar on Beacon hill, Cripple Creek, show a value of fifteen ounces per ton.

The annual report of the directors of the Victor G. M. Co. has been forwarded to the holders of stock. During the past two years it has ranged as high as $7.50 per share in Paris, on the dividends of '96—$20,000 per month—and as low as $2.50 per share in Boston in '98, while the company was paying quarterly dividends of $100,000. The capital stock of the company is $1,000,000 in $5 shares.

GILPIN COUNTY.

During the past month the Concrete mine shipped 170 cords of ore, aggregating 1450 tons, all of which was treated at the Pennsylvania and Iron City mills at Black Hawk.

The Kansas-Burroughs Con. M. Co. reports an output of 313 cords, or about 2900 tons, all of which was handled over the tramway lines.

The Cook mine shipped 3200 tons of mill ore and this, with 750 tons of concentrates and smelting ore, brought the total production up to 3950 tons, being an average daily production of over 500 tons, and bringing this mine up to the first place as a producer in this county.

The property of the Sleepy Hollow M. Co., situated near Black Hawk, was sold to A. B. Seaman of Denver last week for $15,180.49, the property being sold to obtain a recent judgment against the company.

Men at work on the Clay mine are taking out ore running $10 per ton in gold. This is one of the oldest mines in the county and is credited with a production of more than $250,000, but has been idle for nearly twenty years.

The Rocky Mountain concentrator during January treated 1723 tons of crude ore, from which were shipped 428 tons of concentrates.

GUNNISON COUNTY.

(Special Correspondence).—The gold belt covers a country 12x40 miles, northeast and southwest, characterized by many different formations. Near the west end of the now known belt, for several miles west of Cebolla creek, which flows northward into Gunnison river, at a point about four miles from its mouth, the mineral zone seems to set in, and for over twenty miles up the creek good property is being found. The formation consists principally of eruptive rock altered to schist, standing on edge, but there are several places in the belt where granite covers a number of square miles. Both these country rocks are seamed with dykes. Nearly all of the larger veins or dykes are found where much volcanic disturbance has occurred.

On the Gunnison mine a shaft is down 150 feet on a large vein. Walls on either side of the vein are soft and schistose. The quartz is hard and generally of a dark tinge, in some places white. On the surface there were found copper carbonate and oxidized iron, and the ore ran $2 to $8 across a 20-foot vein. At the 150-foot station, I am informed by Mr. Holmes, the Mgr., that by 500-pound sample, taken from across the vein, it shows values of $13 on the plates and about $10 in concentrates. The copper seems to have about all disappeared; the values are all in gold, and some experiments in cyaniding will be made. Mgr. Holmes has determined to sink several hundred feet farther before building a mill.

The Midland seems to have had a series of unfortunate managers and has done but little, though it makes a good showing with a vein about 18 feet wide and ore that should mill not less than $10 and a rich streak which will run from $30 to $100 per ton.

The Vulcan mine and Mammoth Chimney are on one of these large veins. These properties have been consolidated and are worked from the Vulcan shaft. The workings are now down over 400 feet. The walls are light gray schist. At the surface were large masses of chalcedonic quartz, jasper, massive quartz and soft material with porphyry. On the lower levels it seems to be getting better with every foot of sinking. On the south wall there is a vein of solid iron pyrites 20 feet wide. At the place I measured the crosscut it runs about $2.50 in gold. Next to this there is 3 or 4 feet of native sulphur, nearly pure, which is marketed at a good profit. Adjoining the sulphur streak is found a soft zone through which rich streaks of ore occur. This ground is so soft as to require very little blasting. With no free gold, much of the sacked ore will run as high as $800 in gold. It carries about 300 ounces silver also. This mine works about forty men, has passed the experimental stage and is now a steady producer. There are no signs of copper in the ore. A vein not over 500 feet to the south will run nearly 10% copper.

Near the head of the Cebolla is the O'Brien property, with free-milling ore in large quantity. Not far below, on the same creek, I examined the Rudolph property, which is a good prospect, with about 200 feet of work. It shows about 4 feet of ore that runs $20 to $40 in gold, 4 to 5% copper and ten ounces silver. It is a good concentrating ore and has good water power.

A little farther down is the old Lot mine and mill which, I am told, are to be started up again in the spring, after having been idle for a number of years.

A new 10-stamp mill has been built two miles farther down the creek to work a large vein near the Carpenter group. Plate amalgamation will be tried.

At the Carpenter group they have a 10-stamp mill, but no development work done, hence the mill is idle.

Several miles farther to the west is the Duboise camp, where considerable work is being done. The Duboise tunnel, under the management of G. W. Griffey, has been driven 700 feet to tap several large veins which it has not yet reached. I am informed that a 20-foot vein has been cut in a tunnel on the opposite side of the creek that will run $6 per ton.

At Spencer a good deal of work has been done, but no shipping veins have been opened. There is a good 10-stamp mill at this place.

About two miles east and a little south is the Iron Cap mine, with 135-foot shaft and three levels. There are about 3 feet of $18 ore and 20 feet of $6 ore. The mine has a good hoist and 5-stamp mill. The ore carries some copper. It will make a good concentrating mine. Idle for the winter.

The Woodland M. Co. of Denver expect to develop a group of five claims near the Iron Cap when the snow is gone. Their claims look well for prospects.

About five miles farther east is the Gold Basin camp, and four miles south is the Midland, referred to before. The Tuller & Riley property gives great promise of becoming a producer of high-grade ore. Veins are from 2 to 3 feet wide and the ore will run from $20 to $500 per ton. They have opened the vein for a distance of 2000 feet, and there is good ore on the vein the entire distance. This property is just above the Gold Basin.

The Grafiin property, north of Chace and a little east, is working air drills, and their tunnel, which is in over 500 feet, has cut one of their veins 14 feet wide and runs $10 where the cut is made. They expect to cut another within 100 feet and a third about 300 feet from present breast of tunnel.

Some work is being done on large dykes on the Cochetopa creek, about five miles farther east. I will only mention one of these large dykes, which is covered by the claims known as the Red Line group. The vein is about 150 feet wide and composed of a schistose rock, with quartz, jasper, etc., all through the vein. The whole mass is impregnated with hematite iron and from a good many tests in the surface cuts shows values that make it average $4 per ton or better. There is water power enough right at the property to crush 500 to 1000 tons of ore per day. This ore has no copper at present.

There are many such dykes in the belt, and I am inclined to think they will all make good low-grade properties if worked in a large way. The ore generally must be treated on the ground, hence it is not a very good poor man's camp.

G. W. BARTHOLOMEW.

Gunnison, Colo., Feb. 16th, '99.

HINSDALE COUNTY.

Record: The Hidden Treasure mill is turning out three cars of lead concentrates per day. The mine furnishing the ore is one of the largest lead fissures in Colorado, being a continuation of the famous Ute ore shoot. The ore bodies are from 4 to 16 feet in thickness. ——The Lellly mine is working twenty-five men and turning out eighty tons of copper ore per month.——The Vermont group, consisting of five patented claims, is purchased by A. E. Reynolds.

LAKE COUNTY.

Coal is again being delivered at Leadville, the greatest trouble being in getting timbers and the mines are unable to open up any more new ground. Last week there were 1500 idle miners forced to lose time on account of the snow blockade. The Rio Grande road enjoys the exclusive business of the Arkansas Valley Smelting Co. which amounts to $60,000 per month and they have everything in fine shape at the yards of that big institution.

Many miners, charcoal burners and loggers from surrounding camps and gulches, says the *Herald*, have come into Leadville to replenish their comissary. They seem to dread snow slides and prefer to remain until this danger is past. The storm has cost mine employes large sums in the loss of wages.

A Leadville teamster last month loaded and hauled 36,575 pounds of lead sulphides in one load from the Mahala mine to the railroad station—one of the largest loads of ore on record in that section.

The Yak tunnel is in 7000 feet, being nearly 900 feet below the surface at the face.

The pumps of the Bohn shaft at Leadville are raising 3800 gallons of water per minute.

OURAY COUNTY.

At the Revenue mill at Ouray a 100 H. P. engine is put in. The Revenue now employs about 600 men.

PITKIN COUNTY.

The Smuggler mine at Aspen is reported to be making a profit of $10,000 per month by concentrating low-grade ores. Successful concentration promises to give Aspen a new lease of life.

SAN MIGUEL COUNTY.

The Euclid Avenue G. M. & M. Co. has its new 10-stamp mill and wire rope tramway, in Bear creek, in operation, daily treating from eighteen to twenty-four tons of quartz every twenty-four hours. The tramway is 2700 feet long, comprising but a single span, said to be the longest of the kind in the world. The Euclid Avenue Co. is a subsidiary company of the Colorado Exploration Co.

The Smuggler-Union mine has a vast amount of ground opened up for stoping. The ore shoot is over 5000 feet in length.

In the Saw Pit mines near Telluride some new chimneys of fine ore have been opened up and are yielding regular shipments.

In the crosscut being run for the Silver King vein in Alta basin a big strike has been made.

Ore from the new copper mines in the western part of the county has recently been found assaying over 200 ounces silver and 70% copper.

SUMMIT COUNTY.

Snow was 12 feet deep on the level at Kokomo and Robinson. Last week there was nothing but flour, potatoes and some canned goods in Kokomo to eat, and only a few days' supply of these. The fuel supply was almost exhausted. By this time the blockade has been raised.

IDAHO.

The gold output of the Pierce City district for 1898 is estimated by the mining men of that district at $75,000. This amount shows a decrease of about $25,000 from the output of 1897, which was fixed at about $100,000. This decrease is attributed to the increased activity in the line of developing quartz propositions, which has had a tendency to detract from placer enterprises, the main source of the gold output.

C. W. Stickney says of the Big Lost river mines: "The silver mines at the head of the river have entirely ceased operations for the present and the assignee of the Phi Kappa M. Co. has sold its machinery and contemplates pulling down the mill. These mines, however would pay largely if they were worked by electric drills run by water power. The late manager says $15,000 would place them on a paying basis of $60 per day, there being about 14,000 tons of silver-lead ore in sight, requiring only cheap mining and concentration to get its value out with a good margin. The White Knob M. Co. is operating farther down the river, near Houston, on what is called the Big Copper. They have sunk about 500 feet and contemplate going down until they reach water level, where they expect to find sulphide ores of a constant value and in quantity. The owners of the copper mines over on the east fork of Big Lost river are still running drifts and tunnels and developing a larger body of ore each year. This property is destined to be at some time a grand one, as the grade of ore is above the average of the American copper properties. Although no depth has yet been attained, the surface indications and ore bodies uncovered are immense, and enough ore is now in sight to start a small smelter."

E. Juessen, Mgr. American Hill mine at Elk City, has spent some time at South Milwaukee regarding the construction of a gold saver. The plant will be lighted by electricity and is guaranteed to handle 2000 yards of gravel every twenty-four hours. The buckets discharge the material into a hopper, through which it passes into a revolving screen of sufficient internal size to enable it to pass stones brought up in the bucket 18 inches to 2 feet in diameter and of sufficient length to screen and wash all the material. A series of streams of water are introduced into the interior of screen, washing the gravel as it is tumbled over and over. The size of the opening in the screen depends upon the character of the material and the coarse tailings are discharged overboard. The stone chute is built high enough and with sufficient inclination to discharge the material clear of the side of the boat. From the under side of the screen there is a discharge of all the fine material, including the gold, together with a considerable quantity of water. This is sluiced over the stern of the dredge. The buckets are of steel and have a capacity of 5 cubic feet; the dredging can be done at a depth of 45 feet. Water is supplied to the sluices by a centrifugal pump.

In the Crackerjack mine, Buffalo Hump district, a streak of quartz about 10 inches wide assays well.

The Paragon claim on Pritchard creek, east of Murray, is reported sold to Strobach & George of Spokane for $64,000 cash.

The Columbia mine, in the Buffalo Hump district, is locally reported sold to the Columbia M. Co., a Spokane corporation, for $2,000.

KANSAS.

At Ilioa the zinc smelters of W. & J. Lanyon are reported sold to the Palmyra Oil Co., the Kansas branch of the Standard Oil Co., for $2,000,000 cash. These are the largest natural gas smelters in the world.

MONTANA.

A former Austin, Nevada, miner, writing from Butte City, says: "We always thought that the Clifton tunnel was a bad place to work on account of giant powder smoke and bad air, but the Clifton tunnel was a paradise compared to the mines here. You fire your round of holes and back you have to go into the smoke; if you kick there is another miner ready to take your place."

The Union Placer Dredging & Refining Co. intends to construct ten dredges during the year on the Missouri river, according to S. F. Adams, the Gen. Mgr., at Helena. The company has been at work on the Missouri river near French bar building two dredges for securing the gold from the channel of the river, fifty men having been employed. The machinery is being put in place and the company wants to work through the winter, so that the machinery would be ready to be set in motion at the opening of spring. The dredges go in pairs, one of the boats carrying the dredging apparatus, to lift five cubic yards of gravel at once, and the other containing the gold-saving apparatus. The smallest of the boats is 100x40 feet in length and breadth. They draw 9 feet of water. "The company intend to put in ten such machines," says Mr. Adams, "and will before twelve months hence probably be employing 600 or 700 men."

The Parrot S. & C. Co. has recently been declaring a monthly dividend of 3%. The mines of the company are in good shape. There are three shippers, the Parrot, Belona and Original No. 6. Active development is also in progress at the Little Minah, the shaft upon which is down 800 feet. The Belona is the new shaft started last year west of the Moonlight. It is now developed to a depth of 600 feet and is said by the *Inter-Mountain* to be one of the richest copper mines in the district.

NEVADA.

Virginia *Chronicle*, Feb. 22: The draining of the Comstock flooded levels by the Risdon hydraulic pump plant is proceeding in a highly satisfactory manner. At 7 o'clock this morning Mgr. Ross sent the following telegram to the Pres. of the Comstock Pumping Association:

"Pump was shut down two hours last night due to a failure to properly regulate the surface water pressure. During this time the water rose 17 feet in the shaft. The pump was again started and at 7 o'clock A. M. the water was lowered 53 feet below the 1750 level and is constantly going down."

The flow being sent through the Sutro tunnel drain flume is nearly 6000 gallons per minute, and the thoroughness of the work of the Pumping Association in repairing the tunnel drain flume, under the supervision of Mgr. Ross, is demonstrated by the fact that its capacity for carrying off the water raised by the hydraulic pump is nearly double of what is required.

The following was received in San Francisco last Thursday afternoon:

VIRGINIA, Nev., Feb. 23, 1899.

Aug. Waterman, Sec'y Comstock Pumping Association, San Francisco: Water held at 53 feet below 1750 level. Are repairing pump compartment to receive the second elevator.

G. McM. Ross.

Taylor & Fulton have bought from the Amedee Borax Co. the borax marsh and works at Granite Point near the northeastern boundary of Washoe county. They are the principal owners of the Rose Valley borax marsh and works in Harney county, Oregon.

Tuscarora Chief is the title of a new mining company incorporated in Salt Lake, Utah. The property is the Eira mine of two claims at Tuscarora, which has produced considerable gold and silver. On the 200-foot level a raise is being made on a 2-foot body of high-grade milling ore, which carries with it a 9-inch stratum of rich ore, and, according to results obtained from the last consignment to Salt Lake, carries average values of 695.4 ounces silver and $157.60 in gold to the ton. The office of the company is in Salt Lake. The statement is made that a mill will soon be built.

Logan & Hully have returned to Dayton from San Francisco, Cal., where they purchased vats and other appliances for a cyanide plant to be erected in Como to cost $3500.

The last payment on the Young America mine at Tuscarora has been made and the property is now owned by the Young America M. Co.

At De Lamar the De Lamar Co. posted at the mine and mill notices that, if the eight-hour law passed, workmen would have to work for 30 cents an hour. The proposed law was defeated in the Legislature by a 2 to 1 vote.

The Pioche *Record* says A. Bybee of Chicago has bought the Great Eastern and Vesuvius mining claims in Bristol mining district for $10,000.

Virginia *Chronicle*: Stamps are again dropping in Six-mile canyon mills that were hung up during the cold wave on account of the freezing of their motive power, Six-mile canyon creek having been frozen nearly solid.

Hawthorne *Bulletin*: J. S. Cain and H. McCaghren have purchased the tailings at the Kinkead mill, and will put up a plant at once and begin cyaniding in the spring. It is estimated that there are about 2000 tons of tailings and that they will average $10 per ton.

Tuscarora *Times-Review*: The Dexter Co. has absorbed the Young America. The price is said to have been $6000. This must not be confounded with the Young America East. The new auxiliary hoist at the Dexter is a failure so far as hoisting with a cage and car is concerned. The engine is too small to raise the load and the cage has been discarded.

NEW MEXICO.

The output of the Hillsboro mines for the first six weeks of 1899 is reported at about 2000 tons.

John Leachman of San Francisco, Cal., is opening gold mines near Lordsburg.

Near Elizabethtown the owners of the Challenge at Hematite are running a tunnel which will cut the lead at a depth of 300 feet. This property has shipped some rich ore to the Pueblo smelter.

The Ajax mine and mill has been, by order of the court, turned over to the company. J. A. Wolcott now has charge. He will put in some new machinery and increase the number of stamps.

Advocate: Nearly 300 Hillsboro miners waited on the principal mine operators of the camp, asking for an eight-hour working day instead of ten hours, as at present. Their request was granted in a majority of cases, a few of the operators requesting further time for consideration of the matter.

OREGON.

(Special Correspondence). — At Cornucopia Jas. Arthur is arranging to save black sands from gravel.

Baker City, Or., Feb. 20th, '99.

A Youngston, Ohio, dispatch is authority for the statement that R. McCurdy, Pres. First National Bank, and J. C. Wyck, Pres.

Wyck National Bank, with others, have arranged to buy the Cornucopia mine, at Cornucopia, for $600,000.

Glass Bros. are in Baker City, Or., to make first payment on the Vaughan copper mine, Seven Devils district, on the Oregon side of Snake river, sixty-four miles from Baker City. They control the Peacock copper mine. They are completing a smelting plant in Basin, Montana. The copper ore from the Peacock, they say, will be transported by rail to the main railway line and by that road to their Montana smelter.

The Green Vale and Myrtle copper prospects in the Seven Devils copper camp, sold to J. Walton, formerly Supt. South Peacock, have been incorporated.

Near Baker City the just completed 300-foot tunnel in the Little Giant mine four miles from Red Boy has tapped a 4-foot vein.

Last week Mgr. Whittaker of the Eastern G. M. Co., owning the Balsley-Elkhorn mine, brought to Baker City $5000, the result of a mill run of seven days.

At Granite, on the Little Giant a 300-foot tunnel is completed, striking the vein at a depth of 100 feet.

On the Rising Sun, in the Bonanza district, a contract has been let to drive a 300-foot tunnel to tap the ledge. About 150 feet of this tunnel has been completed. It is Supt. W. L. Vinson's intention to build two mills on these properties next summer.

E. & E. mine output for 1898 was about $250,000.

The Baisley-Elkhorn mine, fifteen miles west of Baker City has sent down a bullion bar valued at $4500 as a result of one week's run.

The Bonanza is shipping ore regularly to Selby in addition to that treated at their mill.

SOUTH DAKOTA.

(Special Correspondence).—F. W. Bush, Mgr., and G. W. Tinsman, Supt. Vigilante M. & M. Co. of Custer, has returned from Denver, where he purchased from Hendrie & Boltboff Mfg. & Supply Co. a hoisting plant and other equipage for their property, comprising four claims, nine miles from Custer. In sinking a shaft to the depth of 104 feet and making crosscuts, they find their ledge of ore to be 60 feet wide near the surface and 114 feet wide at 100 feet depth. The ore, as per tests made, runs from 3% to 30% copper and from $1 to $8 gold to the ton. Their property is already provided with shaft house, assay office and residence buildings. The shaft will be sunk to a depth of 500 feet.

Near the Vigilante is the Wabash group of several claims. Under directions of Thos. Carroll, Sec. Wabash Co., a 300-foot shaft is being sunk. In the course of this work ores have been encountered averaging $75 per ton in gold. The property is to be equipped with hoisting machinery this spring.

The North Star, on the Penobscot, has a 165-foot shaft, all in ore said to average $45 per ton.

Judge A. T. Feay of the Custer County Court has several locations on the copper belt, near Four-mile, and is taking steps to develop them this spring.

Custer, S. D., Feb. 18th, '99.

UTAH.

The Alamo M. Co. purchasers, at Bingham, have made a payment of $1500. On April 1st another sum of $3500 is to be paid, and the remaining $11,000 is to be followed on July 1st.

When spring opens the Daly-West will build a sampling mill of its own and transport its crude ores and mill product from the mine to the railroad without the use of wagons. A tramway will be constructed from the mouth of the tunnel which runs from the Ontario mill to the mine, connecting at the 600 level to a point on the hillside below town; all hauling will be done over this tramway. As the 600 level of the Ontario taps the Daly at 800 feet and the Daly-West at the 1100, this appears to be a reasonable proposition, as all three companies will be benefited by it. This method of handling the output of the properties named will not only be an economical one, but it will be a sure safeguard against blocked roads and danger from snowslides in the winter time, and the latter features are no small consideration with mines located as are the Daly and Daly-West.

W. Quigley, Pres. Chicago Pumice Co. at Black Rock, tells the *Tribune* that orders are pouring in at the Eastern office so fast that they cannot get enough pumice to fill them. Mr. Quigley says he is going to leave orders to keep cars going East at such a rate that never again will the company be obliged to ho'd orders.

A one-third interest in the Highland Boy mine at Bingham is reported sold to the Standard Oil Co. for $4,000,000.

The *Tribune* reports a "boom" at Castle Dale, Emery Co., prospectors having made some discoveries of copper in the country south of there, the assay of which had shown $128 in copper besides good values in gold and silver. The new mines are thirty miles south of Castle Dale.

Salt Lake *Tribune*: Over 2000 samples of gold-bearing ore from the diggings of Central America have been delivered at the Butters laboratory in this city, and experiments to which they are to be subjected promise interesting results. Prof. Butters has found the southern Republics a most interesting field for some years and was so favorably impressed with one of the propositions that he purchased it. By chlorination he has succeeded in establishing an average of $22 gold per ton, while recent experiments have demonstrated that this may be increased with the aid of his personal discoveries. Recent experiments on local ores, especially those from the camps of Mercur, have satisfied Prof. Butters that temperature must in future be recognized as a most important quantity in the successful leaching of ores. He has found that with the use of hot water the per cent saved on certain classes of ore is astonishingly increased. It has not infrequently shown an increase of over $1 per ton. It has been notably effective in the leaching of ores with talcose gangue. Col. Hedron, to whom this information was addressed, agreed with him and as an example recited how readily the talc had disintegrated and surrendered its values when hot water was applied, while it had shown itself impervious to cold water. The colonel demonstrated this on the West Dip and at Bingham.

Mercur *Mercury*: The Antler property in the Lyon Hill country is looking particularly well. — The Lindar G. M. & M. Co. will be incorporated. A new steam hoist is being installed at the mines. — A new shaft is being sunk under contract on the Gold Cable.——The Mercur management are considering the advisability of installing either electricity or compressed air for motive power at the main shaft.

Tribune: A rich strike is reported on the 700 level of the Ajax ——The Northern Light tunnel is now in 400 feet; twenty men working.——The Horn Silver mine of Frisco is now shipping high-grade copper ores.——Good ore has been developed on the 430-foot level of the Hillside mine at Mercur.

WASHINGTON.

Men are working on the Lucky Choice claim on Gold Hill, four miles east of Republic. The shaft is down 30 feet.

The Little Falls mine on Douglas mountain, in the Okanogan country, has been purchased by a syndicate headed by F. Raborg of Republic.

The Republic M. Co. paid no dividend last month. The cold weather made it impossible to operate the mill at more than one-third its capacity during January.

The Sunset M. & M. Co. of Everett have completed the survey of their electric road from Index to Galena, and the power plant is new being installed at Sunset Falls, two miles below Index, on the south fork of the Skykomish river. The opening of this road will herald the working of shipping mines in the district.

The Everett *Independent* says, referring to the E. & M. C. Ry.: "Now that John D. Rockefeller has full control of the Monte Cristo mines, the road will be completed without doubt."

Spokesman-Review: The Iron Mask Co. at Republic is doing some surface work preparatory to sinking a shaft on the vein.——On El Caliph claim at Republic the work of development is being hurried forward.——The Morning Glory ledge, adjoining El Caliph, is also to receive immediate attention.——A rich strike is reported from the Insurgent mine at Republic.——The Republic is credited with having made another rich strike, the ore running $200 per ton in gold. It is said to fill the entire width of the drift.——The Lone Pine is developing a shoot of ore 12 feet wide, having an average value of $45 per ton.——The San Poil, in a raise from No. 2 to No. 1 level, averages $50 per ton and the Mountain Lion has 15 feet of $70 ore.——The Quilip has 6 feet of $35 rock.——At the Butte & Boston, Republic, a tunnel cut the vein 210 feet deep. The first assays in 33 inches of ore returned $8.50 per ton; but drifting north, the vein widened to the full width of the drift, with an increasing value in the ore up to almost $50 per ton.

WYOMING.

The mineral paint mines northeast of Rawlins will be reopened. Contracts have been secured for 10,000 tons of the ore to be shipped to Colorado.

FOREIGN.

AUSTRALIA.

Western Australia is reported to have produced 110,090 ounces of gold during January '99.

BRITISH COLUMBIA.

Crosscutting at the 100 level of the Victory-Triumph mine at Rossland has resulted in the discovery of a 2-foot vein of high-grade ore.

D. W. Moore, ore purchaser for the Trail smelter, says that the lead furnace of the Trail smelter will probably be blown in March 10th.

The Dardanelles mine, in the Slocan, is down 487 feet in promising ore.

The electric plant on the Iron Mask at Rossland was started this week and proved a success.

The shipments from the Last Chance mine in the Slocan average a carload a day and is locally reported to "net the owners a profit of $75 a ton over all expenses."

It is thought that the Minnesota Silver Co., operating the Ivanhoe property in the Slocan, will enter the Ivanhoe on the list of permanent shippers this spring. Last year upwards of $40,000 was spent in opening up the property.

At Kimberley the North Star M. Co. are working three eight-hour shifts in the large compartment shaft, now down 175 feet and in heavily mineralized rock.

T. R. More, Mgr. St. Anthony G. M. Co., is in Vancouver, returning from San Francisco, where he bought for the Omineca district machinery to the total value of $50,000.

The Toronto *World* says that the deal for the purchase of the Enterprise mine in the Slocan country by the British American Corporation is off. This deal was on for some time and was regarded as practically closed. The option recently expired. The Enterprise is on Ten-Mile creek, near New Denver.

Work is resumed in the Le Roi. Shipments have been resumed to the Northport smelter.

A large permanent plant is to be installed on the B. C. properties, Summit Camp, near Greenwood, to take the place of the small plant at present in use. It will be the largest in the Boundary country, consisting of a twenty-drill duplex air compressor of the piston inlet type, a double cylinder hoisting engine, a battery of 80 H. P., return tubular boiler, sinking pump, cage, etc., costing $20,000.

At Ymir the Blackcock mine, which had been making regular shipments to the Northport smelter for the past six months, has suspended further shipments.

Rossland *Miner*: British Columbia is becoming noted for its productive mines. The Province exacts a tax on the output of lode mines. The Minister of Mines recently made a return to the Legislature in compliance with a resolution requesting information as to the amounts paid by the several mines in the shape of a tax on their output. The ground covered in the reply is for the fiscal year ending June 30th, '98. The reply shows that official reports often are damaging to popular fallacies. It has been frequently stated that the Payne mine was the largest producer of values in British Columbia. The reply of the Minister of Mines does not bear out this assertion. It does show, however, that the Le Roi for the fiscal year mentioned above headed the list by paying $7525.45, against $6124.82 the previous year. Next in amount is the Payne, $5922.56, in '98, and $2409.04 in '97. The Silver King is third, $4411 and $2670.10. Then follow the Whitewater, $2398.28; Ruth, $2273.76; Reco, $1378.58; Cariboo Hydraulic, $1327.67; Slocan Star, $1299.93. These are all that paid in excess of $1000. There are eighty-five mines that paid less than $1000, the chief of which are the Idaho $898.81; the Cariboo (Camp McKinney), $840.50; No. 1, Slocan, $573.78; Last Chance, $541.91; North Star, $531.55; Enterprise, $491.14; Noble Five, $400.68; Iron Mask, $356.64.

Spokesman-Review: At Ymir, F. Davy has leased the Victor group on Wild Horse creek. The ore is said to be high-grade free milling quartz.——James Cronin, Supt. St. Eugene mine in East Kookenay, states that the property has recommenced shipping. The Lake Shore mine, near the St. Eugene, is also shipping regularly.——The owners of the Herald claim, at the head of Lime creek, have struck a ledge of Galena ore on this property. The work of crosscutting this newly found ledge will be continued until its width is ascertained.——The Pathfinder mine, fifteen miles from Grand Forks, has cut the vein in the crossout tunnel and has a body of copper sulphide ore.——At Grand Forks, while blasting on the grade of the Columbia & Western Railway last week, a ledge of copper ore was opened up on the Seattle, the width of which is claimed to be over 3 feet.——Work goes on on the Golden Eagle property on Volcanic mountain. This claim was recently bonded by an English syndicate for $35,000. It is a copper proposition.

COSTA RICA.

W. S. James of Gold Hill, Nevada, has returned after a year's absence in Costa Rica testing the mining property acquired there by Senator J. P. Jones. The property is a grant from the Government of that State and is in the mountain ranges twenty miles inland. Puenta Arenas is the nearest port. The property is known as the Mina La Union and has been prospected to a depth of 350 feet below the surface, developing a vein averaging from 15 to 20 feet in width, carrying gold values exclusively, the average being in the neighborhood of $10 per ton. A 40-stamp mill is being constructed near the mine to be operated by water power. About eighty men are employed in the development of the Mina La Union, to be increased when the stamp mill is completed. A majority of the employes are natives. The principal food is frijoles, tortillas, rice, eggs and beef, but no butter, the inhabitants being ignorant of that dairy product.

LOWER CALIFORNIA.

J. W. Dawson of Los Angeles, is at Cedros Island examining the gold mines there in the interests of W. A. Clark. It is understood that the latter has practically agreed to buy the stock in the mines owned by O. Schulenburg of St. Louis, amounting to 51%. The remaining 49% of stock is owned by several different parties.

Placer diggings are reported discovered eighty miles south of Calmalli, fifteen miles north of Ascuncion bay, about 400 miles south of San Diego. The diggings were discovered by Mexicans. Many miners from Calmalli and the surrounding country have gone to the new fields.

The Cedros island mines, located off the west coast of Lower California, about 400 miles below San Diego, are reported sold to W. A. Clark of Montana.

MEXICO.

F. McCann of the City of Mexico has a six months' option on the mines of A. Oest, Sierra Madre district, fifty miles from the City of Oaxaca, and will work the property.

C. W. Hayes has the Amarillas-Cajon and Yaqui mines, in the Cerro Colorado district near Santa Ana, Sonora. The two shafts, down to 200 feet each, will be sunk 250 feet deeper. The ledges in both mines are about 10 feet in width, and the ores run $8 per ton.

El Paso *Times*: S. C. Dunbar of Juarez and J. Palmer, in the Casas Grandes country, have secured a valuable silver mine thirty-five miles therefrom, near the Sierra Madre road. Assays show 700 ounces of silver to the ton.——A carload of valuable ore, which it is estimated will run 400 ounces of silver to the ton, has arrived over the Sierra Madre railroad from the Cinco de Mayo, or Top Summit mine, ten miles from San Pedro. The Pilares mining district, west of Casas Grandes, is expected to be a heavy producer this coming year.

ONTARIO.

The western Ontario gold fields are credited with having produced during January $105,900.

THE KLONDIKE.

The Dawson tramway is in successful operation. It runs from Dawson to the forks of the El Dorado and Bonanza creeks and up Bonanza, a total distance of nearly twenty miles. Thirty thousand dollars were expended in building the road and placing bridges over Bonanza creek. The company charges one cent a pound for all freight passing over the road. Ten dogs pull a sled load of 2000 pounds.

Klondike *Miner*: On 25 a pan containing $58 was taken out last week.——On 4, Lower El Dorado, a pan worth $100 was recently washed out ——A tramway has been started from the head of the left fork on Hunker over the divide into Lombard, to be operated by steam, and running shortly. —Bench claim of 21 Quartz, owned by five Swedes, is very good. They are getting as high as $1 67 to the pan. On Discovery they have also found good, but the benches, on the whole, are disappointing. On one lay on 3 Hunker they claim to have the richest dump there is thus far in the Yukon territory. Our informant says that it is his judgment that the dump at the present time will average $25 to the pan.—— No. 28, Gold Bottom, W. Canavan, layman, has put down three holes to bedrock, each hole averaging 30 feet, and very poor prospects thus far. There was another lay on this claim given up by the laymen. On the other hand, claims near the mouth of the creek are said to be turning out fairly well.

Commercial Paragraphs.

The Westinghouse Electric Co. has received a contract from the Mt. Whitney Power Co. of Visalia, Cal., for machinery and appliances to cost about $300,000.

The Black Warrior Copper Company signed a contract at Phœnix this week with the Colorado Iron Works for mining machinery, to be used at the Black Warrior mine near Globe. The contract calls for the shipment of the machinery at the end of forty-five days. The cost of the machinery at Denver is $30,000, and the shipping bill imposes an addition of over one-third of that sum. The appliances will completely equip the mine, including a smelter and leaching plant. The process will be of a capacity to reduce 150 tons of ore daily.

The Edward P. Allis Company of Milwaukee is building near Sorocco, New Mexico, a modern concentration mill for the Timber Peak Mining Company. The building will be a steel structure throughout and lighted by electricity. The equipment will consist of two 20x10 rock crushers of the Blake type, two sets of 36x14 and four sets of 30x14 Reliance rolls, four conical screens, two sets of hydraulic sizers, twenty 6-foot Reliance vanners. The mill is to be run by steam power, the equipment for which to consist of three 100 H. P. boilers and one 16x36 Reynolds Corliss engine. The machinery is on the ground and is now being put in place. Capt. Peter H. Scott, the veteran millwright, has charge of the erection for the Allis Company.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING FEBRUARY 14, 1899.

619,461.—Sash Fastener—M. Angel, San Luis Obispo, Cal.

619,462.—Pruning Tool.—W. Ballerstedt, Altadena, Cal.

619,536.—Aerial Railway—J. Bond, Turlock, Cal.

619,538.—Gas Producer—Burch & Kasson, Seattle, Wash.

619,665.—Knee Pad—T. E. Bent, Los Gatos, Cal.

619,550.—Speed Gear—L. D. Ferris, Hood River, Or.

619,558.—Accordion—J. Galleazzi, S. F.

619,314.—Electric Heater—C. W. Jones, North Temescal, Cal.

619,495.—Valise—Miller & Nichols, Crockett, Cal.

619,341.—Rotary Separator—R. H. Postelthwaite, S. F.

619,502.—Lumber Raft—J. Poulson, Portland, Or.

619,346.—Automatic Damper—E. V. Rice, Azusa, Cal.

30,210.—Design for Game Board—Josephine Altshuler, New Whatcom, Wash.

Note.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Sash Fastener.—Myron Angel, San Luis Obispo, Cal. No. 619,461. Dated Feb. 14, 1899. This invention relates to a device for securing doors window sashes, making them absolutely tight in their frames, and means by which they can be instantly loosened so as to be opened or moved, and in the case of sashes they may be again locked firmly at any desired point. It consists essentially of slidable strips disposed in pairs having their contacting edges formed with inclined or serrated surfaces, means whereby one of the strips is held without motion in the channel in which the window is slidable, a toothed section on the other strip and a pinion engaging the same to operate the movable strip and lock or unlock the two, and pins fixed to the stationary strips extending through slots in the opposite strip, with springs on said pins adapted to retract the stationary strips and allow both to move in unison.

Books Received.

"*A Compendium of Gold Metallurgy*," by E. M. & M. L. Wade, Los Angeles, Cal., 125 pp., 12mo., giving a general idea of the scope and application of metallurgical processes used in extracting gold from its ores; 75 cents, postpaid.

"*The Speed Lathe, Part I, Advanced Metal Work*," by A. G. Compton and J. H. DeGroodt, 130 pp., a compendium of two years' work of students in the college of the City of New York; John Wiley & Sons, New York City, $1, postpaid.

Industrial Notes.

—Prescott, Ariz., wants to sell $75,000 water and sewerage 5% bonds.

—The Spring Valley Water Co. is credited with intention to put in a $450,000 filtering plant at Niles, Cal.

—The construction of the El Paso & Northeastern Railway from Alamogordo, N. M., to the adjacent coal fields, has commenced.

—President Graves of the White Pass & Yukon Railway states that the road will be built to Fort Selkirk, Yukon and also to Atlin.

—Preparations have been made by the miners of Sonora, Cal., and vicinity to have a celebration on the advent of the Sierra railway into that town.

—Cargo shipments of lumber to San Francisco from Oregon and Washington in '98 were 215,036,141 feet, 231,652,065 feet in '97 and 259,381,146 feet in '96.

—A Denver special says that railroad lines east of the Missouri river contemplate withdrawing all Western representatives, both freight and passenger, after March 1st.

—The O. R. & N. Co. is reported surveying a railway from Baker City, Or., sixty-four miles to the Seven Devils copper region, and the line, it is locally claimed, will be built.

—The American Steel & Wire Co. has added two new mills to its list of plants. One is the Puget Sound Wire Nail Co. at Everett, Wash., purchased of Rockefeller for $500,000.

—The Mexican Government has granted a privilege to dig for buried treasure in the streets of the City of Mexico. The Government receives one-fourth royalty should they find anything.

—In Seattle it is believed that the General Electric Co. is behind a syndicate of Eastern capitalists which is seeking to secure a franchise running for fifty years for a consolidation of all the street railways of that city.

—At Pine Grove, Cal., work on the Amador canal is in progress. The capacity of the canal at present is 2200 inches; after enlargement is completed, it will carry 3300 inches—1100 inches for the plant and 2200 inches for the mines.

—Denver reports a movement started looking to the consolidation of all the public utilities in the Colorado metropolis—a plan to combine street railways, water, electric light, coal, gas and telephone plants in one organization with $60,000,000 capital.

—Nevada hears that work of extending the Carson & Colorado road will shortly be commenced—an unlikely event. The road runs south to Keeler and is only 125 miles to Mohave, where it can connect with the A. T. & S. F., Atlantic & Pacific and Southern Pacific.

—Over $500,000 will be spent during '99 by the Chicago, Burlington & Quincy Railroad in improvements to its tracks, roadbed and bridges west of the Missouri river. Of this amount over $200,000 will be put into new iron bridges. One hundred and fifty miles of 75-pound rails will replace lighter rails, and 1,000,000 new ties will be put in.

—The Pacific railroads are paying their debts. The Union Pacific and Kansas Pacific paid what they owed the Government last year. The Central Pacific and Western Pacific have made settlement in twenty 3% notes, payable semi-annually. The indebtedness of these companies on the first inst., less the amount due from the United States, was $58,812,715.

—A contract was made last week, to run ten years, by which the Colorado & Southern Railroad secures trackage rights over the Union Pacific road between Denver and Cheyenne, thus enabling the Colorado & Southern to connect its Cheyenne & Northern branch with its other lines, and throws open to every line in Colorado a large and hitherto excluded territory.

—The Alaska Petroleum Co. has incorporated in the State of Washington. It is the belief of the owners of this property that, as soon as oil flows from the first well sunk, the stock will go to par, and this year. They claim that the crude petroleum has forced its way through the skin of the earth and stands in pools all over the hundreds of acres owned by the company.

—Japan reports an agreement concluded between the Morioka Emigration Co. and the agriculturists in Peru for the conveyance of Japanese laborers to the South American colony. The agreement having been approved by the Peruvian Government, the emigration company is about sending the first batch of laborers, 815 in number. The wages agreed on are $12.50 a month each.

—The Mexican Government has decided to offer a subsidy for the construction of a railroad across the backbone of the Sierra Madre range from Chuichupa, in the State of Chihuahua, to Huisopa, on the Sonora line. This road will save from four to five weeks' time in getting across the mountains. The Rio Grande, Sierra Madre & Pacific is to be extended from Casas Grandes to Chuichupa during the summer.

—Reports of a Pacific cable cause a New York paper to ask: "From where is the gutta percha for this gigantic cable to come? Every whisper of the construction of a transpacific line sends the gutta market at Singapore up by leaps and bounds. The ruling price of the gum is the highest that has ever obtained. It is stated, on what authority it is hard to say, that the visible supply of gutta is insufficient for the task and that if this cable is laid it will be the last—the last with a gutta percha insulation, at least."

—American machinery sold directly to consumers now tends to drive out all competition from Mexico; but it will be noticed that machinery houses keeping an office in Mexico themselves are doing better than those whose interests are entrusted to local commission houses or colonial merchants. Such machinery is sold very largely at the seller's terms, because as a rule the purchaser is an industrial or a foreign firm or corporation. But American heavy machinery constitutes only a small portion of that vast variety of industrial products upon which American superiority is resting and the use of which by the people has a tendency to raise the standard of living.

—At Stockton, Cal., the Blue Lakes Power Co. has strung its wire, and expects to turn in the first current of electricity from the mountains by May 10th. The Blue Lakes line is a novelty in electrical engineering. In the use of aluminum instead of copper wire to transmit the current, it has been a race between the Blue Lakes Co. and the Snoqualmie Falls Power Co., under construction in Washington, to see which would be the first to turn on the power through the white metal conduits. The California line will carry 30,000 volts. The aluminum wire, the first of its kind used on this coast, has reached Stockton. It is the intention to ultimately extend the line to Oakland.

—At Canyon Ferry, Montana, with little parade, electric power from the Missouri river dam near Helena has been turned into a network of wires extending in many directions from the dam site. The dam cost $500,000. Three million feet of timber, 45,000 cubic feet of earth and 12,000 cubic yards of granite were consumed in its construction. It is a little over 500 feet in length and contains four penstocks, each 175 feet long, having water wheels within them, revolving at the rate of 157 times per minute, furnishing the primary power to the generators. There have been installed four generators, with a capacity of 12,500 H. P., but as occasion requires this number will be increased to ten, thus supplying about 31,000 H. P. The generators employed are combined with a motor in the same instrument. They weigh fifty tons each.

—The Santa Fe R. R. Co. is substituting Japanese labor for white on track work between Mojave and Needles, Cal. The Randsburg *Miner* says the reason for this, the officials say, is that the supply of reliable white labor at $1.50 a day, the wages which the company have been paying section hands, is not equal to the demand. While there are hordes of so-called workingmen roaming the country and occasionally offering their services to the company as section hands, they cannot be relied upon. Usually these nomads leave after the first payday and new men must be employed. The Japanese, who are good stayers, work for $1.10 a day and make no trouble. The whites are still paid $1.50, but none are employed unless they give assurances that they will continue in the employ of the company long enough to be of some service. Officials of the road say they do not discriminate in favor of Japanese except where forced to do so.

—J. A. Scrymser, president Pacific Cable Co., says: "The situation in the East is not at all bright so far as a new cable is concerned. An absolute monopoly over the Philippines is held by strong English companies in the East. Their monopoly also extends to Hongkong and the Asiatic coast, including Corea. The Great Northeastern Co. enjoys the same privileges between Japan and the Asiatic coast. Exclusive rights living until 1940 are held by this company. The Japan contract will expire in four years, but an extension of fifteen or twenty years has just been arranged for. Unless an arrangement is made with these companies it would be very difficult to land an American cable either in the Philippines or on the Asiatic coast. These companies hold exclusive or vested rights. Private capital will be very slow to risk success under such a condition of affairs. To force a cable landing would mean the expenditure of a considerable amount of money. The United States will be unable to abrogate them without paying heavy compensation."

—The following is a report from a representative of the Philadelphia Commercial Museums in Mexico upon the increasing use of gas and gasoline engines and electricity for power purposes: "What is most needed in Mexico at the present time in order to assist in properly developing manufacturing and mining resources is cheaper power-supplying fuel. Coal is nearly all imported and costs from $6 to $8 in gold per ton, according to distance from the coast, and water in all sections is too scarce to supply power. The total imports of coal in August were $85,725 gold. In some sections water costs as much as $1.50 per thousand gallons. Statistics do not show the number of gas and gasoline engines imported, but it is well known that very few have entered the country, and of this most are of the hoisting engine type for mine work, etc. Wherever used they are well liked and the demand is increasing. Very few of those here came from the United States, most of them being from Great Britain and Germany. The use of gasoline engines is bound to increase rapidly, so to introduce American engines it would not be necessary to attempt take established trade away from other houses. The total foreign trade of Mexico now amounts to about $100,000,000 gold annually, and her imports of all classes of goods are increasing at the rate of $5,000,000 gold a month. The next few years will be the most prosperous that Mexico has ever experienced. The country is now in the midst of an era of development such as it has never witnessed. New industries are being established and old ones are branching out, and steady development is the order of the day. There is no 'boom' here, and no one wants one. Every month some new railroad or extension opens up new territory, stimulating it to greater production and bringing new markets to the outer world. Were American manufacturers of gas and gasoline engines to appoint responsible agents in Mexico City, Guadalajara, etc., furnish them with modern samples and catalogues, printed in Spanish, a good trade would probably be the result."

Personal.

P. H. DEIDESHEIMER is in Inyo Co., Cal., examining copper mines.

T. L. AYRES has returned to Cerbat, Arizona, from Oakland, Cal.

CLARENCE KING is examining the Center Star mine at Rossland, B. C.

W. A. ROBERTS of El Dorado county is in San Francisco on mining business.

W. H. TRUESDALE is to have $40,000 annual salary as Pres. Lackawanna Railroad.

F. WILMANS, a prominent mining operator of Tuolumne county, is in San Francisco.

W. F. DETERT, Supt of the Zeila mine at Jackson, Amador Co., is in San Francisco, Cal.

W. FRANK DRAKE, Sonora, Cal., has been appointed Supt. of the San Guiseppi mines there.

W. A. KING, Montana's new U. S. Senator, is examining mining property on the Mexican border.

THOS. R. STOCKETT of St. Louis, Mo., has been appointed Gen. Mgr. Pacific Coast Co.'s coal mines.

HENNEN JENNINGS has returned from South Africa and has taken up his residence in San Francisco, Cal.

R. H. CAMPBELL of Shasta has returned from California to the Horsefly, Cariboo, B. C., to resume work on the Horsefly hydraulic mine.

M. MARKS is in San Francisco from Dawson to get thawing machines such as, he says, are being successfully used there thawing 10 feet per day.

S. HEIN and F. Calmer, two Russian mining engineers from Siberia, are in San Francisco, en route to New Zealand to examine extensive dredging operations.

R. J. ANDERSON of Boise City, Idaho, Mgr. of the Twin Springs mines, illustrated and described on page 201 of this issue, is at Colfax, Cal., arranging for miners from Dutch Flat and vicinity.

W. B. PARSONS, now making a survey for an American railroad through China, cables success in securing mineral rights in that country. C. Cary, a member of the syndicate, started from New York City for China last week to investigate the value of the mining franchises.

GEN'L MGR. VAN ETTEN of the New York Central railroad, and president of the Randsburg, Cal., railway, is in San Francisco. He is reported to have said that "without doubt at least one line of railroad will be built immediately from southern Nevada into southern California."

L. W. MORGAN of Los Angeles, Cal., has assumed the management of the Azurite copper properties near Tucson, Arizona. The smelter is turning out copper matte; fifteen men are employed. Saeger, Cooper & Fellows of the Calumet & Hecla Copper M. Co. of Michigan paid $50,000 for the property last December. It is locally stated that the properties will be fully developed and a large plant established.

W. J. NEVIN, Gen. Mgr. California Southern railway, is in San Francisco. Regarding the construction of the S. F. & S. J. Valley road, he says, if the present progress continues, it will be possible to have the trains of the Santa Fe system running to Point Richmond by Sept. 1st, '99. It is probable, however, that the regular transcontinental service will not be inaugurated by the Santa Fe until Jan. 1st, 1900. Wm. Bissell will take charge in San Francisco as Asst. Traffic Mgr. of the Santa Fe.

JOSEPH MCGILLIVRAY, a veteran California miner, has returned to San Francisco from Dawson. He says there are enormous areas of low-grade alluvial gravels in the Yukon region, but as it will cost $3 to get $4 worth of gold the gross output must be taken off before work can be profitable. Mr. McGillivray is going to Ottawa to try and get the Government to take off the royalty. He has a proposal to make to the Government, he says, covering the whole matter of working these deposits, and he wants to get concessions so as to be able to raise money in England.

OLAF ELLISON, special representative for the Pacific coast to the Paris Exposition, is in Los Angeles, Cal. He says the Paris Exposition is expected to be opened early in 1900. The space officially allotted to the United States has been nearly doubled, being now 220,000 square feet of floor space—about one-half of that at the Chicago Exposition. United States Commissioner General Peck has appointed J. V. Skiff of Colorado chief of the mineral department. The Paris Exposition headquarters are at the Auditorium in Chicago. Of the space allotted to the United States, that devoted to mines and metallurgy is 7700 square feet; to machinery and electricity, 48,000 feet; to civil engineering and transportation, 16,000 feet. The limited space allotted makes it imperative that quantity give place to quality in the selection of exhibits.

THOS. J. BARBOUR has returned to San Francisco from Virginia City, Nev., where he has been representing the Risdon Iron Works of San Francisco, Cal., who placed the big hydraulic pumps in the C. & C. shaft of the Comstock lode. He reports progress thus far as more rapid and satisfactory than had been anticipated. On the morning of Feb. 23 the water was lowered 81 feet below the point of discharge, which is 29 feet above the 1750 level. The pumps are in the central (a hoisting) compartment at present, and as the water is lowered the old pump rods, column pipes, etc., have to be cleared out of the pump compartment to make room for the hydraulic machinery. At the rate of unwatering the shaft thus far it is evident that for a time the rate of progress will exceed the inflow of water from distant connections. Mr. Barbour and Mgr. G. McM. Ross are each very hopeful of the ultimate result of the undertaking. The flume in the Sutro tunnel has been repaired under the direction of Mgr. Ross, and is now carrying 6000 gallons of water per minute, with a capacity of double that amount. There has been a slight delay owing to an unequal pressure in the pressure column, but steps have been taken to make this constant. During the progress of the work careful observations will be made at other shafts in neighboring mines to note the effect the draining of the C. & C. shaft has at these points.

Recently Declared Mining Dividends.

Parrott S. & C. Co., Montana, 3%, $69,000; Feb. 18. Total to date, $2,276,898.

Cariboo, Camp McKinney, B. C., 1½ cents per share; Feb. 20.

The Homestake M. Co., South Dakota, usual monthly dividend, 25 cents, and an extra dividend of 25 cents; payable Feb. 25.

Gold Coin, Colo., 1 cent per share, $10,000; Feb. 25.

National Lead Co., regular quarterly dividend, 1¾%, on its preferred stock; payable March 15.

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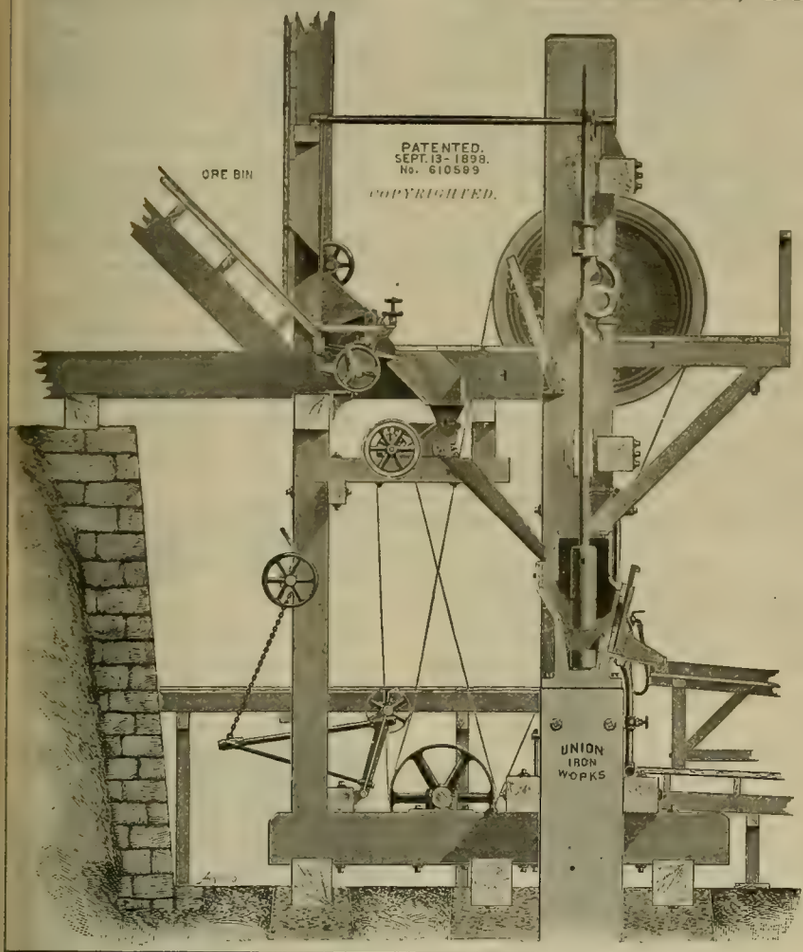

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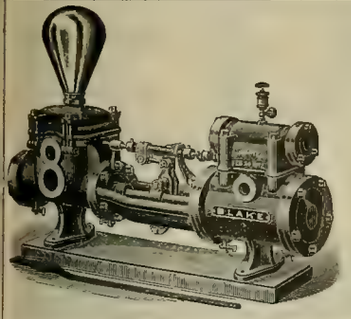

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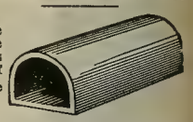
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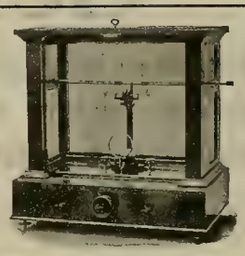
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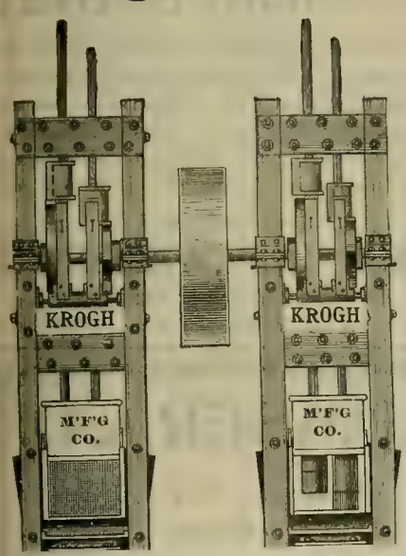

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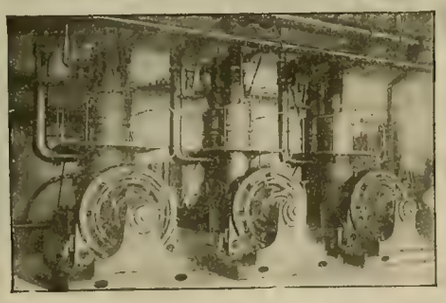

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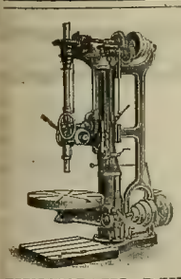

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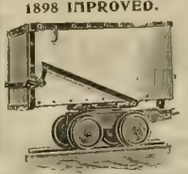

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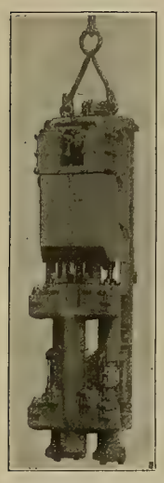

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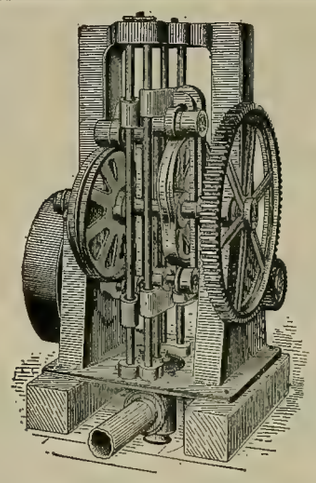

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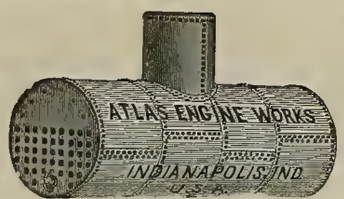

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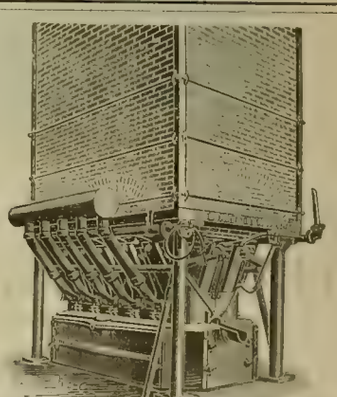

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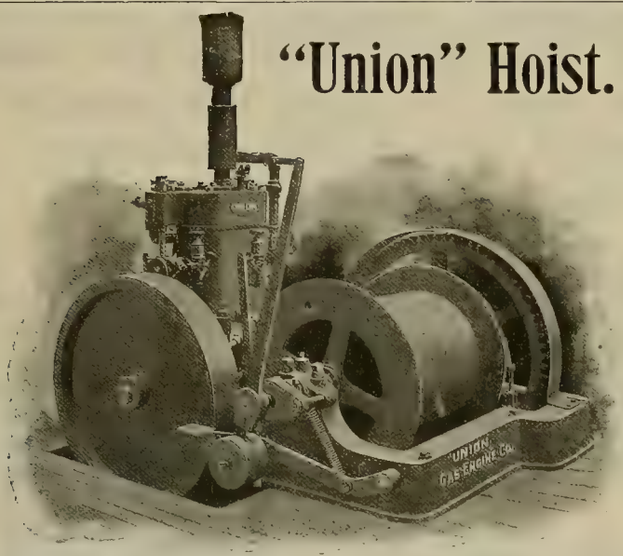

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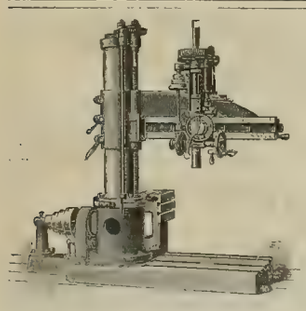

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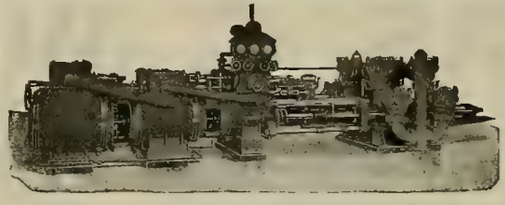
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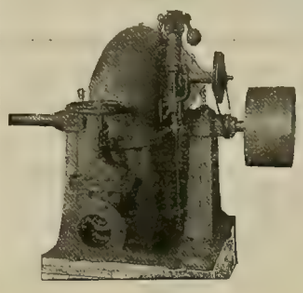

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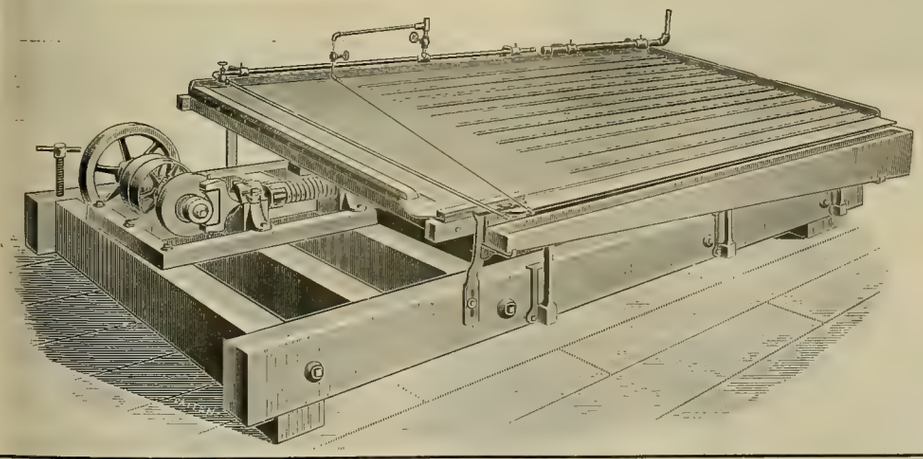

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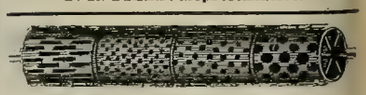

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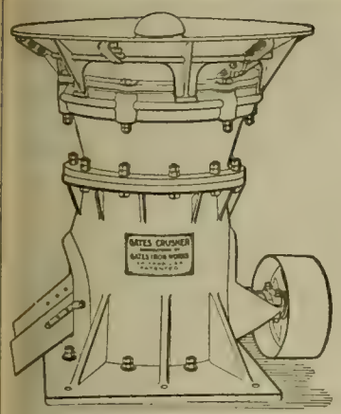

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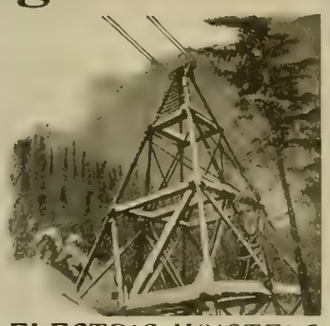

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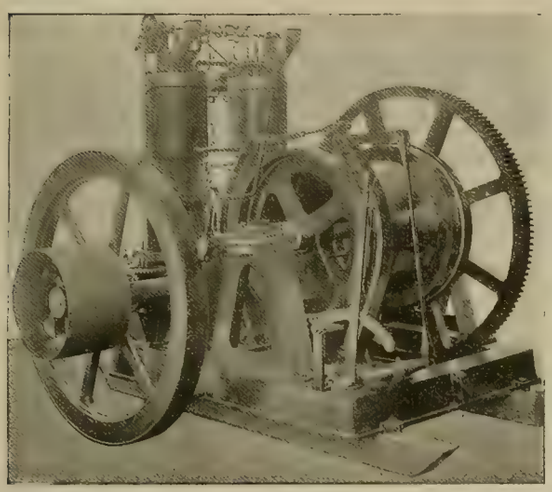

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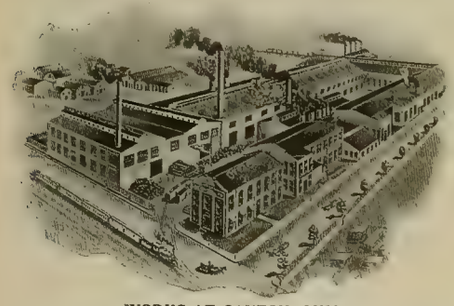

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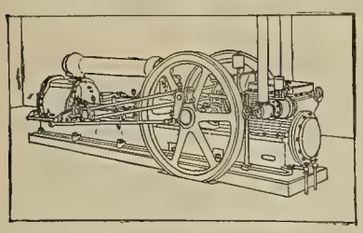

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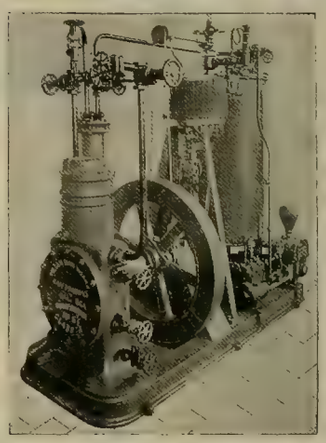

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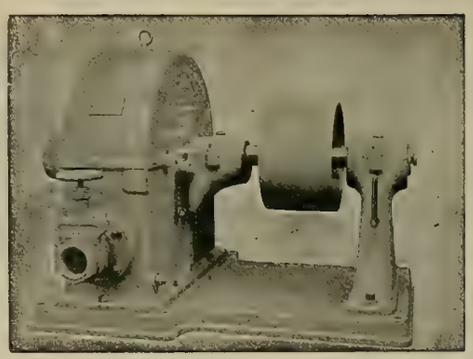

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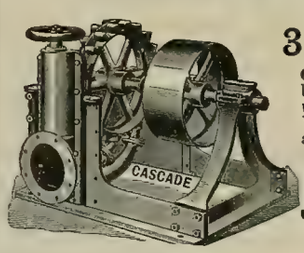

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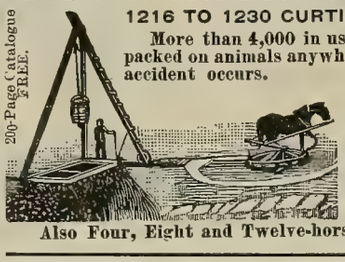

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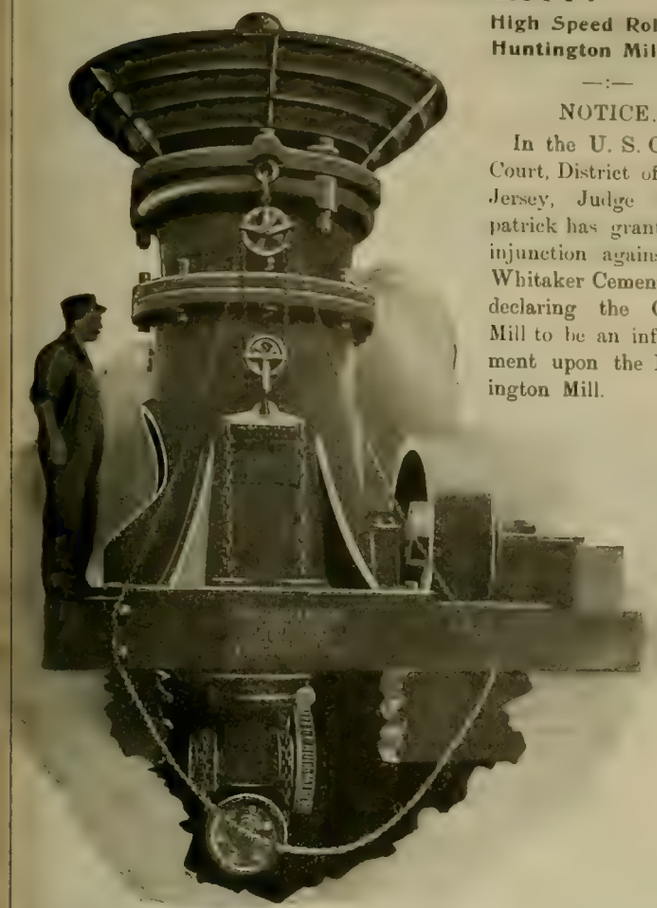

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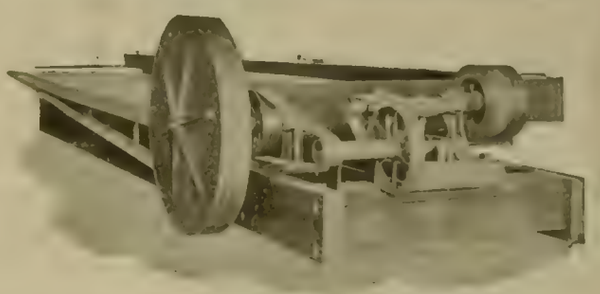

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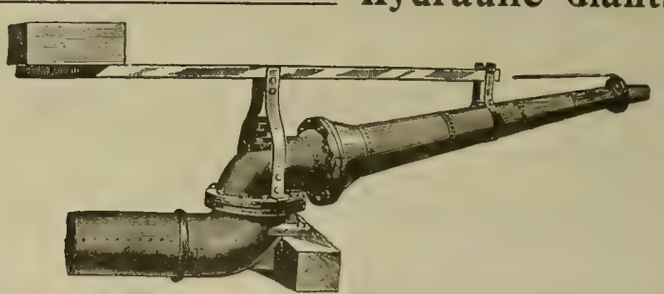

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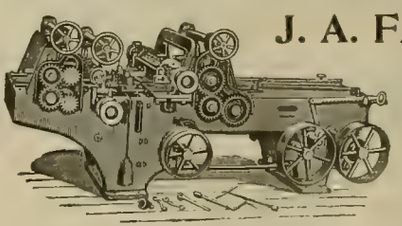

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LEAD. — New York reports "barely steady," $4.40 bid, $4.45 asked; brokers' price, $4.20.

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Extremes do not necessarily follow one another in the price of commodities. Because within the present century the value of timber, coal, petroleum and many other things was not known, it does not follow that they will again be worthless. New uses make new prices for commodities, and the many new fields into which copper is introduced, and its enlarged consumption in those branches of industry where it has always been used, assure an increasing demand for a long time to come.

It is probable that present prices will have some tendency to curtail the consumption, while the production of copper will increase slowly, and that the price will eventually settle to a lower level. At the present time, however, it is impossible to figure out from where the copper is coming to supply the present demand and stop the rapid decrease of the visible supply.

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The *Iron Age* says: Steel is exceedingly scarce for prompt delivery, $18 50 in the central West and $21 in Philadelphia. Manufacturers of merchant pipe have advanced prices 5%.

SPELTER.—10¼. Official statistics of the production of spelter in the United States for the calendar year 1898, as compiled by Special Agent C. Kirchhoff, of the Geological Survey, show a total of 115,399 short tons, an increase of 15,419 tons over 1897. The aggregate is distributed as follows: Eastern and Southern States, 8631; Illinois and Indiana, 47,103; Kansas, 40,132, and Missouri, 19,533. The greatest increase in output was in Illinois, Indiana and Kansas. The exports of ore and spelter for the first eleven months of the year were: Ore, gross tons, 10,254, $291,870; spelter, net tons, 9535, $937,631. This indicates a considerable falling off in '98.

TIN.—Pig, 30c per lb.; Bar, 29c. New York reports "strong and scarce" at $24.25.

ANTIMONY.—16.

BABBITT METAL.—No. 3, 8c.

QUICKSILVER.—Local, $42; export, $39.00 @39 50; carload lots, special rates.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 30 @ 31c per lb.; carloads, 29c; in 10-lb. tins 37c; sulphuric acid, 2½c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9½@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French. 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 7½c; 6s, 14 oz., 6¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 4½c; Granite (Mining) Candles—6s, 16 oz., 8¾c, 6s, 14 oz., 7¾c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $2.50; cut, $2.35; 10 to 20d, wire, $2.55; cut, $2.40; 8d, wire, $2.60; cut, $2.45; 6 and 7d, wire, $2 70; cut, $2.55; 4 and 5d, wire, $2.80; cut, $2.65; 3d, wire, $2.95; cut, $2.80; 2d, wire, $3.20; cut, $3.05. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia ...)	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, Feb. 23, 1899.

9:30 A. M. SESSION.

400 Alpha	10c	600 H. & N.	39c
1000 Andes	21c	200 Justice	23c
500 Belcher	25c	1300 Mexican	69c
1100 Best & Belcher	59c	1300 Ophir	$1 10
300 Bullion	08c	800 Overman	14c
100 Challenge	28c	100 Potosi	32c
200 Choliar	41c	500 Savage	30c
1100 Con. Cal. & Va.	$2 05	1000 Seg. Belcher	06c
200 Con. Imp.	02c	300 Sierra Nevada	$1 20
500 Crown Point	38c	900 Union Con.	57c
1000 Exchequer	03c	1000 Utah	23c
500 Gould & Curry	44c	1000 Yellow Jacket	32c

2:30 P. M. SESSION.

1100 Ophir	$1 05	1100 Sierra Nevada	$1 20
600 Mexican	65c	100 Utah	23c
500 Gould & Curry	39c	200 Overman	12c
200 Best & Belcher	54c	400 Union Con.	53c
1450 C. Cal. & Va.	$1 90	100 Alpha	08c
400 Choliar	38c	100 Alta	12c
700 Potosi	29c	150 Caledonia	41c
400 Hale & Norc's	40c	200 Andes	21c
400 Crown Point	23c	300 Standard	3 25
1000 Yellow Jacket	31c	300 Syndicate	08c
500 Belcher	23c		

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage. MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.
Cable address Edtec Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

ANTIMONY.
We buy Antimony Ore in any quantity and pay prompt CASH for same. Write us and let us know what you have.
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(INCORPORATED.)
422 Battery Street.....San Francisco, Cal.

UTAH
Mines—Dividend Paying and Investment Stock.
W. E. HUBBARD & CO., 15 W. 2d So. Street, SALT LAKE CITY.

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SIMPLEST. **BEST.**
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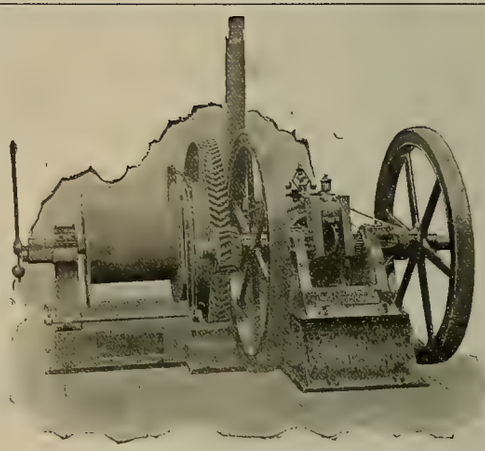
ABNER DOBLE COMPANY, COR. FREMONT AND HOWARD STS., SAN FRANCISCO, CAL.



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The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

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MANUFACTURERS OF DIRECT CURRENT MACHINERY
For Power and Lighting Purposes.
SPECIALTY
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521-525 Seventeenth St., DENVER, COLO.
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ORES CRUSHED AND SAMPLED. MILL RUNS.
Prices on Application.

Assessment Notices.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of February, 1899, an assessment (No. 23) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of March, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 3rd day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of February, 1899, an assessment (No. 8, new series) of seven (7) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of March, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 5th day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. P. THURSTON, Secretary.

Office—324 Pine St., San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from F. M. Pheips, in the Cedar Creek Mine, near Fair Play, El Dorado Co., to deposit tailings in Cedar Creek; from A. B. Jacks, in the Badger Hill Mine, near Spanish Ranch, Plumas Co., to deposit tailings in an old pit; from John H. Hoad, in the Hoad's Ranch Mine, near Merrimac, Butte Co., to deposit tailings in Haphazard Ravine; and from T. S. Mills, in the Mountain Ranch Placer Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in Murray Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco Cal., on February 27, 1899, at 1:30 P. M.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.

CAPITAL, - $550,000.

The Original Cyanide Process.

SIMPLE. RELIABLE. ECONOMICAL.

Gold Medal, Columbian Exposition, 1893.

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Samples assayed and fully reported upon. Particulars upon application.

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OFFICE: McPHEE BUILDING, DENVER, COLORADO.

The : Popular

. . . DINING ROOMS . . .

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Prices Right. GEARY ST.

F. W. KRONE, Prop.

SAN FRANCISCO, CAL.

DELINQUENT SALE NOTICE.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco California. Location of works, Auburn Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment No. 12, levied on the 2nd day of January, 1899, the several amounts set opposite the names of the respective shareholders, as follows.

Name.	No. Cert.	No Shares	Amt.
Marcus Schwab	1	500	$50 00
Marcus Schwab	64	500	5 00
Thos Henningsen	105	100	10 00
Wm. Schmitz	140	1 500	150 00
Wm Schmitz	165	1 000	100 00
N Rienecker	208	100	10 00
Peter Kruckel	232	62½	6 25
J Beck	233	62½	6 25
Peter Kruckel	250	110	11 00
Andreas Kruckel	251	100	10 00
George Schafer	297	194	19 40
Chas Strohmaier	304	200	20 00
Richard Schneider	309	100	10 00
George Schafer	323	300	30 00
George Schafer	324	300	30 00
George Schafer	325	200	20 00
George Schafer	326	200	20 00
George Schafer	327	200	20 00
George Schafer	329	100	10 00
George Schafer	333	60	6 00
George Schafer	334	90	9 00
George Schafer	342	544	54 40
Adam Miller	350	125	12 50
N. Rienecker	351	200	20 00
B. Eggenberger	352	275	27 50
George Schafer	354	52	5 20

And in accordance with law and an order from the Board of Directors, made on the 2nd day of January, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 237 Twelfth street, San Francisco, California, on MONDAY, the 6th day of March, 1899, at the hour of 3:30 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

F. METTMANN, Secretary.

Office—237 Twelfth street, San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the MARINA MARSICANO GOLD MINING COMPANY will be held at the office of the Company, 217 Sacramento St., San Francisco, California, on MONDAY, the 6th day of March, 1899, at the hour of 2 P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer books will close on Friday, March 3rd, 1899, at 5 o'clock P. M.

CHARLES BOVONE, Secretary.

Office—217 Sacramento St., San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the BOULDER MINING COMPANY will be held at the office of the Company, 163 Crocker Building, San Francisco, California, on WEDNESDAY, the 1st day of March, 1899, at the hour of 3:30 P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer books will close on Saturday, February 18th, at 2 o'clock P. M.

J. M. WILMANS, Secretary

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20 "
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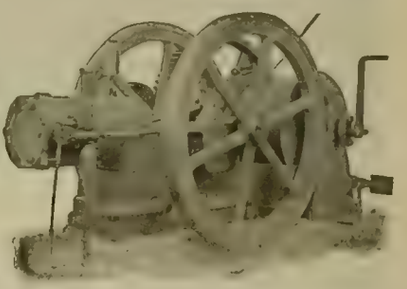

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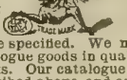
All our catalogue goods, except those listed by us as manufactured by others, are stamped with our name "Keuffel & Esser Co." or our initials "K. & E. Co" and where there is room for it, with our trade mark 

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Duplex Universal Anvil Paragon Normal

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FOUR and SIX-FOOT FRUE VANNERS

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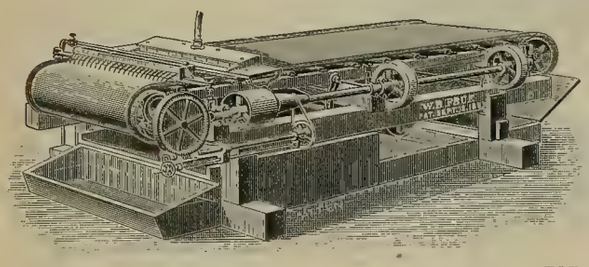

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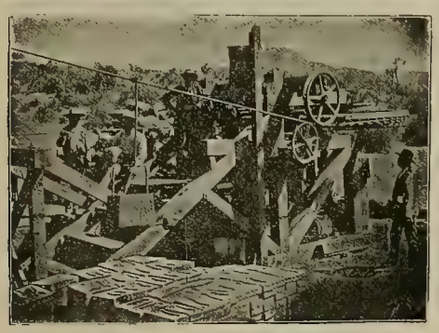

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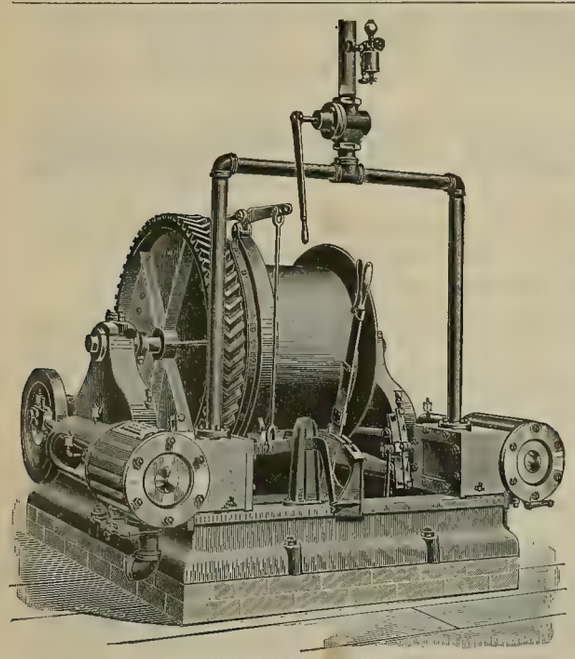

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Estimates Furnished for Complete Plants for Hoisting Works, Smelters, Concentrating and Stamp Mills.

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AND PACIFIC ELECTRICAL REVIEW.

0. 2017.— VOLUME LXXVIII. Number 9. SAN FRANCISCO, SATURDAY, MARCH 4, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Prospecting for Gold With a Drilling Machine.

ritten for the MINING AND SCIENTIFIC PRESS by ROBT. H. POSTLETHWAITE.

I will briefly describe the method of prospecting r gold in placer deposits by means of a drilling ma- ine. I have been interested in gold dredging for any years past and have, after considerable expe- ence, come to the conclusion that the business can, y thorough and systematic prospecting beforehand the ground on which the dredge is to operate, be moved from the sphere of uncertainty and specu- tion and be rendered a profitable and safe invest- ent. The old method of prospecting by the sinking shafts was so costly that but few felt inclined or, deed, were able to thor- ughly prospect a piece of round before operating e same by means of a redge. In consequence of is fact many dredging perations have proved ilures and the dredging usiness has received a ack eye, not from any in- rent fault in the dredge t because the values were t in the ground. After oroughly investigating fferent driller and other achines, I, in April last, rchased a Keystone No. driller for the purpose of rospecting certain placer aims upon which I medi- ted placing a dredge. I first felt dubious as to hether it was possible to tain by means of a driller thorough and accurate st of the values in any rticular piece of ground. nce purchasing the above entioned machine I have rospected hundreds of res by means of it and n now convinced that the roblem of thoroughly and stematically prospecting dredging ground at a asonable figure has been solved. In order to test e accuracy of the prospect obtained by the driller, sank a shaft close to the driller hole and obtained a sult almost identical. The driller showed 37 cents d the shaft 35.8 cents to the cubic yard, and in the tter was a large boulder which would account for e slight difference in value of the two prospects. ll that is necessary to insure success is the exercise great care both in the drilling and in the handling the sand pump.

DRILLER IN OPERATION NEAR FOLSOM, CAL., SHOWING MR. POSTLETHWAITE AND MEN WITH NO. 2 SELF-MOVING RIG.

The driller is a traction machine of 8 H. P. and ay be described as a combination driller having th "mast" and "walking-beam." The hole is illed by means of a heavy steel bit attached by a per screw to a 24-foot stem weighing some 500 unds. This stem is attached to a hempen cable nning over a pulley at the top of the derrick and wn to a drum on the body of the machine. The aterial is raised from the hole by means of a vac- m pump. The machinery is set in motion and the t and stem are by means of the cable raised from inches to 36 inches, according to the stroke used (which can be regulated at pleasure), and then let fall their full weight. The fall or stroke is regulated by a crank which gives motion to the walking-beam from which the drilling tools are suspended. Without delay the drill is raised for another stroke and during its ascent the operator twists it about one-eighth of a turn, so as not to strike two successive blows in the same place, otherwise the second blow is lost. During this process water must be put in the hole, about two gallons to each foot drilled, so that the cuttings may take the form of batter or thin mortar. When the depth of the hole made is such that the cable prevents the drill from striking the bottom of the hole with its full force, by means of a brake an inch or so of cable is allowed to run off the reel or drum, and the process continued until the cut-up clay, rock or gravel becomes so thick that the drill will not fall freely through it. When about 2 or 3 feet have been drilled the drill rope reel is thrown in gear and the tools lifted from the hole by means of the engine. The brake holds the drill suspended in the derrick, when the drill rope reel is thrown out of gear and the sand pump reel is thrown in gear. The sand pump is then lowered into the hole by means of a brake. The cuttings in the form of mud or mortar enter the pump at the lower end and a valve prevents them from flowing out when the pump is raised. The sand pump is drawn up and emptied two or three times, until all loose material has been drawn up. Great care must be exercised in preserving all the material drawn up, as on this depends the accuracy of the prospect. I empty the material into a large bucket or tub and keep a Chinaman continually panning it out. The amount of material is small, as the hole only measures 6 inches in diameter. When the sand pumping has been completed more water is poured in the hole, the tools run down again and the process of drilling repeated. In order to obtain an accurate prospect it is essential that the hole be cased with iron pipe and that the pipe at all times be kept within a foot at most of the bottom of the hole. When the prospect is completed this pipe is withdrawn by means of hydraulic jacks and can be used again.

If the pipe is not made to closely follow the drill a cave in is likely to occur in which case the prospect will, of course, be valueless; indeed if the cave is not discovered a very wrong estimate of the value of the ground may be arrived at as the actual amount of material raised will be much larger than the amount figured on, which latter is estimated from the size of the hole drilled. In order to obtain the best results in drilling it is necessary to make from sixty to sixty-five strokes per minute which can be done with the machine I am operating. The advantage of this, besides making the hole straighter and more rapidly, is that the cuttings as taken up by the sand pump are coarse and chunky and not ground to a powder as is the case when a slow short stroke is used. The long quick stroke keeps the heaviest materials afloat and does not allow them to settle between strokes to be recut or driven into the solid ground at the bottom of the hole at each descent of the drill bit and thus placed possibly out of reach of the sand pump. In order to make doubly sure of obtaining an absolutely accurate prospect a tool has been devised whereby it is possible, when prospecting ground having a soft bedrock, to cut into and bring up in a solid chunk about 4 inches of the bedrock, thus insuring the obtaining of every trace of gold, if any, which may have been driven by the driller into this soft bedrock. The cost per foot of drilling, whether there is water present or not, is a comparative constant and is in no case more than 25% of the cost of sinking shafts. For the purpose of prospecting thoroughly for dredging purposes, say a 100-acre tract to a depth of 50 feet, it is necessary to drill not less than ten holes spread over the tract. The cost of prospecting such a tract of land by sinking shafts might vary according to formation and conditions from $1500 to $20,000 and in some cases it could not be done at all. This reduction in the cost of prospecting will I believe, tend to greatly increase gold dredging operations in this State and elsewhere.

(On Golden Gate mountain, five miles west of San Andreas, Cal., F. J. Horswill of Valley Spring, Cal., used a driller of somewhat similar construction in locating an ancient river channel, boring several hundred feet through the lava cap which overlaid the gravel. He also recommends drillers highly for this purpose and for prospecting gravels generally.—ED.)

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THE rain-making crank is again in evidence in various parts of the country. One in Montana proposes to deluge the earth by means of electricity; another in Los Angeles, Cal., proposes a general bombardment of the heavens from balloons sent up from Mt. Lowe. The first essential in rain-making is to supply the atmosphere with moisture sufficient to produce the desired precepitation, and if noise will bring about this desired humidity it would be a good plan to let the Los Angeles man try his experiment at his own expense, as suggested by himself.

BUILDING the Sierra railway into Tuolumne county, Cal., will prove of benefit to the mining industry in that section, if the result in other regions be any criterion. There are those who look upon the coming of a railroad into a mining region with alarm; but while it may for a time prove detrimental to a certain class—chiefly farmers—it will be found a great help to the general advancement and development of the mining section through which it passes. There are mines in that section carrying high-grade ores, and with better transportation facilities some of them should be directly benefited. The railroad will be a great convenience to the mining community.

GREAT importance attaches, in the minds of many, to the question, "Does the vein go down?" Admitting that it is desirable to have the vein, shoot, or whatever form of deposit it may be, "go down"—which condition is presumed to indicate permanency—is it so vastly important as to make a mine which does not go down valueless? Take two ore deposits of wholly different character, and compare them; for example, some of the mines in the vicinity of Terry in the Black Hills of South Dakota, where many of the ore deposits occur as flat or nearly flat sheets, extending across the top of a ridge, reaching from canyon to canyon. Some of these lie very close to the surface and require little stripping; others are not stripped, but mined and timbered. The ore deposit may be assumed, for convenience, to be 800 feet long, 130 feet wide and 10 feet thick. This represents a tonnage of 80,000 tons of ore, worth net, say, $15 per ton. This will place the net value of that particular mine or shoot at $1,200,000. After sufficient development has been done the owners may arrive quite arbitrarily at the net value of their mine. Yet this mine does not go down—no one looks for it to do so. There is no trouble with water, the mine can be worked systematically and economically. The mines in the district are not all as favorably situated as might be inferred from the example, but a type has been taken which represents the most superficial deposit—a cap on top of a ridge. In comparison with this take a fissure vein in California, standing at say 70°, which does go down. When opened to a depth of 800 feet and blocked out at a cost of not less than $65,000, it is found that the ore shoot is 300 feet long and averages 6½ feet in width and is worth $15 per ton. This represents 120,000 tons of ore, which must be extracted and hoisted at an expense of nearly a quarter of a million dollars. The pumps must be kept in motion without cessation. Everything in such a case is done at a disadvantage. The net result when the mine is worked out to the 800 level will probably be $1,400,000, and the mine may continue a large and profitable producer for many years more. But does the comparison make the flat shoot of ore capping the hill of so little value as not to be worth locating?

SECRETARY BENJAMIN of the California State Miners' Association has been officially informed by Secretary Raymond of the American Institute of Mining Engineers that that body will hold its next meeting in October, 1899, in San Francisco, in acceptance of the Association's recent invitation. The membership of the A. I. M. E. is about 2400, a percentage of which attends the stated meetings. It is probable that the San Francisco meeting will be the occasion of a large gathering of this representative mining organization. It will be the first time that the association will have met so far west, and the San Francisco gathering of this eminent body can be made the occasion of mutual pleasure and profit. There will be much for the visitors to see, and opportunity will be given to dispense California hospitality. Numerous details will have to be arranged for the proper reception and entertainment of the visitors, and it readily occurs to every one interested in the mining industry of this west half of America that it is to its advantage in every way that the sojourn of the A. I. M. E. be made as pleasant as possible. The meeting will be an event of importance to mining men on the Pacific coast, being the first meeting ever held west of the Rocky mountains by the Institute. The American Institute of Mining Engineers has been in existence twenty-nine years. The objects of the Institute are to promote the arts and sciences connected with the economical production of the useful minerals and metals and the welfare of all employed in those industries, by means of meetings for social intercourse and the reading of professional papers, and to circulate and publish among its members and associates the information thus obtained. The Institute consists of members, honorary members and associates. The members and honorary members are professional mining engineers, geologists, metallurgists, chemists or persons actively engaged in mining, metallurgy or metallurgical engineering. Associates include all suitable persons who, being desirous of connection with the Institute, are elected in accordance with the rules. The membership includes many men of greatest attainment, broadest knowledge and widest practical experience in the mining and metallurgical field, and the "Transactions" have taken a high place among the technical literature of the broad field which the scope of the Institute covers. Members from every corner of the globe contribute something of their personal experience for the benefit of those who are unable to visit the far distant section. The discussion which frequently follows original contributions forms one of the most valuable features of the "Transactions." In these mistakes or omissions by the original contributor of some paper are pointed out, or his ideas may be verified by the experience of others and amplified.

AS PROBABLY with every other publication, numerous inquiries are now received in effect: "When does the 20th century begin?" At 12 o'clock, midnight, Dec. 31, 1900. That is the brief correct answer. But the question brings up some additional reflections. There really is no 20th or 19th or any numbered century. The whole thing is arbitrary. By universal consent of Christendom a certain or uncertain starting point to count from has been selected; and, taking that as a basis on the 31st of December, of next year, 1900 years will have elapsed, and, as it takes 100 years to make what we call a "century," not till the last second of the hundredth year is a century completed. As with the first second of the year 1 began the first century, so with the first second of 1901 begins the hundred years that ends with the last second of the year 2000, called the 20th century. History has been defined as "fable agreed upon;" so with chronology. There is no reason for calling this the 19th century any more than the 29th or the 4th beyond the general acceptance of the idea that we must have some starting point, some way of numbering the years for convenience and the world's requirements. It would be interesting to know, were such a thing possible, what this year's number really is. Doubtless several times since the primal protoplasm evolved into the mammal, attempts have been made to keep correct record of the years. Doubtless those records were carefully kept, each succeeding 365¼ days being numbered one more with its predecessor till a large total accrued, and then, when the poor little human record of the years had aggregated 15,000 or 50,000, came a great cataclysm, its cause and result long since in oblivion, and the record began anew till another total of 15,000 or 50,000 years was attained, when another human convulsion compelled beginning the count anew. The insignificant little figures 1899 bear about the same relation to the real year of the world that an arc light does to the sun. It would be interesting, were it feasible, to know what the correct current date, from that standpoint, is—and about as profitable as to know when the 20th century begins.

PROSPECTORS who object to recording a claim with the county recorder, instead of with a local district recorder, as formerly, may note that the claim being recorded at the county seat, in the official books of the county, gives greater security to the title than when simply recorded with a district recorder, whose records were often poorly kept and frequently not kept at all. A copy of the certificate of location may be sent by mail, as it does not require the locator to appear in person at the office of the county recorder. The ambiguous language of location certificates is a fruitful source of trouble, as is also neglect to refer the corners to natural objects, such as large boulders, section corners, streams, etc. Trees are usually selected, and described by name and size, as "a pine tree 10 inches in diameter." The pine tree will grow with years, or may be cut or burned down, and then the bearing is destroyed. The location of a claim is simple and rarely requires the services of a surveyor to get the lines fairly accurate. Good, substantial monuments of stone, with a post not less than 4 inches in diameter, constitute legal and enduring monuments. If a locator considers his claim of any value, actual or prospective, it is surely entitled to have the corners defined in a positive and substantial manner, and to be recorded with the county recorder. If an opportunity to sell presents itself the owner has clear title, and in event of a transfer the deed must be recorded with the county recorder. Then, why not the certificate of location?

ON page 236 of this issue is a communication from "Mine Owner." The sentiment is concurred in. It might be further said lack of funds in the treasury of a mining company is not always responsible for parsimonious management nor for the many foolish things which are done at the mine. The superintendent is always held responsible for any evident mistakes in the development or equipment of a mine, but very often he has no voice in the matter. It is the board of directors who have the say, and sometimes they say very strange things. This is particularly the case with new corporate companies. The members of the directory feel the weight of their new responsibilities, and, while they may know little regarding the development of a mine or its proper equipment, they think they do, and want everyone else to think so, and the superintendent gets his orders forthwith: "Don't strike any more water if you can help it;" "keep away from soft ground—it requires timbering;" "the shaft is too big, reduce it to a single compartment," and so on. The superintendent usually has one alternative—to quit—for the directors do not propose to relinquish their prerogative and will not be instructed. The best way is for the board to engage the services of a competent superintendent, in whom they have confidence, and then give him full swing, for he, with the knowledge of the property, should, and certainly does, know better what should be done than the directors.

Concentrates.

A GRAIN of $18 gold is worth 3¾ cents.

QUARTZ containing 1 cent in one pound is worth $20 per ton.

IN placer mining 20 inches of water is usually considered a sluice head.

AT ordinary temperature a cubic foot of water weighs 62¼ pounds avoirdupois.

AMALGAMATION should be accomplished in a battery with the least possible amount of water.

THE average loss of quicksilver in free-milling ores should not exceed one-sixth ounce per ton of ore crushed.

COLORADO has passed an eight-hour-shift law for the benefit of miners, exactly similar to that in force Utah.

A MILLIMETER is nearly one twenty-fifth of an inch. A cubic centimeter is a very small fraction over .061 cubic inches.

AN assay ton contains 480 grains, being a troy ounce, and there are 29,166 troy ounces in an avoirdupois ton of 2000 pounds.

A CUBIC FOOT of quartz weighs nearly twice as much as a cubic foot of quartz sand owing to the interstitial spaces in the latter.

THE dredge that is to be operated in Stanley Basin, Idaho, on Marshall's and Cooper's placer ground, weighs about 225,000 pounds.

IN a 5-stamp battery the succession 1, 3, 5, 2, 4 is a good order of drop, and in a 10-stamp battery 1, 6, 3, 8, 5, 10, 2, 7, 4, 9 usually gives satisfaction.

THE square-set system of timbering was first introduced in the Ophir mine, Comstock lode, Virginia City, Nevada, in 1860, by Ph. Deidesheimer.

THE weight of freshly fallen snow varies from five to twelve pounds per cubic foot, depending on the humidity of the atmosphere through which it falls.

THE Catalpa Mining Co., Leadville, Colo., is shipping steel iron ore and fluxing iron to South Chicago. The mine is showing reserves of manganese.

AN exchange reports snow at Lane Mountain mines, near Elko, Nev., to be 10 to 18 feet deep. The miners pass from house to house through tunnels in the snow.

WHEN one sees the statement that "Mr. ———, mining expert, stakes his reputation on his report" on a certain district or mine, does it signify anything of importance?

A COPPER-SILVER MINE near Reno, Nevada, has the odd name of Cuag, being a combination of the chemical symbols for the two metals which it produces—Cu. (copper), Ag. (silver).

A No. 5 SCREEN has 20 meshes to the inch; No. 6, 25 meshes; No. 7, 30 meshes; No. 8, 35 meshes; No. 9, 40 meshes; No. 10, 50 meshes; No. 11, 55 meshes; No. 12, 60 meshes.

THE Nevada and Placer Co., Cal., miners employed by Mgr. Anderson to work for the Twin Springs Placer Co., Boise, Idaho, get $4 per day for pipemen and $2.75 for laborers.

THE recent Eastern advance in the price of steam boilers of 20% is occasioned by the rapid and continued increase in the price of materials entering into boiler construction.

A SHAFT having an inclination of 60° from the horizon, departs from the perpendicular 50 feet in each 100. One at 45° gains 70.7 feet in each 100 and one at 30°, 86.6 feet in each 100.

FROM the Golden Gate mill at Mercur, Utah, last week was received at Salt Lake City one consignment of auro-cyanides, weighing 6000 pounds, and calculated to be worth $20 per pound.

MARCH is a bad month for snowslides in Colorado, and the unusually heavy February snowfall threatens a continuance of the present timber famine in the higher altitudes of that commonwealth.

WATER flowing from the shafts or tunnels of many copper mines contains sulphate of copper in solution. By passing this water through a sluice box or tank containing old scrap iron metallic copper is deposited.

A QUESTION of some importance in California is: how may the large piles of roasted sulphides (tailings of chlorination works), containing values in gold of $5 per ton and upwards, be successfully treated at a profit?

A MIXTURE of absolute alcohol and ether, in the same proportions as are used in making collodion, is a solvent for celluloid, and will not interfere with any of the coloring matters used in the preparation of the article.

AT Hedges, California, 120,000 gallons of water were pumped from the Colorado river to an elevation of 500 feet at the mines, a distance of twelve miles, at a cost of $22 per day, or about 22 cents per ton of ore treated.

THERE was a stampede to the Buffalo Hump district in western Idaho in '62, caused by the report of rich placers, but none of value being found the stampeders left the field. No attention was given to the quartz veins at that time.

THE careful sizing of pulp from batteries before sending it onto concentrating machines gives better results. It is scarcely reasonable to expect to save coarse and fine sulphurets on a single belt or table with an equal volume of water and the same grade.

AT the Redman mine, Banner, San Diego Co., Cal., 12 inches of water were raised from the shaft from a depth of 90 feet by means of a hydraulic ejector. To accomplish this, 9 of the 12 inches were introduced under a 650-foot head, through a 4-inch pipe.

TO FIND the approximate weight of a conical pile of quartz, measure the diameter of the base in feet, square this diameter and multiply by .7854. This will give the area. Multiply this sum by one-third the vertical height of the cone-shaped pile and divide by 20. This will give the number of tons in the pile. Example: A pile of ore is 12 feet wide and 4 feet high, piled in circular form; 12 12 144. This multiplied by .7854 equals 113.09 1', feet (one-third the height) 150.4 cubic feet. This divided by 20 (the number of feet in one ton) gives 7.52 tons.

NEAR Prescott, Arizona, search is being made for rubies by a man who claims to have noticed them there years ago, at which time he did not recognize their value. Should he find the place again, his rubies will in all probability prove to be garnets of no great value.

IN some Southern States chlorination can be successfully accomplished at a cost of but $5 per ton of concentrates, owing to low cost of labor, fuel and chemicals. In California the cost ranges from $6 to nearly $12, according to magnitude of operations and conditions.

THE relative height of discharge from a stamp battery influences the capacity. A low discharge increases capacity, a high discharge retards it. While increased capacity may result in cheapening the cost of crushing per ton, a loss of gold from more rapid crushing may result in a loss instead of a gain.

A MINER'S inch in California is a variable quantity, ranging from 1.36 cubic feet to 1.73 cubic feet per minute, according to height of pressure. When the surface of the water is exactly 6 inches above the center of the discharge (2 inches in height) each square inch discharges 1⅓ cubic feet per minute, or 12.09 gallons.

A PROJECT is being agitated to run a large drain and transportation tunnel from Malta, Colo., in the valley of the Arkansas river, under the mines of Leadville. The tunnel would be several miles in length, but the conditions obtaining at Leadville warrant the undertaking. The miners are asking State aid to accomplish the great task.

WERE the Standard Electric Co. of California to complete its project of bringing electric energy from Blue Lakes to Oakland, Cal., the transmission wire would be the longest in existence—125 miles. The project is deemed feasible. In southern California high voltage is now carried eighty miles, a distance that a few years ago was considered impossible.

THERE is no business quite so legitimate as mining, rightly says Judge Goodwin. In other occupations when men obtain money they have to go down into the pockets of other men to get it. They may give full value for it, but after all it is only a "swap." When they take it from the ground it is a creation, and blesses not only him who receives it, but all the world.

THE French metre is 39.370432 inches and is presumed to represent the one ten-millionth part of the distance from either pole to the equator, but after having been adopted errors were found to have been made in the calculation, and in consequence is not what it was intended to be, but approximates it closely. Taking it at 3 feet 3⅜ inches, the length of the metre is but 1 part in 8616 too great.

A WASHOE COUNTY, Nevada, legislator has introduced a bill in the Assembly to restore the provisions of the original mining tax measure, providing that in no case shall the exemption from taxation of any mine exceed 90% of the proceeds of ore that yields $12 or less per ton; 70% of the gross proceeds of ore that yields over $12 and under $30; 50% on ore from $30 to $100; and 35% on ores over $100.

IN an article on the chemistry of coke in *Revue Universelle*, O. Simmersbach of the Westphalia Coke Syndicate sums up the following points which should be insisted on in a good coke for metallurgical purposes: (1) Not over 4% of water; (2) not over 9% of ash; (3) not over 1% of sulphur; (4) not over 0.18% of phosphorus; (5) not over 6% of fine coke in any shipment; (6) a crushing strength of at least 1140 pounds per square inch.

RAPIDLY fluctuating values in mine stocks have a tendency to influence capital against mining as a legitimate industry. The price of mining stocks at the exchanges seldom bears any actual relation to the real value of the mine as determined by "ore in sight." When a mine is prosperous, its stock is usually selling at a price above its actual value; and when not paying stock is often below its reasonably safe prospective value.

"WHEN a broker creates a market," says one of that fraternity to the Salt Lake, Utah, *Tribune*, "he has a right to fill his order at the figure to which the seller has responded, without interruption from any other buyers, and the sooner that principle is recognized and incorporated in a rule, the better for brokers. The only fair means of side-tracking the original buyer is to make a better market. Observe this rule and the daily conflicts will have been overcome."

WHEN the Utah Consolidated, Utah, mine was a gold mine it sold at $1 80 per share. Now that it is a copper mine it has sold at $30, which for the 300,000 shares would make it worth $9,000,000. Last week a company represented by H. H. Rogers bought 100,000 of the 300,000 shares for $3,100,000. Boston men who parted with the stock paid $5 and $6 per share for it about two years ago. The stock is understood to be selling at $30 per share at present.

ACCORDING to a recent patent, iron or steel can be colored by cleaning and dipping in a solution of the salts of one or more metals. It is then placed successively in a dry chamber at 100° Fahr., steam, the dry chamber again, and boiling water, for about thirty minutes in each, and then scratch brushed. The solution used can be made by mixing hydrochloric and nitric acids with perchloride of iron and some sulphate of copper and water. Metallic iron is added and the solution is filtered. Coloring matters may also be added.

THE fulminates of the various metals—gold, silver, mercury, etc.—are preparations of these metals which have the property of exploding or detonating, more or less violently, under certain circumstances, such as being struck a sharp blow, being scratched and even on being touched. Some explode even when the surrounding atmosphere is put into certain forms of vibration, vibrations of a certain velocity, etc., as by the explosion of another substance. The term fulminate has no reference to the chemical make-up of the substance.

THE structural geology of Calico district, Cal., is not unlike that of Cripple Creek, Colo. A heavy deposit of rhyolite-breccia and tuff lies upon an older system of crystalline rocks in the Calico region. The breccia and tuff are cut by intrusive dykes of t.parite and vitrophyre. The ores, however, occur in fissures, chiefly in the breccia. Hornblende andesite forms a large portion of the southeastern hills at Calico. At Cripple Creek andesite lies in heavy layers upon the granite. The andesites are cut with intrusive dykes of phonolite. The ore shoots in Cripple Creek are usually associated with these dykes.

THE first time electricity was used in mining in California was in Placer Co. in '89. The first use of the kind in Colorado was by the Aspen M. & S. Co. at Aspen, where, in the Veteran tunnel, a street car motor was rigged up to haul a train of empty cars 1200 feet and to raise from an incline. A vertical shaft to tap the Molly Gibson vein was sunk and operated at a depth of 1230 feet with the largest electric hoist in the State. In Cripple Creek there are fifty electric hoists in operation, using the induction motor, varying from 5 to 50 H. P. There are now two under construction of 200 H. P. each and one of 300 H. P.

BY specific gravity is meant the weight of a body as compared with the weight of some other body of equal bulk which has been adopted as a standard of comparison. Pure water is the usual standard excepting for air and gasses generally. Where extreme accuracy is not essential no account is taken of temperature of the water nor atmospheric pressure. The manner of ascertaining the specific gravity of any body heavier than water is as follows: Weigh the body in air, then in water; find the difference, which represents what the body loses in water, and is the weight of a bulk of water equal to the bulk of the body immersed in it. Then by proportion—as the difference is to the weight in air, so is one to the specific gravity of the body.

THE "smokeless giant powder" recently reported invented is the product of A. Moffatt of Indianapolis, Ind. So far as the writer knows, it has not as yet received any practical test. In Sydney, Australia, Messrs. Fraser & Callaghan have invented a smokeless blasting powder that they call "kallenite." The base is "eucalyptus leaves and titree bark," instead of infusorial earth. An account of a recent test at Sydney of "kallenite" says: "Four holes had been drilled to a depth of 16 feet, and each had been charged with twelve pounds of 'kallenite.' The charge was fired by electricity, and dislodged with comparatively little upheaval some 200 yards of stone. There was little noise and hardly any perceptible smoke or fumes."

AIR in passing through pipes is subject to friction in the same manner as water or any other fluid. Frictional resistances in pipes conveying fluid are proportional to the density of the fluid. At equal velocities the frictional resistance of air is very much less than that of water. Air may be transmitted in mains, without serious loss or fall of pressure, at ten to twenty times the velocity practicable with water in water mains. Air at ninety pounds is 115 times lighter than water, and frictional resistance at equal velocities is less than 1% of that of water. In air mains velocities of 25 to 50 feet per second are allowed without serious frictional loss. In consequence of this high velocity large amounts of power can be transmitted by air at moderate pressures in pipes of moderate dimensions. It is seldom necessary to use anything above 6 inches in diameter; 5 inches has been the size of pipe most utilized, and as low as 2 and 3 inches. In pipe lines of a mile or over the difference in pressure at both ends is hardly appreciable.

FLASHLIGHT powder usually consists of either magnesium, in powder alone, or with the addition of an equal weight of aluminum in powder and 20% of potassium chlorate. Another formula consists of 15 parts (by weight) of gun cotton and from 15 to 30 parts of magnesium in powder. They are to be "mixed" as follows: Pull out 10 or 15 grains of the cotton in such a way that it makes a thin, round layer from 3 to 4 inches in diameter. Sprinkle over it, evenly, a similar amount of powdered magnesium (which you can purchase already powdered); lay over it a layer of the cotton similar to the one first prepared, and the light is ready for ignition. The operations described before should be performed on a dust pan or similar object (a sheet of tin will answer); and, after putting on the covering layer as described, attach a fuse, 6 inches or more in length, according to the time desired, made of twisted cotton that has previously been dipped in a solution of potassium chlorate, or a mixture of chlorate and nitrate, and dried. Taking flashlight photos in mines requires the proper apparatus and a natural aptitude therefor. The sample sent is not suitable for engraving; too dark. The utmost care should be used in the manipulation or manufacture of flashlight powder, as carelessness is apt to result disastrously.

RECENT advance has been made in the treatment of zinc ore containing iron by magnetic separation. The separation of the two metals had hitherto only been possible in cases where the particles were of comparatively large size so as to allow of their treatment by a process of concentration by gravity, the iron being the heavier. The impurities which affect the value of the zinc are iron and lead. The former, which is the most frequent, renders the metal much harder and causes it to heat and crack during the rolling of zinc plates. Lead is generally present to a small degree, being introduced from the galena which so often accompanies the ore. Zinc is extracted by a process of distillation, which is rendered easy, as the metal volatilizes at a bright red heat. When the sulphide is used for this purpose it is first roasted to get rid of the sulphur. Lead is separated from the zinc during the treatment by heating the pigs of zinc on the sloping bed of a furnace. As they melt and run down to the bottom the lead, being the heavier, collects in the bottom of the hollow and the upper layer of zinc can be run off. The deposits in which the ore is usually found are, like most deposits in limestone, irregular fissures and pockets connected by stringers. The ores which occur are the sulphide of zinc (blende) and the carbonate (calamine). The former carries 60% zinc when pure, but averages 40% to 60% in practice. Calamine is a white, pearly ore containing up to 52% zinc, and was for a long time the principal ore worked. The red oxide of zinc is found in some places. When heated before the blowpipe it gives a characteristic incrustation on the charcoal which turns green when moistened with cobalt solution and reheated. Various other metals in combination prejudice this test. Galena has a specific gravity of 7.5, blende 4.3 only, so that the one ore is nearly twice as heavy as the other. Galena is also much softer than blende.

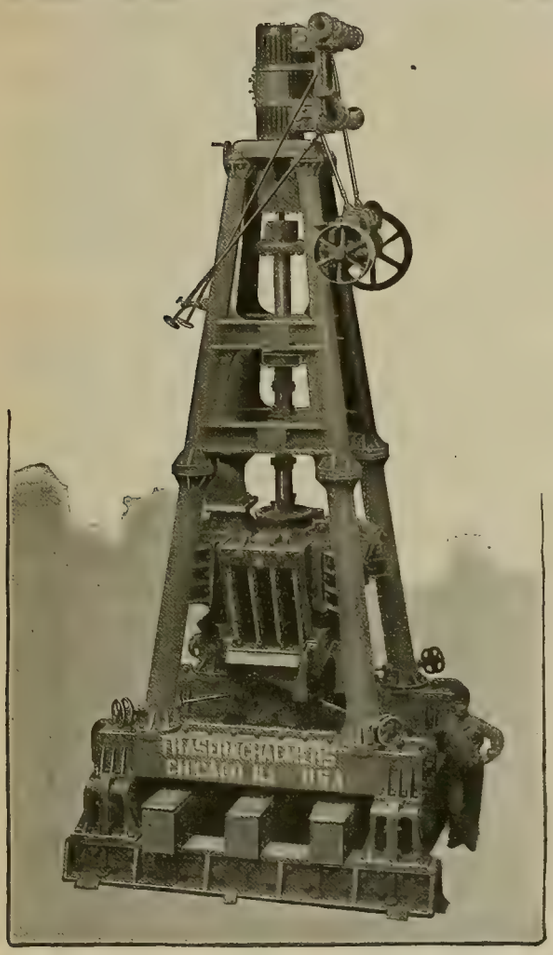
Notes on Steam and Other Stamps.

Written for the MINING AND SCIENTIFIC PRESS by C. H. FITCH.

A valuable summary of information on the steam stamp is contained in the historical paper by Frederick G. Coggin, superintendent of the Calumet & Hecla mills, Lake Linden, Michigan, before the American Society of Mechanical Engineers. Messrs. Blandy, Rolker and Munroe have presented interesting papers on the subject before the American Institute of Mining Engineers. An official report (1898) by Geo. A. Newett, Commissioner of Mineral Statistics for the State of Michigan, gives additional facts.

From these and other sources I gather the following memoranda, not as being exhaustive in treatment or infallible in opinion but rather as foot-marks along the line of progress in steam stamps, leaving much to be said:

The first steam stamps were built from the designs of William Ball of Chicopee, Mass., in 1856, for a mine in South Carolina. These had cylinders 9 inches in diameter, 24 inches stroke, stamp stem 6 inches in diameter. A slide valve was used with an eccentric driven by a train of elliptical gears. These gave a wide admission of steam for the down stroke, but only a small opening, about $\frac{3}{16}$ inch, for the up stroke. The mortar was shaped in section very much like a bottle, with a single screen opening about one-quarter way around it.



STEAM STAMP FOR THE ANACONDA COMPANY, BUTTE, MONTANA.

The usual steam pressure was eighty pounds per square inch; blows per minute, seventy five; capacity about fifty tons of rock in twenty-four hours. Stamp frame and sills were of wood. Weight of anvil under mortar was about eight tons; of reciprocating parts, 2000 pounds, including shoe 15 inches long, 12 inches wide, 6 inches thick, and weighing about 300 pounds. Steam was wastefully used with great compression at the upper end of the stroke, and great clearance at both ends.

A later type of Ball stamp was placed on the Franklin mine in 1861, remodeled in 1865, and recently supplied with solid anvil blocks. These stamps are in commission after thirty eight years of service, three of them pounding out 450 tons a day. The 1865 design had 12 inch cylinder, 8 inch stamp stem, shoe weighing 500 pounds and anvil about ten tons. The screens were placed on two sides, aggregating four times the previous area, and were higher relative to face of die (apparently about 20 inches, scaled from a small drawing). The mortars were also lined, and were of the modern flaring type, angle of inclination being increased from 10° to 30° from the vertical. Iron sills took the place of wood, and spring timbers 14x18 inches were increased in number from three to seven for greater stiffness.

This change indicated that there was some appreciation of the fact that there was too much "give" to the spring timbers which spanned sills some 9 or 10 feet apart, but it was years later before they were displaced by solid anvils, a suggestion claimed by Edwin Reynolds some time after E. D. Leavitt Jr. had built the stamps of his design with pyramidal frame of iron columns for the Calumet & Hecla mill.

The Ball stamps at the Franklin mine, as first improved, had a capacity of 100 tons of rock in twenty-four hours, a gain of fifty tons, about thirty-eight of which was apparently due to larger cylinders and twelve tons to increased weight of stamp and timbers, and larger screens. But upon this improvement the solid anvil appears to have made a further gain of 50%, reaching a capacity of 150 tons.

The Leavitt stamps had practically two superposed single-action cylinders, the pistons fixed on one rod. The upper piston was first 20 inches (later design 21½ inches) diameter, and the valve gear was of the cam and yoke order. Between the pistons was a space in vacuo, and a uniform pressure for lifting the stamp was maintained under the lower piston which was smaller, 11$\frac{11}{16}$ inches and 14 inches in different models. The object of this was to reduce wasteful clearance which in some of the Ball stamps amounted to 50% of the space swept by the piston.

It was an idea of A. H. Emery to simplify all this by using one single-acting engine with no lower cylinder head, the stamp being lifted by atmospheric pressure. This he never worked out, and it is an example of a good and practicable idea left slumbering because no one is ready to take hold of it. It may be superfluous to mention that Mr. Emery was the designer of the system of testing machinery used at Watertown arsenal and elsewhere, ranking in my opinion, in point of originality of design and range of combined delicacy and power, as one of the seven wonders of modern mechanism. I say this because, popularly speaking, an ingenious mechanician is obscured by the forwardness of advertising engineers, and as showing that he had the ability to make good practice of his ideas on steam stamps if he had chosen.

To return to the Leavitt stamps: the mortar was four sided, doubling the screen area, and was made two tons heavier, the anvil weighing twelve tons. The clearance was reduced first from 50% to 22%, and then by a further decided improvement employing a dash pot with rubber cushion, it was found practicable to reduce it to 5$\frac{7}{10}$%. By these changes the saving of fuel over the old Ball stamp was first 10% and finally 40% and the increased capacity first 25% and then 50%, the steam pressure being ninety-five pounds per square inch. At this stage the capacity was 240 tons in twenty-four hours. Subsequently the steam pressure was raised to 107 pounds and a solid anvil displaced the spring timbers, the total weight of iron base and anvil being 120 tons instead of the smaller anvil (at first twelve and later twenty-three tons) on spring timbers. This brought the capacity up to 300 tons.

All these capacities relate to crushing through $\frac{5}{16}$-inch mesh screens, as has until recently been the common practice.

In 1880 some twenty-six Ball stamps were enumerated by Munroe as in use at Lake Superior mines, and in cases cited averaged per stamp about 144 tons on amygdaloid and 105 tons on conglomerate rock. A battery of seventy-two 1000-pound ordinary stamps is at the same time credited with about four tons per stamp.

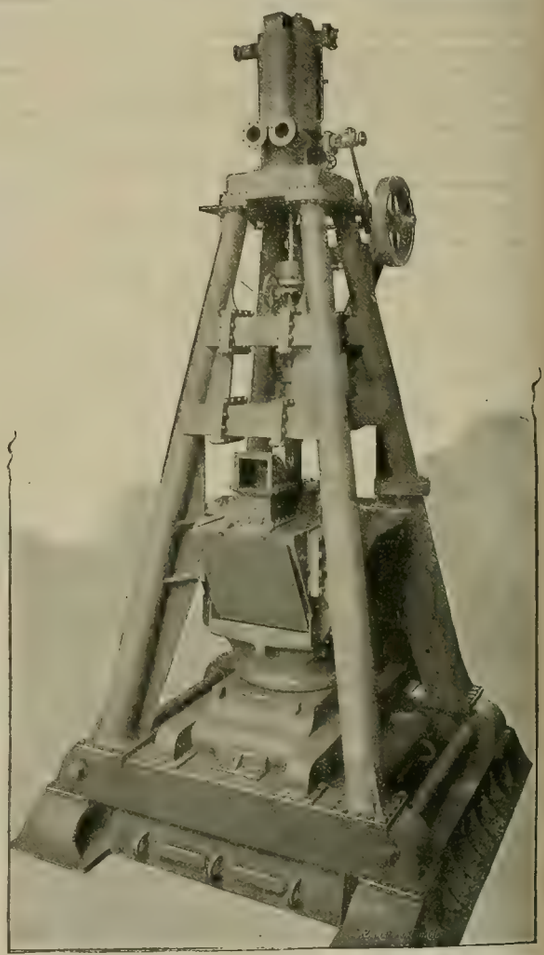
About 1883 and later improved Ball stamps with pyramidal columnar iron frames were built in considerable numbers by Fraser & Chalmers. One of these is shown in the illustration herewith, a man standing beside it giving an idea of the height of these machines, which is about 30 feet. No less than thirteen of these were built for the Anaconda Copper Mining Co. and used both on copper ores to be concentrated and on silver-bearing ores to be treated by pan amalgamation. They were also supplied to the Broken Hill Proprietary and other Australian companies; to W. A. Clark and to the Homestake mine, where one was used for a time on gold ores. This last I think was equipped with sectional screens patented in 1891 by T. J. Grier, superintendent of the Homestake. While increase in screen area makes some gain in capacity, it is by no means proportional with increased area. The lower part of the screens do most of the work and take most of the wear, from which the advantage of sectionalizing is obvious.

These improved Ball steam stamps were, so far as I know, the only machines of their class and size extensively used in fine crushing, having a capacity of 150 tons a day when so used.

On coarse crushing their capacity reached 230 tons even with the spring timbers then universally used. They gave ninety blows per minute. The largest of them having only 15x30 cylinders, it will be seen that their capacity compares favorably with the larger Leavitt stamps even after the latter were provided with solid anvils.

Some of their details are here noted: The anvil or bedplate was 20 inches thick, weighed eleven tons and was placed on a 1-inch thickness of rubber. The mortar was set in planed angle guides of the frame with gibbs adjustable by set screws and jam nuts. The guides were bronze bushings in cast-iron brackets. The slow turning of the stem was accomplished by means of a pulley sleeve on the stem, brass-bushed, and with two feathers fitting slots in the stamp stem. Ball first attempted to turn the stem with gears, but afterwards used a belt. One-inch Manila rope is now used.

The method of attaching shoe is by a dovetail tongue into stamp head. The method of attaching piston rod to stamp stem is by a circular disc on the rod, being encased in rubber within a bonnet secured to the flange of the stem. Both of these methods are approved by long satisfactory usage. The piston was of steel with bronze packing rings. The whole weight of machine, including spring timbers, was about 140,000 pounds.



FRASER & CHALMERS' STAMP FOR THE TAMARACK MINE, MICHIGAN.

Water was fed to the stamp through a circular ring about the stem. The volume of water required in the crushing and concentration of copper ore is very great. According to Rolker, in 1876, at the Allouez mill, with two stamps crushing about 200 tons of ore a day, 1556 gallons of water a minute were required for the whole mill, but of this only 200 gallons a minute were fed to the stamps. The Atlantic mill, with a capacity of 320 tons of ore a day, used 2200 gallons of water a minute.

The following are recent reports of steam stamp service: The capacity of Ball steam stamps at Lake Linden was 275 tons for 18x24-inch and 325 tons for 20x30-inch cylinder stamps crushing from 3 inches through $\frac{3}{8}$-inch screens.

Old style wood frame stamps at Atlantic mine: Cylinders, 20-inch; steam pressure, 105 pounds per square inch; blows per minute, 95; valves, double-slide, with auxiliary valve for regulating up-stroke; capacity with spring timbers, 200 tons, but some have been changed to solid foundations, and this, with perhaps other improvements, has given them a capacity of 316 tons and more.

Mr. C. H. Krause, superintendent of the Osceola mill, states the gain of solid anvil over spring timbers to be 35% to 40% in capacity. The new Osceola

steam stamps will have improved mortars with circular screens and shoes of new form, 15% heavier than previous designs. With other modern features and methods they are expected to pass the 500 ton mark.

In a report of the Tamarack Co. for 1897, by W. E Parnall, it is stated that there were seven 20 inch cylinder stamps in use. Their duty was equivalent to one stamp run 1915 days, crushing 640,000 tons of hard conglomerate, an average of about 333 tons in twenty four hours; cost of stamping, 28 cents a ton.

Having traced progress from the original Ball stamps, I reach the climax of my chapter in the new Tamarack stamps built by Fraser & Chalmers, one of which is shown in my second illustration. These have 20-inch cylinders. The maximum drop is 24 inches and the falling weight 6500 pounds. They have solid anvil base, quadruple discharge mortars, and a new valve gear, light, quick-acting and with small clearance. The valves are rotative, similar to the Corliss valve. They have shown the great capacity of over 500 tons in twenty-four hours.

A feature which contributes to this large capacity is the method of crushing through a coarser mortar screen, $\frac{5}{8}$ inch or $\frac{9}{16}$-inch instead of $\frac{3}{8}$-inch as formerly, the pulp being then passed through a revolving screen with $\frac{3}{16}$-inch or $\frac{1}{4}$-inch holes, and the oversize elevated and returned for recrushing.

At the Osceola mill, where a similar practice prevails, they have tried sending the over-size to a stamp with finer mesh screens, but have found this unnecessary.

The use of more solid foundations in ordinary stamp batteries also promises some gain in capacity. The new stamp mills of the Alaska Treadwell and allied companies were equipped by Fraser & Chalmers with 1130-pound stamps and solid anvil blocks on a concrete foundation. They have also supplied other mills with heavy cast-iron anvils under the mortars. The resulting capacity appears better than usual, but the conditions do not admit of positive comparison on this one point. The gain may be 30%, but perhaps not so much as the timber foundations of batteries are relatively more rigid than the spring timbers placed under steam stamps, so that there is not quite the same room for improvement.

Geological Features of Some Desert Mines.

Written for the MINING AND SCIENTIFIC PRESS.

The mines at Hedges and vicinity, in the Cargo Muchacho mountains, San Diego county, California, are not veins but bedded deposits without defined walls, the economic conditions determining where mining shall cease. The gold-bearing rock is highly silicious, but altered from its normal condition. Large reticulated granitic dikes intrude the gold-bearing formation, and for that matter the entire region, but these intrusions seem to have enriched the gold-bearing horizons, of which there are several. The ore is copper stained (malachite) and is made up of quartz, epidote, hornblende, chlorite, feldspars, and other minerals which occur less sparingly than those mentioned. All of these have been found gold-bearing except the epidote. The gold is usually quite fine, though visible gold not infrequently occurs in the upper levels. The pay ore can nearly always be distinguished from that which is worthless by its physical appearance and sometimes by the sense of touch. The former is bright and "lively" looking, while ordinarily the latter looks dull and grayish and has a harsh feel. The American Girl mine, situated more than a mile from the mines at Hedges, may be in the same geological horizon, but if so it is the result of a fault. If not, then this gold-bearing series has an immense thickness, as the mines at Hedges dip toward the American Girl. The Cargo Muchacho mountains are divided into two distinct masses by a canyon which cuts directly through the center of them, and the group of hills on the south is distinctly different from the group on the north. This difference may be observed plainly miles away. It is not improbable that the canyon marks a line of fault and that the American Girl mine, which is on the southerly side of the canyon, belongs to the same series of rocks as those at Hedges. The occurrence of the ore shoots and the mineralogical features in each group of mines are essentially identical.

Forecasts by Means of the Aneroid Barometer.

TO THE EDITOR:—I possess an aneroid barometer with thermometer attached. Would you kindly give me a means of telling the state of the weather by means of these?

TO THE EDITOR:—Replying to your correspondent's question regarding the best means of predicting the weather by the use of an aneroid barometer and thermometer, I must say that while he will find the instruments useful, still the character of the work that he will be able to do would be very crude indeed. Readings of the aneroid barometer are dependent upon elevation. It will be necessary for him to read his instrument frequently, keeping it in the same position, and in the course of a few months he will be able to determine about what is its normal condition. High stages of the barometer are favorable for fair weather and low stages for rain. A rapidly falling barometer is an indication that a severe storm is approaching, especially when the wind changes toward the southeast. The more rapid the barometer falls, and the lower the stage that it reaches, the more severe will be the storm; but the faster the barometer falls the shorter will be the duration of the storm. A slowly rising barometer is indicative of fair weather which is likely to continue for some time, while a rapidly rising barometer will cause quickly clearing weather which is not likely to last very long. W. H. HAMMON,

Professor Weather Bureau.

San Francisco, Cal., Feb. 23rd, '99.

Some Experiences of a Working Miner.

NUMBER IV.

Written for the MINING AND SCIENTIFIC PRESS.

In one of my trips to an out-of-the-way district I ran across a man who had located a fine-looking quartz vein. The rock looked well, some of it very well—good enough, the owner said, to eat. He had built a good arrastra and crushed a lot of rock, but got little gold. He reached the conclusion that the arrastra was not suited to the treatment of his ore, and, having money enough for experimental purposes, built a 5-stamp mill fitted with water power and all modern attachments. When complete he started up, but still the rock refused to give up enough gold to pay for milling to say nothing of other expenses. I asked him if he had ever had any of it assayed and he replied he didn't believe in it. I finally persuaded him to have some of his best ore tested which he reluctantly (it seemed to me) did, and it was found to contain about 60 cents per ton. He declared the assayer did not understand his business. It took considerable argument and the loss of several hundred dollars more in money to convince him his ore was valueless and now he has a good little mill for sale cheap.

Col. D—— was owner and superintendent of the S—— B—— mine at G——. He was always wide awake and did business with a rush. The contractors had scarcely turned the mill over to him before he had the whole plant in full blast. The ore contained a large percentage of lead, chiefly as sulphide. It would not amalgamate freely raw so a White & Howell rotary furnace had been put in. The ore passed through a dryer, was crushed dry and lifted by a bucket elevator and dumped in the hopper of the furnace. For a day or two things went along smoothly and then the trouble began. A mistake had been made in the construction of the furnace foundations—they were too close together. This would under ordinary circumstances, perhaps, have occasioned no serious difficulty, but with that high-grade lead ore the intensity of the heat of the furnace caused the pulverized ore to assume a semi-pasty condition and it fell dripping from the lower end of the furnace into the discharge chamber. After a time it had plastered the fire bricks of the wall opposite and then it was wound and twisted about like molasses taffy between the furnace and the wall as the furnace revolved, until finally it became evident something must be done. Probably a rough sorting of the ore to reduce the percentage of lead would have accomplished the desired result, but this was not thought of, or if it was the idea was rejected. The elevator was stopped and the fire allowed to burn out and the furnace to cool in order to make the necessary change, but the stamps were not hung up for a moment. For nearly three days the dry pulp continued to discharge from the batteries, and, as there was no other place to put it, it was spread out on the floor a mass of heavy yellow dust a foot deep. Meanwhile the cylinder of the furnace was moved upward into the foundation at the feed end. When the change had been made and the fires gotten in full blast again the mill foreman, tired out with the hard work, went home to rest and sleep and I went with him, the colonel himself assuming charge. Before we left the ore elevator had again been started and everything seemed to be running smoothly. After supper we both retired for the much needed rest. About 10 o'clock that night a loud knocking at the door aroused us. The foreman asked what was wanted. A voice replied "the colonel wants you both to come to the mill at once, the d—l is to pay down there. The mill has been on fire two or three times already." We hastened to the mill and there saw the colonel in his shirt sleeves with the fire hose in hand trying to prevent the complete destruction of the mill. The entire floor space in front of the discharge chamber of the furnace was filled with red-hot pulp, the doors were open and a perfect cataract of molten fire was pouring from the chamber. The doors could not be closed and it looked serious indeed. The large amount of pulp coming from the furnace surprised us and we could not understand it, but going around for the purpose of stopping the elevator we discovered dimly through the darkness, dust and smoke at least a dozen men formed in a line armed with buckets. These men were dipping up the pulp in front of the batteries and passing it along from hand to hand, it was being poured into the hopper of the furnace at an astonishing rate in addition to that lifted by the bucket elevator. The foreman signaled them to quit at once and stopped the elevator also. The colonel, who had followed us, when he saw what had been done danced excitedly about and motioned us outside. We followed, and as soon as we were out of the door he bawled in our ears, "I want to get through all I can—I want to clean up the mill." "All right," replied the foreman, "you run it and I'll go home." "No," said the colonel, "you fellows run it, I am going home."

The danger of fire being over, the colonel told us at a little distance from the mill that, after we had gone home, it had occurred to him that he might as well run through the pulp lying on the floor, and conceiving the idea of the bucket brigade had sent up town and hired a dozen idle men and set them at work. For a time all went well. The first charge was cleared away from the furnace and sent to the pans, but the second charge quickly accumulated. This was not wholly removed when the doors of the furnace were bursting open with the third charge. It went from bad to worse and at last he could not get near enough, owing to the red-hot pulp on the floor, to shut the doors, but it had never occurred to him to shut off the supply.

After the colonel had gone home we hung up the stamps and in time removed the pulp, but it was not properly chloridized nor oxidized and all that had not been charged in the pans had to be sent through the battery a second time and reroasted. It took all of three days to clean up the mill and get things working systematically again.

It is said "haste makes waste." It certainly did in this instance.

The U. S. mine was discovered by poor prospectors, who, by following a small rich pay streak in a very wide vein, took out enough gold in a mortar by hand to pay for a 1-stamp mill. With this little mill they made enough money to buy a second-hand 15-stamp mill, of which they managed to keep five stamps working, and took out a moderate fortune and then sold out to a company. The manager of the big concern evidently thought the mine rather a small affair and immediately ordered a 60 stamp mill and built a big hoisting works. When completed the entire vein was stoped 50 to 100 feet wide, but it never paid a dividend. The little pay streak was there, and that worked separately was a good little mine in itself, but the great barren ledge in which it occurred with little or no value aside from the small streak resulted in failure. This is a lesson which teaches us that rock too poor to pay for milling is not made profitable by mixing with ore that is rich. This is a popular fallacy among many miners. MINER.

A Handy Power Hammer.

Herewith is a sketch of a foot hammer used satisfactorily by different smiths. J. D. Hall, Orrville,

O., the inventor, says: "It will do almost any kind of work. I weld, swage and cut iron from $\frac{1}{4}$ inch and can weld steel toes to horseshoes (sharpened) in three blows. I can do the work of two men with this hammer, and it is just the thing where a man needs a helper, but cannot always have one. I might add that the power can be attached by the taking off of the springs."

ROPES of all sizes can be automatically measured by a new machine, which has a roller journaled in a casing around which the ropes are passed and then extended through openings of different size to correspond with the diameter of the rope, the roller turning pointers on a dial as it revolves.

Analogy of the Ore Deposits of the Black Hills and Leadville.

Written for the MINING AND SCIENTIFIC PRESS.

In the Black Hills of South Dakota, in the Cambrian rocks of the northern hills, have been developed mineral deposits of great interest and value. These deposits occur in the formations lying near the base of the sedimentary series including the Cambrian (principally quartzites, sandstones, impure limestones and calcareous shales) and Carboniferous limestones, some of which are magnesian. A marked feature of the sandstones of the Cambrian is the occurrence of glauconite (a hydrous silicate of iron and potassium of pale green color). In only one instance is this sandstone metal-bearing in the knowledge of the writer, that being found on the east side of Spruce gulch, a mile and a half east of Deadwood, at which place is found a deposit of silver-lead ore, associated with an eruptive dyke. The ores of the Cambrian occur at several different horizons, being in some places silver-bearing, usually with lead, and in others the value is chiefly in gold in the form of telluride. The character of these ore deposits varies in different districts, though in the same geological horizon. In Ruby basin and vicinity the lower quartzite member contains chiefly gold; in Spruce gulch the same horizon develops silver-lead ore, and the same is the case near Green mountain. Near Garden City both gold ores and silver-lead ores are found. Immediately overlying this basal quartzite, in highly silicious (altered) shales, rich telluride ores are found in several localities. The upper quartzite horizon, lying about 200 feet higher (this bears no relation to altitude), is the repository of valuable ore bodies also, in it occurring both gold and silver-lead ores at numerous places, and always at contact or near an eruptive dyke. Gold also occurs, sometimes native, in silicious masses (chert) in the limestones of the Carboniferous. The lower member of the limestone, a buff calcareous shaly rock, may possibly be Devonian, but this is not important from an economic standpoint.

In the massive gray limestone of the Carboniferous have been found, at several localities, bodies of lead-silver ore of value, notably those of West Virginia City (Carbonate Camp). Similar ores occur near Deer mountain, five miles south of Lead City, and near Galena. In every instance these ore shoots throughout the Cambrian and Carboniferous formations, whether in quartzite, sandstone or limestone, are associated with intrusive dyke rocks which, ejected from below, have cut through all the sedimentary formations, and where favorable exposure by erosion has taken place these dykes may be seen in the underlying Archæan schists, proving that they were ejected from great depth, and doubtless have formed the channels through which these ore deposits have derived their values.

The eruptive rocks of the northern Black Hills are all of the Pretertiary series, including rhyolite, trachite, phonolite and some rocks more closely allied to the andesites. These rocks occur in two distinctly characteristic forms. First, great masses forming mountain peaks, as Terry, Black Butte, Custer and Sugar Loaf, and many of lesser magnitude, which have injected vast sheets from the uncleal mass into the sedimentary beds of the region, lifting them sometimes from their contact with the upturned Archæan and in many places splitting the Cambrian and Carboniferous rocks at various horizons. Some of the quartzite beds have sheets of rhyolite both above and below, being isolated over large areas from all contact with other Cambrian rocks.

These sheets of rock, which are usually rhyolite or trachite, become thinner with increasing distance from the main mass of which they form a part. This is that type of structure known as the laccolite and is a very pronounced feature in this part of the Black Hills, occurring in many places on a far less stupendous scale than about Terry peak. Small and perfect laccolites occur on Two Bit gulch, three miles from Deadwood, and others on Squaw creek, near Carbonate.

The other type of eruptive rock is found in the dykes, which are younger than the great, massive intrusions, and cut both sedimentary beds and the laccolite sheets alike, and it is to these that the ore bodies probably owe their existence. Over the greater part of the region in question erosion has removed a vast amount of material, both of the sedimentary beds and the eruptive rocks. How great the thickness of the sedimentary series originally was has no bearing on the economic features, but it probably included the Permian, Jura-trias and Cretaceous which overlie the Carboniferous. The super-induced erosion which determines the courses of the Belle Fourche and South Cheyenne rivers, which almost encompass the Black Hills, indicates that the Jura and Cretaceous covered the entire country.

As a matter of course, this vast erosion included many ore bodies, and their values, in the case of the telluride deposits at any rate, were irrevocably lost, as these ores form no placers. The uplift, faulting and erosion have spread out the open book of geology here—an epitome of the Rocky mountain region—the primer, I may say, of geological science.

Not only are the sedimentary beds ore-bearing, but the eruptive rocks are known to contain gold. This is true of Two Bit and near the Carbonate Camp, and it will probably be found to be the case elsewhere. Having described the occurrence of these ore bodies geologically, let us make a comparison with Leadville, Colo.

In this district we find essentially the same features as obtain in the northern Black Hills. The limestones are explored for bodies of lead-silver ore and the Cambrian and Carboniferous formations consist chiefly of quartzites at base with limestones above. The succession of rocks in the two districts is not identical, but the geological age is the same and the conditions under which the ore bodies are found are essentially the same. The limestones of the Leadville district are explored for bodies of lead-silver ore, and with what result every mining man knows. More recently exploration for gold in the silver camp has been carried on industriously in the eruptive rocks back of Leadville, on Breece Hill and still higher toward the mosquito range. Mines of phenomenal richness have been and are still being developed. The occurrence of so many conditions in Leadville analogous to the Black Hills region leads the writer to think that a systematic exploration of the underlying quartzites should be undertaken, with a view to the possible discovery of gold under conditions possibly identical with those in the Black Hills. Another fact of importance in this connection is the occurrence of gold in the quartzite at Battle mountain, Red Cliff, not far from Leadville, and this quartzite is positively known to underlie a large portion of the Leadville region.

The yellow silt so characteristic of the Red Cliff deposits is identical in appearance and manner of occurrence with the yellow silt-like deposits in the lower quartzite of the Black Hills, particularly between Carbonate and Garden City.

Should explorations at Leadville be undertaken in this direction, it must be remembered that the silicious telluride ores of the Black Hills invariably lie in close proximity to one of the vertical dykes referred to and that investigations should be carried on with that fact in view. The discovery of gold in Leadville under the conditions mentioned would give a new impetus to the industry which would extend over a period of many years. On the other hand, the Black Hills would perhaps be benefited by a careful exploration of the eruptive rocks in search of more gold-bearing deposits similar to those found in the massive eruptive rocks back of Leadville.

W. H. S.

Some Questions Answered.

What is the best speed for overshot water wheels to get the maximum of power?

What is the best method of getting and keeping copper plates in good working condition when they have been used before and in many places the silver is worn off and the plate seems so hard that the quicksilver will not remain coated on the plate, but runs in globules? The plates in many places are pitted with small holes.

What is the average amount of wood used per ton of ore crushed in a 10-stamp steam mill run by portable boiler and engine—the ore average rock?

Is there a law in this State compelling employers to pay their employes monthly or not?

Quincy, Cal.

The maximum power with overshot water wheels is obtained when they are running at maximum speed with the maximum amount of water which the buckets will carry. A diminution of water results in a corresponding diminution of power. The speed at the periphery of the wheel varies with the load and also with the diameter of the wheel for a given number of revolutions per minute.

Copper amalgamating plates, whether silvered or not, may be kept in condition by dressing twice or oftener daily. The character of water used in the battery has often a bad effect on the plates, necessitating a more frequent dressing. Evidently the plates mentioned have been scraped with a steel or iron instrument with the natural result—the removal of the silver plating, and doubtless acids and cyanide solutions have also been employed to the injury of the plate. When plates become hard from these causes they give much trouble. On pages 36 and 175 of the current volume will be found descriptions of the methods of caring for plates in two large mills.

The amount of wood consumed in a 10-stamp mill varies considerably with the character of the wood and the kind of boiler and much also depends on the judgment of the fireman. An average consumption would be about one-tenth of a cord of dry wood to each ton of ore crushed in a 10-stamp mill. A fire-box boiler, such as described, consumes more wood for work accomplished than a return-flue boiler, such as are set in brick or stone foundations.

There is a law on the statute books of California requiring corporations to pay employes monthly.

A MR. TABER is reported to have perfected improvements on a telephone transmitter, by means of which a person in a noisy workshop at least 40 feet from the 'phone can be distinctly heard at the other end of the line.

Some Very Extensive Claims.

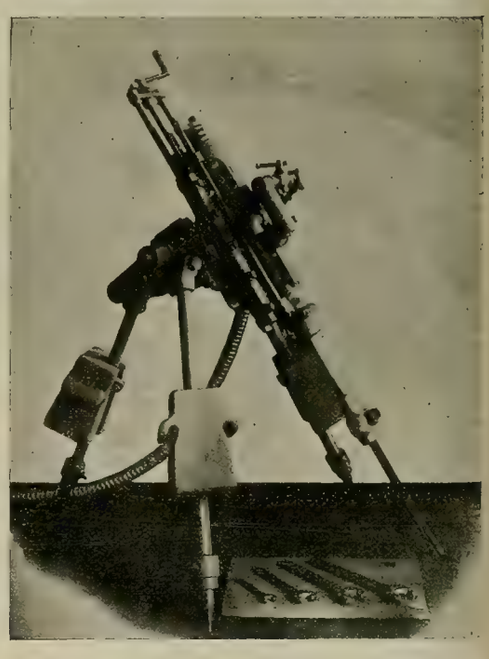
A New York dispatch this week says T. A. Edison, Jr., has discovered a new process for hardening and toughening steel and iron, and that a $1,000,000 company has been formed to float the project, known as the Thomas A. Edison, Jr., & William Holger Steel and Iron Process Co., incorporated in West Virginia. Thomas A. Edison, Jr., claims that his discovery will "revolutionize the iron and steel industries;" that it "will increase the elastic limit and the tensile strength of both iron and steel. It will increase the tensile strength 5% and the elasticity 30%. For instance, I can take a sheet of 10-inch armor plate, such as is used in building the United States war ships, and make it withstand the same force as the ordinary 15-inch plate." The new process will be used in hardening steel nails, frogs for switches, machine shop tools, needles, knives and many articles for general use. We are in communication with the Government for supplying armor plates for men-of-war. We will agree to give the Government plates that will be proof against shell and that will make the vessels much lighter."

Smokeless Powder.

The first smokeless powder that I made in England was made in exactly the same manner as the French. I had obtained a quantity of true guncotton, that is, tri-nitro-cellulose (known sometimes as insoluble guncotton because it cannot be dissolved in alcohol and ether like collodian cotton, di-nitro-cellulose). Some of this powder, when freshly made, produced fairly good results, quite as good as those produced by the French powder, but upon keeping it for a few months the grains lost their transparency, became quite opaque and fibrous, and it then burned with great violence. Investigation showed that about 1% to 2% of the solvent was still in the powder when the tests were first made, whereas the drying out of this last trace of the solvent had completely changed the character of the powder. I then added to this powder about 2% of castor oil, with the result that the castor oil remained after the solvent had been completely removed, so that the powder would keep any length of time—indeed, powder made at that time (1889) is quite good to-day.—Hiram S. Maxim.

Giant Improved Drill.

Herewith is portrayed the Giant improved drill, a rock drill of simple construction, made and sold by



the Compressed Air Machinery Co., 11–13 First S San Francisco, Cal.

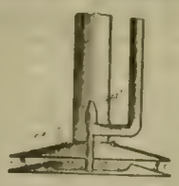
FROM Manila a telegram goes to Hongkong by cable, thence to Saigon in Cochin China, and another cable carries it to Singapore. Around the Malay peninsula it goes by another cable to Penang, an island on the west coast of Siam, and from Penang to Madras. Here it strikes the first land telegraph line and crosses India to Bombay. Thence it goes under the Arabian sea to Aden, under the Red sea to Suez, by another cable to Malta, and still another line takes it to a point in Portugal. From there it is cabled to Land's End in England, crosses the Atlantic ocean to the coast of Nova Scotia, thence to New York and across the continent to San Francisco. It has traveled 17,351 miles.

Latest Mining and Metallurgical Patents.

Patents Issued February 21, 1899.

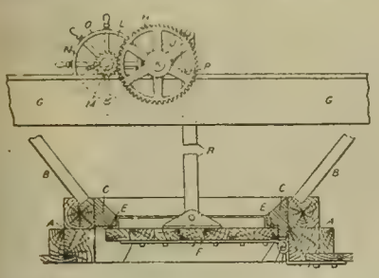
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR COLLECTING GOLD FROM RIVER BEDS.—No. 619,727; Jno. T. Davis, San Francisco.



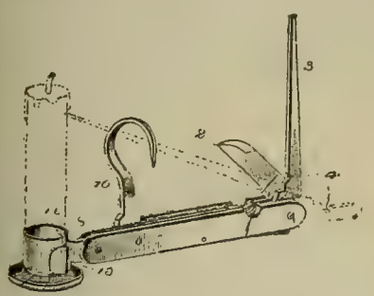
A combination of a boat having an opening in its bottom and a sluice box located adjacent to the opening and provided with suitable riffles; an elevator pipe arranged in opening and having its discharge mouth over the sluice box; a hood carried by the lower portion of the elevator pipe; a pan secured to and separated from the hood, a pressure or delivery pipe entering near the bottom of the elevator pipe and turned upward therein and terminating in a nozzle; a water discharge pipe connecting with the pressure pipe and extending through and below the pan, and a windlass carrying a chain for supporting the elevator pipe to raise and lower it and to permit the addition of sections thereto.

DUMPING DOOR FOR DREDGING VESSELS.—No. 619,-837; Jos. Edwards, New York City.



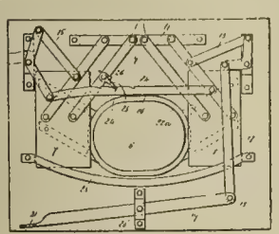
In a dredging vessel, a swinging dump-door having vertically adjustable hinges and elastic packing between the door and its seat, in combination with a vertical connecting rod and a cogwheel having a projecting arm and a motor pinion and hand wheel, whereby the rotating of the hand wheel in one direction will force open the door, and, if rotated in the opposite direction, will tightly close and hold it.

COMBINED MINER'S CANDLESTICK AND FUSE IMPLEMENT.—No. 619,765; J. F. Layes, Lenville, Idaho.



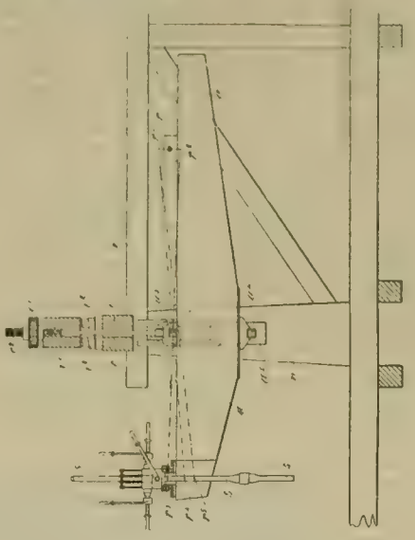
An implement consisting of a handle, a suitable means for supporting the handle, a candle holder attached to the handle and having a cylindrical portion adapted to receive the lower end of the candle, the cylindrical portion having in its side a recess, a sleeve adapted to slip in the lower end of the cylindrical portion, the sleeve having in its side an eccentrically extending section adapted to enter the recess of the cylindrical portion, and a removable drip cup attached by means of a screw to the bottom of the sleeve.

FURNACE DOOR.—No. 619,817; Geo. W. Wolf, Keyser, W. Va.



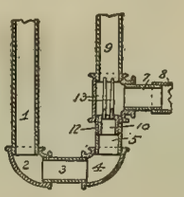
A furnace provided with two similar doors suspended by lever arms, a crank lever supported laterally at each side, one arm of each crank lever being connected by means of pivoted links with the adjacent lever arms, and one arm of one crank lever pivotally connected with a lever arm on the opposite side by a horizontal cross bar; a treadle lever in operative connection with one arm of the opposite crank lever, the crossbar provided with notches or recesses and one of the lever arms provided with a pivoted pawl which operates in connection therewith; a horizontal bar forming a guide for the lower end of the doors.

BORING APPARATUS FOR DEEP BORINGS.—No. 619,907; A. Raky, Rupprechtsau, Germany.



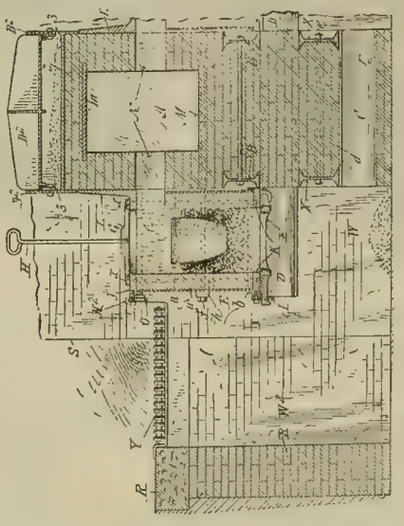
A boring apparatus for deep borings, having an oscillating beam adapted to carry the rods at one of its ends, and to be acted on by the driving power at its other end, and having an elastic support that is put under tension by the weight of the rods, the combination with the latter and with the rods, of springs for maintaining the tension of said support, pins located upon the under crossbar and serving as guides for the springs, arranged in such manner that, in accordance with the increase of the weight of the rods, the number of springs in action may be correspondingly varied.

MINING PUMP ATTACHMENT.—No. 619,938; B. Chaloner, Anaconda, Colo.



In a water-elevating apparatus, the combination with the supply pipe, the discharge pipe and connections and the coupling connected with said discharge pipe, of the suction pipe connected therewith, the screw-threaded plug and the jet pipes extending above the coupling.

CRUCIBLE FURNACE.—No. 619,973; Marsh & Millett, Springfield, Mass.

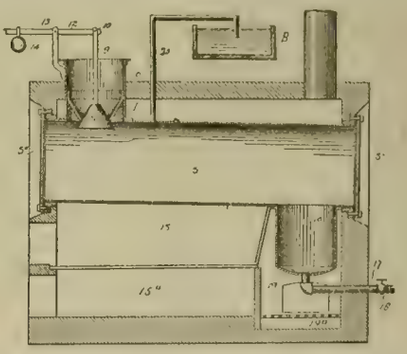


A metal-melting furnace construction, substructure comprising masonry, longitudinal and transverse iron I-beams embedded in masonry, bolts extending through masonry and interengaging longitudinal beams, a superstructure comprising transverse iron I-beams extending across substructure, the extremities of which last-named beams constitute supports for the melting furnaces, a superstructure comprising longitudinal I-beams extending across transverse beams, masonry in which the central portions of transverse I-beams, and portions of longitudinal beams, are embedded extending upwardly and containing a main flue for communication with a chimney, and furnace flues communicating with main flue, iron top frames having a floor covering the top of superstructure and having parts covering upper portion of sides of and having sides extending upwardly from floor, and a series of separated iron boxes for holding metals supported upon frame sides, each having a metal-holding compartment open on the opposite sides of the superstructure.

ORE CONCENTRATING MACHINE.—No. 620,014; O. Blackett, Sydney, N. S. W.

In an ore concentrator, a combination with a downwardly inclined sluice box, of transverse riffle boxes arranged at intervals in the sluice box, screens arranged transversely between the riffle boxes, each screen being arranged to receive the overflow from the riffle box immediately in advance, and means for flowing water down the sluice box, each riffle box being narrower and deeper than the riffle box immediately below, and each screen being narrower and coarser than the screen next below, the arrangement being such that the velocity of the upward flow of water decreases in each succeeding riffle box to suit the varying sizes of the screens.

WURTZILITE PRODUCT AND APPARATUS.—No. 620,-082; C. A. Anthony, Denver, Colo.



A retort having a bottom inclined from end to end and a reservoir depending from there at the low end; with a furnace having a firebox around the reservoir and a separate firebox under the inclined bottom of the retort.

THE fortunate escape of several miners in the Blue Gravel mines in Siskiyou county, California, a few days since, by means of an old shaft, when they had been imprisoned by a cage, illustrates the necessity of having more than a single means of exit from mine workings. As a matter of course, such provision cannot constantly be made for every drift or crosscut, but every mine should have more than one shaft, or be connected with the working of a neighboring mine. There are numerous mines in California which are down 500 and some of them 1000 feet, with extensive workings and only one shaft and no connection with neighboring mines.

AT Madison, Wis., Mr. Wood has organized the idea of thawing out frozen water pipes with electricity, and made two successful experiments. He takes the electric current used for street lights, attaches one wire to the frozen pipe inside the cellar of one house and another wire to a similar pipe in the adjoining or any other house, thus completing the circuit. A current of about fifty volts is then turned on, heating the pipes and melting the ice within. He uses a "transformer" to reduce the voltage, so that the current will not melt the pipes.

A CIVIL ENGINEER of St. Louis, Mo., is advocating the use of crude petroleum on highways, basing his statement, that it creates fine roads and is in the end less expensive than other methods of treating roads, on his observations in the oil regions of Pennsylvania.

The Genesis of Petroleum and Asphaltum in California.

NUMBER V.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

Red Shales as Connected With the Genesis of Bitumen in California.—Shales were and are deposited in still and salt water. The iron contained in these waters and organic remains, both animal and vegetable, and other materials constituting the shales were deposited contemporaneously.

If the iron was the peroxide of iron, ferric oxide (Fe_2O_3), by contact with organic remains it was deoxidized and reduced to a protoxide, ferrous oxide (FeO), by the absorption of one equivalent of its oxygen; when the peroxide was reduced to a protoxide, carbonic acid produced by the decomposition of organic matter, then united with the protoxide, forming carbonate of iron ($FeCO_2$).

The carbonate of iron imparts a bluish or greenish color to the deposit.

The accumulation of iron in the presence of an excess of organic matter retains the form of ferrous carbonate. In all coal measures of all periods, whether Carboniferous, Jurassic, Cretaceous or Tertiary, or in all cases where there is organic matter in excess in a state of change—in all strata, whether older or newer, in which there is organic matter in excess in a state of change (not graphite)—the iron is in the form of carbonate protoxide or ferrous carbonate ($FeCO_3$).

Sulphide of iron, ferric sulphide (FeS_2), is subsequently formed and deposited instead of carbonate of iron. The sulphates of lime ($CaOSO_3$) and of magnesia ($MgOSO_2+7HO$), and other sulphates which exist in sea water, when subjected to the action of decaying organic matter out of contact with air are deoxidized and converted into solubles, from which sulphuretted hydrogen gas is set free by the carbonic acid gas produced by the decomposition of organic matter. Sulphuretted hydrogen converts the soluble compounds of iron into sulphide of iron. The color of pyrites is brass yellow.

The presence of protoxide of iron and of iron pyrites in their shale beds arises from the considerable amount of organic substances exercising a reducing action. The water flowing from the mountain heights where there are no organic substances exercises at first an oxidizing influence, in virtue of which the rocks over which they flow are decomposed.

The suspended substances carried down by these rivers and the detritus swept along their beds come after a time in contact with organic substances, by means of which the peroxidized iron compounds are again reduced. Consequently the iron thus carried into the sea is for the most part in the state of protoxide, either combined with silica or with carbonic acid, the silicate being suspended and the carbonate dissolved in the water.

When unaltered by oxidation the carbonate of iron, with varying amounts of lime, clay or sand, is dark grayish blue or green, or even white, in color.

When unaltered by oxidation the sulphide of iron is brassy yellow in color.

From the preceding explanation it is safe to say that, at the time of their deposition, the carbonaceous shales were not red; and as long as they are not submitted to oxidizing influences they will not become red.

When carbonate of iron is exposed to the oxidation of the air it forms limonite (hydrous ferric oxide), which is usually of a brownish yellow or brownish red color. These iron ores are found in all stages of transformation. On the outcrop they are limonite; under dense cover, carbonate; while going from the outcrop inward the limonite constantly decreases in proportion to the carbonate. In the alteration of the compact carbonate the line of chemical change and color is usually very sharply defined, and the limonite covering can often be entirely removed from the enclosed core of carbonate by a blow with a hammer, the limonite covering preventing the carbonate core from being oxidized by the air. In shales charged with gray carbonates of iron the following reaction takes place by the action of the air: the carbonic acid is released and part of its oxygen oxidizes the iron.

Gray shales containing finely divided pyrites or bisulphide of iron are converted by heat into bright red, the sulphur being released, leaving the shales charged with red oxide.

The color of burnt ferruginous shale is entirely due to the amount of iron present. Gray shales containing less than 1% or 1½% of iron change by heat to various shades of cream color or buff; while those containing 2% to 10% or 12% of iron produce by heat pink and bright red bodies. The depth of the color depends merely on the amount of iron present, the buff shades graduating into the deeper shades of red.

A group of stratified rocks usually consists of various species arranged in alternating beds, a series of beds of many hundreds or even thousands of feet in thickness containing strata of shale, limestone or sandstone.

Some strata are seamed or porous and easily penetrated by fluids, serving as conduits and reservoirs for fluids. Some strata are nearly impervious to fluids, while others are practically so, frequently serving as incasements for the conduits and reservoirs formed in and by porous and seamed strata.

All stratified beds have been originally deposited in a horizontal position, or approximately so. While these beds were in the horizontality of their deposition and incased by impervious strata, there was little or no circulation of fluids within their porous or seamed strata. When they were tilted and inclined to the horizon at angles varying from the horizontal to nearly absolute perpendicularity and their porous and seamed strata exposed to the entrance of fluids by denudation fracture or otherwise, and an exit for the fluids was supplied or produced at a lower level than the place of its entrance, the circulation of fluids commenced, slowly at first and gradually increasing as the inclination and exposure of the different strata became greater. The course of the circulating fluids was complex and anfractuous.

Water supplied by the rainfall of the region enters at the outcrop of the porous and seamed strata. If the porous and seamed strata are incased in impervious strata, the greater the depth to which the strata extend from the place of entrance of the water, the greater the pressure will become. In some instances this pressure will be very great, forcing the water into comparatively impenetrable rocks.

The water percolating and circulating through the porous and seamed strata, by its solvent action, accumulates mineral ingredients. These waters, saturated with minerals, coming in contact with other minerals existing in the shales, by chemical reaction produce heat. This heat contracts and fractures the shales, permitting a freer circulation of water.

This chemical heat distills petroleum from carbonaceous shales and oxidizes the carbonate and sulphide of iron, producing the red colors of the shales, and water of different temperatures charged with mineral ingredients will frequently rise by hydrostatic pressure through fissures and faults, etc., to the surface of the earth, forming mineral springs. These springs are often accompanied by bitumen and their solvents, action producing the white shales hereafter described.

But very few fossils exist in these red pyrogenous shales, as they have been obliterated by the solvent action of hot water or by the chemicals held in solution by the circulating waters; or, if the molds or casts of their external forms existed, they have disappeared from the same causes, or they have been crushed and distorted beyond recognition.

Red Shales in California.—Red shales in California are the effects of chemical heat. Strata which have been more or less altered by the action of heat, emenating in the strata from chemical reaction, consists of burnt shale, porcelain jasper, earth, clinkers, slag and white shale.

OUTCROP OF RED SHALES AND PORCELANITE.

Burnt Shale.—Its color is usually red, sometimes gray, yellow or brown, and graduating from cream color or to brilliant red. It is clay or shale burnt, but not so much changed as to form a porcelaneous mass.

Porcelain Jasper.—It is shale, or changed into a kind of porcelain by the action of heat. It is dark red, yellow or striped yellow and red.

Earth Clinker or Slag.—This is a shale converted into a kind of clinker or slag. It is black-brownish or reddish, and it has occasionally a tempered steel tarnish.

Sometimes it shows iridescent colors. It is vesicular, usually amosphous, but occasionally possessing the prismatic form of artificial coke.

White Shale.—During these chemical fires, carbonic acid, sulphuretted hydrogen and aqueous vapors are formed; these exhalations, in passing through the shale, bleach and decompose it. The silicates are decomposed by the continuous action of aqueous vapors at 212° Fahr., sulphuretted hydrogen, air and the alkalies, magnesia and lime, are nearly removed, and metallic oxides are carried away. The vapors convert the shale into a white clay, or nearly white, when a small quantity of iron still remains. By the removal of the alkalies, magnesia, lime and metallic oxides, the quantity of alumina and silica increases. The absence of the bases, such as lime and iron, in these bleached shales give growth to a different vegetation from that which grows where these bases exist. This difference in vegetation is a good index to deposits of petroleum and bitumen. The removal of these substances make the shale incapable of sustaining vegetable life; the absence of or scarcity of vegetation is indicative of this action. Immense beds of these white and altered shales frequently occur in the vicinity of bituminous deposits, generally running in the direction of the anticlines.

From the immense amount of mineral matter which has been carried away by the solvent action of water, thousands of tons of fossil shells, silica, magnesia, iron, etc., and the large area now occupied by the whitened shales, the flow of mineral water at some former time must have been very copious as compared to the flow at the present time.

The illustration shows an outcrop of red shales and porcelanite near Mount Solomon, Santa Barbara county.

(To be Continued.)

Mine Management.

TO THE EDITOR:—In your issue of Feb. 11th, "Mine Superintendent" treats the general subject of mine management in a sensible way. His letter should be read by every one in any way connected with mines. One point not covered in his letter seems worthy of consideration, and that is what may be termed the "treasury influence" upon the management. A mining property should be looked upon as a business entity and the superintendent should manage it solely from the standpoint of the mine's best interests. How many superintendents are privileged to do just that? How many superintendents have spoiled promising mines and their own reputations, not from choice, but at the behests of a hungry treasury?

Men of good ability run "grass root tunnels" to catch the ore quickly, rob the mine by gouging the good ore, stop development to avoid expense, realizing all the time that they are open to the sensible criticism of their own employes, but compelled to the course by the demands of the treasury. Verily, a large but hungry vein is more to be desired by the average superintendent than a large and hungry stockholder. More good mines are closed because the superintendent manages them from the standpoint of an abused treasury than because of his lack of skill and good sense. MINE OWNER.

THE Liverpool Chamber of Commerce is favorably considering a proposition to build a "mono-railway" between that city and Manchester, over which trains are to run at a speed of from 100 to 150 miles an hour. B. Behr, the advocate of the scheme, claims that the new system will obviate the ordinary dangers of railroad travel. Derailments are an impossibility, and there will be fewer collisions than in the two-rail system. The cars intended for the line are to be fitted with wheels in the center, and these will run on an elevated rail. The position of the coach on the railway may be likened to the saddle packs which hang on each side of the camel's back.

THE *Journal of Geology* is authority for the statement that a new mineral has recently been discovered which, as a fuel, is far superior to coal. The substance, which is of a lustrous black color, is found on the island of Barbadoes and is called by the natives "manjak." It is thought that manjak is petrified petroleum, great quantities of petroleum being found on the same island. It contains only 2% of water and fully 27% of solid organic matter, thus surpassing in utility the best asphalt of Trinidad, in which 30% of water is contained, and which has been classed so far as the finest fuel.

A LARGE map of the Cripple Creek mining district, situated in El Paso and Fremont counties, Colorado, issued by the *Mining Investor* of Colorado Springs, has been received. Upon it are shown several thousand of the claims located in that region. Around the richest portions of the district the claims lie thickest, overlapping each other, sometimes five or six deep. The map graphically illustrates the possibilities under the mining laws of the United States for interminable litigation.

The Auto-Truck.

Written for the MINING AND SCIENTIFIC PRESS.

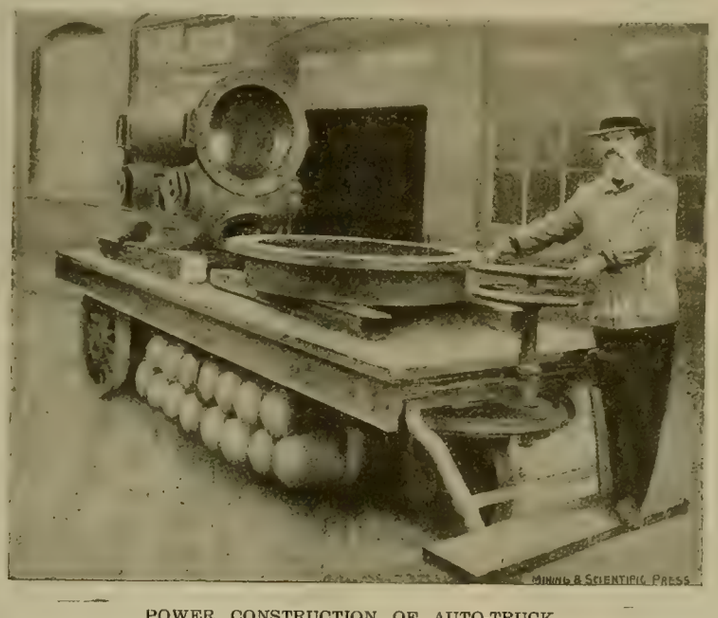
Several illustrated articles have recently appeared herein, descriptive of "automobiles," "auto-trucks," "horseless carriages," and other forms of motor designed to supplant the horse on the streets and roads. Universal present interest attaches to the new devices with that end in view. In the great cities men who make their living by the transfer of material naturally decry the several inventions; but, if the new system can prove to be economical, their protests will prove as futile as have those of workers in other industrial fields.

In the city of New York has recently been formed an "Auto-Truck" Company, that proposes to supplant the 17,000 truckmen who now make their living by hauling goods. The new company has a capital of $10,000,000. They are building trucks which, they claim, can be severally run for twenty-five miles with one charge of compressed air at a minimum cost of 1 cent per mile. A similar corporation has been formed, with equal capitalization, in Philadelphia; another in Chicago, and so on. Probably when all these big concerns get going, they will form a truck trust, as nearly all other industrial organizations are doing at present.

The proposition is to build power stations at various points throughout the city, a system of pipes connecting with these stations to be laid beneath the streets. These pipes will connect with hydrants, similar in appearance to water hydrants. A truck will stop, make connections, and, in two minutes, steam already used in the working cylinders. After leaving the high-pressure cylinder, the air is again warmed by causing it to flow through pipes in the hot water heater. Again hot water is sprayed into the pipes containing the air, before the latter passes to the low-pressure cylinder. In this, it is found that the results of reheating are slight in comparison with those in the high-pressure cylinder. So perfect, yet simple, is the mechanism throughout, that the valves respond instantly to their requirements. There is also a hand valve, in the same pipe as the automatic water valve, that enables the amount of water to be adjusted as may be thought expedient. On small trucks, the heater will be dispensed with; and, eventually, when greater perfection is reached, it will not form a part of the larger trucks.

One of the advantages of the Hoadley-Knight motor, as the New York auto-truck is styled, over the old style air-motors is that there is no exposed machinery. All of the moving parts of the motor proper run in a cast iron box, or casing, which is partly filled with oil. They are thereby continuously lubricating themselves. With this system, oil cups are unnecessary. After a careful estimate, it has been found that, during service, about 35% of the indicated power of the compressor is delivered at the axle in driving the motor, and of the total amount stored, about one half is available in the motors. If it were not for the reheater, this would be reduced by at least 50%. It has been proved by tests that the cost of reheating is about one-fifth of the cost of compressing the air.

The auto-truck is absolutely under the control of the motorman, who sits on an ordinary wagon seat. The steering apparatus is similar to that of the yard



POWER CONSTRUCTION OF AUTO-TRUCK.

will be replenished with compressed air. The conduits beneath the streets will be ordinary iron pipes, 2½ inches in diameter, while the pipe which supplies air to the truck will be about ½-inch in diameter. Together with these may be laid two other pipes—one for water and the other for steam—for purposes yet to be explained. The air bottles, or tanks, varying in number according to the size of the truck, are placed beneath the floor, between the two axles. These air reservoirs are seamless steel bottles. An average truck requires nine of these bottles, placed in the manner shown in the accompanying picture of a heavy yard truck. In a wagon truck these reservoirs are fewer than in a yard truck, higher from the ground, and out of all danger of being damaged. The motor is iron-clad, and rests in the middle, on the rear axle, and is driven in the middle by means of the gear. This does away with the side rods of the old-style air motor, prevents indirect swaying, and is considered a great improvement. A heavy truck has a heater under the center of the floor, which consists of a seamless steel flask charged with hot water, under a pressure of from 150 to 300 pounds per square inch, heated by steam at the same time the air reservoirs are being filled at the charging stations en route. A pipe leads from the air reservoirs to a combined reducing and throttle valve, which lessens the storage pressure to the working power. But before the pipe reaches the reducing valve it passes several times around the heater, so that the air can receive sufficient heat to prevent the freezing of any moisture that may be in it. When the air is reduced to about 320 pounds of pressure per square inch, it passes through a coiled pipe placed in the reheater, which raises the temperature of the air, causes it to expand, and naturally increases its working capacity. Again, before this air goes into the high-pressure cylinder, hot water is injected into it by the opening of automatic valves. A part of this water is instantly vaporized, and takes the place of the truck, two horizontal wheels, one below the other. The upper wheel is the controller. On the auto-truck, the controlling and steering apparatus will have the appearance of that on an automobile carriage. The motor is controlled by varying the cut-off, also by the throttle, the two being operated simultaneously. A forward movement of the single controller starts the truck, and the propelling force is proportional to the distance it is moved from the starting point, so that any degree of quickness can be obtained. A backward movement to the starting point brings the valve to a minimum cut-off, and closes the throttle; while a still further backward movement reverses the motor and opens the throttle to back the truck. No brakes are required, and the truck can be brought to a standstill at a moment's notice. It is claimed that, while a horse finds it difficult to drag a load of two tons, the auto-truck will move easily along with five times that load, at the rate of eight miles an hour, to a horse's four miles. It is also asserted that the auto-truck can turn almost in its own tracks.

The tires of the heavy trucks will be of steel, while those of the lighter ones will be of cushion rubber. No improvements will be made on the main body of a truck, which will be similar to that of trucks drawn by horses. Each truck, complete, will cost from $2000 to $3000. That includes all the expense of the truck, and there is very little wear or tear to take into consideration; while the cost of running is about two-thirds of that of a horse and truck. The auto-trucks are unfit for country use, and can only be utilized where there are excellent roads, and where replenishing stations can be established.

At Trenton, N. J., on the 23rd ult., were filed articles of incorporation by the New York Electric Vehicle Transportation Co., with an authorized capital of $25,000,000, to manufacture and operate vehicles propelled by electricity, air, gas and oil.

Conglomerates in Honduras.

Written for the MINING AND SCIENTIFIC PRESS.

There are in the Department of Olancho, Honduras, C. A., auriferous gravel deposits of considerable extent, particularly in the territory drained by the Guyape and Parnal rivers. The beds are not of great thickness—some places 200 feet, but usually much less. The gravel lies on a formation of red sandstone dipping at low angles, having been gently folded, and possibly also faulted, over quite a large area. Intercalated in these red sandstones is a series of conglomerate beds, in some of which the fragments are angular (breccia) and in others well worn by water. In the crystalline rocks which occur in the neighborhood quartz veins are not abundant, though not unknown. The gold found in the gravels is uniformly in small grains, coarse pieces rarely being found. These facts, well known to the writer, have led to the thought that the conglomerates may be auriferous and are possibly the source of the gold found in the gravels. Structurally, these sandstones and conglomerates are much like those in the Witwatersrand, South Africa. It must not be understood that it is positively asserted that these conglomerates are gold-bearing, but there is a reasonable probability of it. Near the Guyape river, at its confluence with the Guampo creek, about 200 miles from Brewer's lagoon by the river, are also found large conglomerate deposits intercalated in red sandstone. The deposits, so far apart, may be in the same geological horizon, but it would require a great deal of time to determine this, as the latter locality is in a dense virgin forest, amid rugged hills, though easily accessible from the coast.

Wireless Telegraphy.

There are several methods by which electric or magnetic effects can be utilized for telegraphy without the use of a continuous wire between the two stations. One of the most simple, in the form in which it has been put into practice by the officials of the postal telegraph department, consists in making an interrupted or alternating current in one line or circuit. At some distant place there is a receiving line or secondary circuit in which a secondary electric current is generated by magnetic induction across space. The secondary current is detected by a suitable sensitive receiving instrument and can be made to give rise to appropriate signals. This method has been put into practical operation by the British post office between Lavernock and Flat Holm, on the Bristol Channel, over a distance of three or four miles, and is now in daily use for sending messages. The other method, which has attracted popular attention, is based on the employment of Hertz waves, and has been especially developed by Marconi.

In this wave system a long insulated upright rod or wire is erected at each of the terminal stations. At the sending station an induction coil with spark balls is connected between the bottom of the rod and the earth, and at the receiving station a very sensitive detector, consisting of a Branly tube or tube containing fine metallic filings is inserted between the upright rod and the earth. When the induction coil is in action rapid electrical oscillations are made in the transmitting rod and ether waves sent out from it. These on reaching the receiving rod set up an electromotive force in it, which causes the metallic fillings in the detector tube in connection with the rod to become conductive. By means of a relay and battery this electrical change in the detector can be made to print Morse signals on a strip of paper utilizing the ordinary Morse instrument.

Aerial Bombardments.

The regions of space beyond our planet are filled with flying fragments. Some meet the earth in its onward rush; others, having attained inconceivable velocity, overtake and crash into the whirling sphere with loud detonation and ominous glare, finding destruction in its impervious armor, or perhaps ricocheting from it again into the unknown. Some come singly, vagrant fragments from the infinity of space; others fall in showers like golden rain; all constituting a bombardment appalling in its magnitude. It has been estimated that every twenty-four hours the earth or its atmosphere is struck by 400,000,000 missiles of iron or stone, ranging from an ounce up to tons in weight.

Every month there rushes upon the flying globe at least 12,000,000,000 iron and stone fragments, which, with lurid accompaniment, crash into the circumambient atmosphere. Owing to the resistance offered by the air, few of these solid shots strike the earth. They move out of space with a possible velocity of thirty or forty miles per second, and, like moths, plunge into the revolving globe, lured to their destruction by its fatal attraction. The moment they enter our atmosphere they ignite; the air is piled up and compressed ahead of them with inconceivable force, the resultant friction producing an immediate rise in temperature, and the shooting star—the meteor of popular parlance—is the result.

The Alluvial Deposits of Western Australia.*

By T. A. RICKARD, State Geologist, Denver, Colorado.

General Geological Considerations.—The interior of West Australia is an arid table land, elevated 1400 feet above the sea. This plateau is flanked to the south by the Tertiary limestones which fringe the Great Australian Bight. It is bordered northward by the Carboniferous beds of the Fitzroy river and westward by the granite of the Darling hills, while to the east this wide area, about 900 miles square, slopes downward imperceptibly into an undulating plain of sand, which stretches with dismal persistence across the boundary of South Australia. The waters of the ocean receded from this tract of land long ago; it is probably the oldest land surface on the globe, and represents the basal wreck of a much larger continent. Herewith is presented a map of this region.

The Coolgardie and Kalgoorlie gold fields are situated in the southwestern part of the region. The rock formation consists of granite penetrated by diorites and andesites. The latter are occasionally associated with tuffs, which have been readily mistaken for sedimentaries. There are no fossil-bearing rocks, such as would afford a datum-line from which to measure the relative geological age of the prevailing formation. On the extreme edges of the mining territory there are, it is true, remnants of sand rock which are considered identical with the "desert sandstone" of Queensland, determined by Daintree to be of Mesozoic age. But even this formation has evidently been laid down so long subsequent to the underlying rocks that it serves merely to emphasize their much greater antiquity. Their age can only be vaguely described as Archæan.

In this region all diversity is wanting, and a sameness of aspect wearies the observer. In the absence of an elevatory movement, more than sufficient to balance the slow degradation of the higher parts of the region, there has been no compensation for the effects of atmospheric erosion, so that this tract has become a dreary flat, strewn with the sandy wreck of weathered rocks.

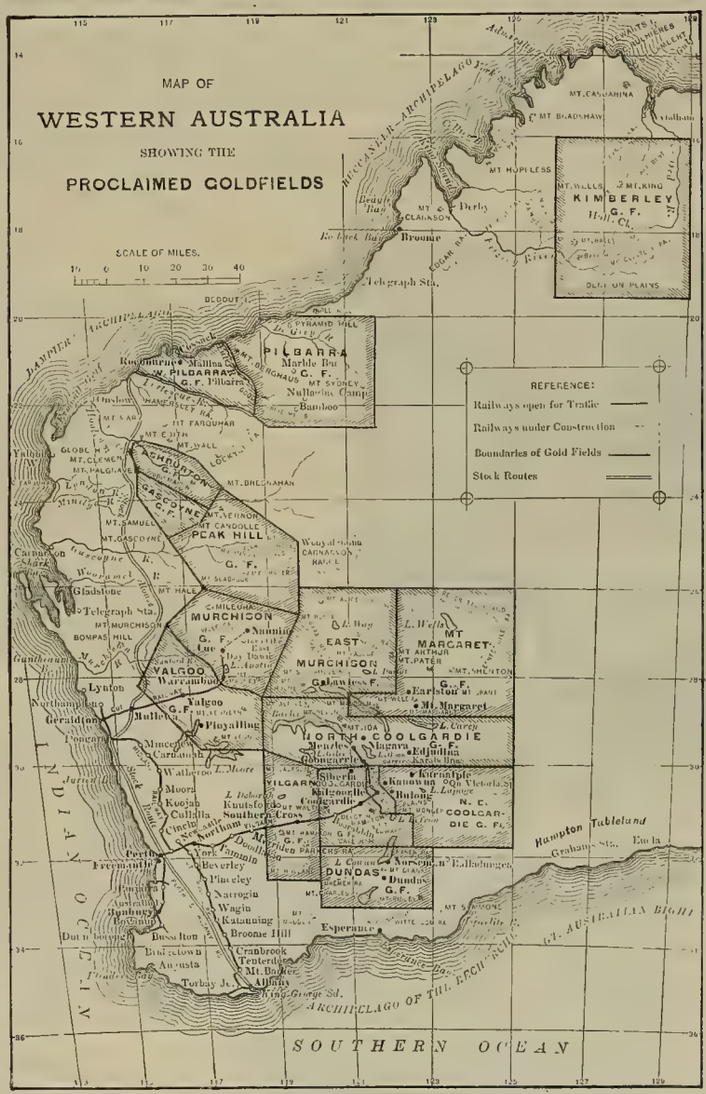
The interior of Australia can be likened to the great basin, occupied by Nevada and parts of Utah, Idaho and Arizona, between the Rocky mountains themselves and the Sierra Nevada. There is only one large river in Australia which reaches the sea, namely, the Murray, which rises near the boundary line of Victoria and New South Wales, and then flows toward the interior, to be saved by a backward sweeping curve, which permits the river at length to empty itself into the sea at the border of South Australia. There are many "lost rivers," like the Carson and the Humboldt in Nevada. During the rainy season they are tempestuous torrents; during the succeeding dry months their course is marked by sandy bottoms, dotted with an occasional water hole. The mountains are near the coast, so that the Australian Alps and the Blue mountains do the same service as the Sierra Nevada and the Cascades, in that they interrupt the warm, moisture-laden winds and compel them to precipitate on the seaward slope. The consequence is that the eastern parts of the colonies of Queensland, New South Wales and Victoria, between the mountains and the sea, resemble the valleys of California and Oregon, just as the interior region beyond them bears a likeness to the dry tracts of Nevada and Arizona.

The sea retired from the interior of West Australia in the very dawn of geological time, and the movement of elevation which raised the land above the waters continued with but little interruption until the beginning of the Tertiary period. Since then slow subsidence has robbed the Australian continent of a part of its extent and made Tasmania an island. There is evidence of a much larger continental area, which at one time extended toward southern Africa.

The main drainage of the interior is to the south. The last retreat of the sea was accompanied by the formation of broad valleys, which have lost their former outlines and now appear as long depressions, largely filled up with the products of erosion.

The Physiography of the Gold Fields.—The principal gold field of West Australia is situated in the southwestern part of the desert plateau. The chief towns are Coolgardie and Kalgoorlie; they are twenty-five miles apart, and are connected by 350 miles of railway with the coast. During 1897 the total rainfall amounted to $5\frac{2}{5}$ inches at the one place and $4\frac{3}{4}$ inches at the other. In contrast to these figures, it may be added that the rate of evaporation in this region is estimated to be equivalent to 7 feet per annum.

The country consists of a sandy plain, the monotony of which is intensified by a series of alternating low rocky ridges and equally slight depressions, having a northwesterly direction. Most maps indicate the occurrence of lakes and the occasional course of a stream, but these are the mirages of the cartographer. The "lakes" are shallow basins with clay bottoms, in which, during the rainy season, a little water lingers, and the "streams" are sandy channels, where sinking will sometimes tap a trickling flow of brine. The surface is devoid of vegetation, except in spring, when flowers of a brilliant hue leap into brief existence.



The real nakedness of the region is hidden by the "bush," consisting of scrub from 20 to 60 feet high, chiefly mulga and ti-tree, both acacias. The roads are cut through it with the monotonous regularity of a canal. One portion of the journey is but the counterpart of another. The sameness is wearisome beyond words. And when an elevated spot is attained, the eye commands, from north to south, from east to west, one dark unbroken sea of trackless bush.

Gold mining caused this desert to be invaded. The first discovery was made by Anstey in 1887 at Yilgarn, which is 210 miles east from Perth, the capital of the colony. This started the Southern Cross mining district. Prospectors began to scatter farther inland. In 1892 Bayley made the discovery which marked the birth of Coolgardie and the commencement of an activity which culminated in the mining excitement of 1895. A series of rich finds, scattered over the surrounding desert, gave rise to the settlements of Menzies, Goongarrie, Kanowna, Kurnalpi, Kunanalling, Wagiemoola and a score of other patches of corrugated-iron hideousness labeled with euphonious aboriginal names. In June, 1893, Patrick Hannan pegged out a discovery claim at Kalgoorlie, twenty-five miles east of Coolgardie. The find which he made was of no particular importance, and the neighboring area, like many others, became the scene of the purposeless digging which was at that time sufficient to give an impetus to a great deal of reckless company promoting. However, just as in Colorado, the Mt. Pisgah fiasco of 1884 preceded the real development, eight years later, of Cripple Creek, so the vagaries of irresponsible schemers led to the accidental opening up and the eventual recognition of the magnificent series of rich lodes that have now placed Kalgoorlie among the few great mining camps of the globe.

In 1897 West Australia produced 674,993 ounces of gold, to which Kalgoorlie alone contributed 306,000 ounces. During the same period the mines of the colony paid $2,400,420 in dividends, and out of this total Kalgoorlie is credited with $1,775,000. The growth of the industry is exhibited by the accompanying statistics:

Year.	Kalgoorlie. Ounces.	West Australia. Ounces.
1895	36,000	231,513
1896	103,000	281,265
1897	306,000	674,993

It is estimated that the yield of the colony for the current year will reach a million ounces, and that of this one-half will come from the Kalgoorlie district.

The development of a group of very rich telluride lodes amid this immense desert country, dotted over with the unhappy failures which were based on small pockets of specimen gold quartz, did not happen without a sad expenditure of money and human life. With the whisper of every new discovery, crowds of reckless gold seekers plunged madly into the outer desolation. Eager horsemen jostled the awkward camels, whose swinging gait carried them in turn past the mobs of diggers who trudged wearily to the scene of each successive excitement. One knows not whether to admire the pluck or to deride the foolishness of men who died of thirst and perished of fever in the mad search for gold. The incident known as "the Siberia rush" will be typical of early days. A man came into Coolgardie one night with a story that gold had been found at a locality thirty odd miles to the north. Hundreds started off on horses or on camels; many went on foot, carrying their billies—a tinned-iron vessel of from two to four quarts capacity, in which the miner makes his tea and does his cooking—and blankets upon their shoulders or trundling their packs in wheelbarrows. Some took the wrong direction, and of these many never reached their destination, but died miserably in the bush. Four hundred eventually reached Siberia. This locality has a mean annual temperature of 78° and the summer heat is 112° to 120° in the shade. The only water near the discovery was a soak, a morass of the desert, where water has accumulated in a depression, and is got by digging through the sand which covers it. This soak is seven miles distant. It was soon drained dry by the crowd of diggers. News came to Coolgardie that a water famine was imminent. The superintendent of water works—a government officer—instantly dispatched a dozen camels to the succor of the adventurers. In the meantime, realizing the impending danger, they had left the gold and were making for the nearest condenser. All the drinking water is the product of the "condenser." Many died on that return journey, and many more would have been lost save for the water brought by the camel train. But in a few days there was another stampede in another direction. Thus the gold fields were opened up.

The peculiar character of these "rushes" is directly traceable to the nature of the gold occurrence. Gold is found lying on the top of the ground, and the first surface mining yields extraordinary profits. The search for the particles of gold scattered over the surface is called "specking." In the early days hundreds of ounces were thus picked up in a few hours by the men first to reach a rich spot. When the cream has thus been skimmed off, the sandy soil underneath is treated, the dirt being winnowed by pouring it from one pan into another. After that, actual digging begins, the shallow deposits being trenched and pitted in the search for those patches of rich ground through which the gold is found sporadically distributed. "Specking" is still a recognized occupation on Sundays, even at the established mining centers. Sunday labor is generally forbidden throughout the Australian colonies; hence the opportunity to go "specking," as above described. I have seen as many as 100 men walking about with their hands in their pockets and their eyes intent on the ground, for all the world as if they were in disgrace. A five-ounce nugget may be found; and everyone hastens to the spot. Perhaps nothing more is picked up; or it may be that sufficient gold is discovered to attract troops of "dry-blowers" to the place. The "dry-blower" is brother to the "gulch-miner" of America and the "alluvial digger" of the eastern colonies of Australia. In the investigation of the methods of the dry-blower and the occurrence of the deposits out of which he wins the gold, I observed many facts of such interest, it seemed to me, as to warrant the preparation of this contribution.

(To be Continued.)

* Condensed from paper read before the Am. Inst. M. E.

Mining Summary.

ALASKA.

The Alaska Treadwell report for February hows 21,925 tons ore worked and 444 tons sulhurets treated, latter yielding $15,527. The ullion shipment was $50,504, the ore averging $2.30 per ton. February expenses were 26,444.

Thanksgiving creek, near Eagle City, is one f the latest discoveries on American terriory. A new district is being organized there. Cleven hundred men are working Forty-mile nd tributary creeks.

Eagle has a population of 600, and 140 men re working American creek. Seventy-mile own his forty cabins, and 250 men are workng that creek and its tributaries. The best roducer is Garney creek, from which five en took $8000 last summer.

The Klondike miners are objecting to the harges made by the Pioneer Tramway Co., which the Yukon Council granted a franhise for a toll road to the Bonanza mines. he company took possession of the trail, made ome improvements, erected tollhouses and egan collecting money for every passenger nd pound of freight. The Bonanza claim wners along the tollroad are required to pay or walking over their own claims.

ARIZONA.

Fifteen cases of smallpox are reported mong miners at Clifton.

Shipping ore is being taken out of the Union ine, twenty-five miles southeast of Prescott, hich carries over $300 gold per ton; the mill-g ore carries $40 gold per ton. The vein is 2 et wide.

Kier and Gerritt, two prospectors, have ound a 4-foot vein in the Hualapi mountains, outheast of Kingman. The ore is said to be silver.

H. W. Blaisdell, Shultz, Pinal county, has a ontract with the Mammoth-Collins G. M. & M. Co. for the tailings at the mill other than he 200,000 tons contracted for by the St. ouis Gold Saving Co., who are represented y Peck & Anderson. He will build a cyanide ant below that of the St. Louis Co. The ar says the St. Louis Co. has been clearing 00 a month since early in August last, after aying royalty to the Mammoth-Collins Co. nd they have a few years work ahead of em to clean up what remains of the 200,000 ns of tailings.

In the Grand canyon of the Colorado is reorted a copper ledge. The ore is base and he ledge is said to be 100 feet in width. It exposed in vertical depth for fully 800 feet. he ledge lies on the north side of the river, ne north of Ash Fork.

A copper strike is reported in the Corville ine located twelve miles northwesterly from lobe. The Corville is one of a group of four. he tunnel continued until 180 feet was eached, when a body of carbonate ore was ruck in porphyry and quartz. Running with is carbonate is a 6-inch vein of copper glance e. The crosscut has reached under the dge 225 feet.

On the opposite side of this high ridge or ountain the owners of the Finletter group e driving a crosscut, now in 120 feet.

The surface of all these claims is covered ith ore, broken from the ledges that crop t.

In the Pacific mine, near San Carlos, it is reorted a 5-foot vein of solid copper ore has een found.

Fitzsimmons & Ware have a lease on the aqua Hala mine and mill, employing fifteen en.

P. J. Quinn has leased the Golden Eagle ill.

At the Old Dominion, near Globe, one of the 5-ton furnaces was blown in Feb. 6th with a ew crew of men, who are becoming familiar ith their work, and things are now moving hoothly. A track has been laid for slag pots nd horse power will be used to move them. he new 250 H. P. engine will not be in place. he pump for the mine is now in the shaft nd will handle the water at a depth of 2000 et. The mine is now down 1000 feet.

The Tucson *Star* reports that the Mammothollins G. M. Co. proposes to increase its amps to 100. The water of the Aravaipa ver is to be utilized to generate electric wer for the works.

The Yuma *Sentinel* says that every availble team in Yuma county has been engaged haul the Blaisdell mill and cyanide plant om Picacho to the King of Arizona mine, a stance of forty miles. The plant weighs 400 ns and will be moved as rapidly as possible.

Mojave *Miner*: A. E. Vandercook, associed with R. G. Eckis and B. Vandercook, has und in the January claim near El Dorado nyon a body of ore running well up in gold nd silver.

Mojave *Miner*: There are forty tons of ming machinery at the Kingman depot awaitg transportation to El Dorado Canyon to be ed in erecting a cyanide plant to work the ilings from the El Dorado Canyon mill. The ant will handle fifty tons per day. Mr. ckis is Gen. Supt.——Harris & Redman rently arrived from the Colorado river bringg sixty ounces of gold nuggets worth $18.50 r ounce as the result of three weeks' work. he smallest piece weighs not less than 25 nts.——F. L. Smith, who has mines at Bounry Cone, San Francisco district, has opened a vein of ore, a 4-foot crosscut not yet havg cut through the ledge.——There has been id $18,000 in cash, through the Kingman nk, for the Mollie Gibson and Bullion-Beck, joining mines, at Chloride by E. J. Carter Chicago. The new owner will erect a mill d boarding-house, and the local paper says ill put 100 men to work immediately.——T. cNeely of Mineral Park is shipping ore from s lease on the Retort mine.——M. W. Henkle s made another strike on his Retort mine, ineral Park.——Phillips & Dominguiz are nning a drift from the old shaft on the Daisy White Hills to a block of ground on the 'Malley lease.

CALIFORNIA.

Amador.

Supt. W. R. Thomas has let a contract to sink the shaft at the Central Eureka mine 300 feet, making it 1400 feet.

Record: Water has been turned into the new reservoir of the Wildman-Mahoney Co. It is proposed to build another reservoir in close proximity to the present one.

Butte.

The Oroville *Register* says the dredges now running in the gravel deposits south of that town are taking out from $150 to $300 for each twenty-four hours—for each boat. In some instances the returns exceed these figures.

Calaveras.

J. A. Campbell of Sheep Ranch and Mr. Elliot have discovered a rich quartz vein near the Italian ranch, on the San Antone and O'Neill's creek ridge, three miles southwest of Sheep Ranch.

El Dorado.

Thirty men are employed at the Goglns mine on the Ralston Divide, six men at the Lynchburg and four at the Ramsey City.

Fresno.

The Copper King mine near Clovis is reported capitalized in London for $1,750,000, a company being organized there to work the mine. The Fresno *Republican* says the property was bought some time ago for $15,000. There are twenty men employed at the Copper King mine. The daily output is about fifteen tons.

H. B. Vercoe has bought the Heiskell copper mine, six miles north of Clovis. The property had been abandoned fifteen years ago because it did not pay to work it on account of the low price of copper. There are five men erecting buildings and getting everything in shape to begin active operations.

Kern.

The owners of the Ruby mine, at Randsburg, are shipping from twelve to sixteen tons of ore per day. This is the claim on which C. Koehn recently had a lease, during which he milled over 215 tons, which brought him from $12 to $15 per ton.

A party of four dry washers from the Summit district, twelve miles from Randsburg, have recently brought into that town between $800 and $1000 in gold dust, as the result of a month's work.

G. Otis of Redlands has bonded the Hard Cash mine east of Randsburg.

The new mill recently built by the Union Iron Works of San Francisco, Cal., is in successful operation.

Randsburg *Miner*: B. F. Myers has bonded for ninety days the "9-Spot" mine near the Minnehaha to V. Smith.

Los Angeles.

The Red Rover mine at Acton is being operated successfully under the superintendency of W. R. Shilling. The shaft is to be straightened and sunk to 1000 feet. A new hoisting plant will be put in and the mill enlarged to twenty-five stamps.

At Newball is reported an oil well throwing oil at the rate of 600 barrels daily: the flow of gas and oil is so heavy that the well cannot be capped and the oil is only retained by hastily constructed dams which form reservoirs for the overflow oil. The well is located in Wiley canyon and is down 1400 feet with 6-inch casing.

The drill of an oil well that W. E. de Groot is sinking near West Lake Park this week penetrated a stratum of iron at a depth of 725 feet.

Madera.

In Swede gulch, near Coarse Gold, a large body of ore has been discovered in a prospect which is down about 35 feet. The vein of quartz is about 3 feet wide.

Nevada.

The Malakoff Co. is working the bedrock tunnel. The present small force of men may be increased.

Union: At the Cadmus mine work has begun extending the 320-foot level to reach a shoot which always paid well. The 10-stamp mill has been kept running steadily for the past two months on rock from the Home and Cadmus mines.——The new 10-stamp mill at the Texas mine is in full blast.

Placer.

The Red Dog mine at You Bet is running with a large crew.

The Hidden Treasure G. M. Co., at Centerville, has 135 men on the payroll.

The Three Stars quartz mine, at Ophir, has three vertical shafts, the greatest depth reached being 700 feet. Forty-five men are employed.

The Eureka Consolidated Drift M. Co. has found gravel in the shaft they were sinking, so much water was encountered that a drift is now being run to tap the channel below the shaft.

The Big Pine mine at Auburn is being operated by Bouk & Bushnell of Santa Cruz. In the lower drift they ran through a pay chute of 40 feet, with ledge from 2 to 4 feet thick, from which they netted about $2000. At the last crushing the rock went $10 per ton, sulphurets $100.

The Gold Ring mine, near Gold Run, has been sold to the Blue Gravel M. & M. Co. of San Francisco. An incorporation has been formed with a capital of $40,000 to prospect and work the mine. E. A. Moody has been appointed Supt.

A second party of experienced hydraulic miners has left Dutch Flat for Boise, Idaho.

A miner charged with having taken gold from the Big Dipper drift mine near Iowa Hill has been held to answer with bonds fixed at $1000.

Near Michigan Bluff, W. Stuart, Supt. of the American Bar quartz mine, is working fifteen men.

In the Eureka Con. drift mine on the Forest Hill divide, three miles north of Sunny South, Cal., the channel, for which search has so long been made under the direction of F. Chappellet Jr., Supt., has been found 300 feet above the main tunnel and 2100 feet from its mouth. This means much for drift mining in that section of California, and will doubtless result in the opening of a new and great mine and the employment this season of 200 men.

The Big Dipper Co. near Iowa Hill expects to have the mill running in ten days.

H Stemple is running gravel at the Pioneer below Yankee Jims.

The Gold Run M. & M. Co. near Gold Run has run its tunnel 1000 feet from a point on the bedrock beneath the first bench near Canyon Creek.

The mines at Gold Run and Dutch Flat that are now in operation are located on the deep Blue Lead.

The Dutch Flat Blue Lead Co. recently incorporated owns the ground under Dutch Flat and thence west to Bear river. A tunnel is being run under the management of S. Jordan toward Bear river.

The mining property at Green Valley formerly known as the "Gold Ring" is incorporated under the name of the Blue Gravel M. & Co. The new 10-stamp mill has been started.

The Pioneer mine, near Damascus, has issued its statement for January as follows:

	1899.	1898.
Value of gold bars	$10,466	$8,354
Total expenses	4 531	5,127
Net income	5,935	3,117
Tons of rock crushed	950	721

A ditch is being opened from Centerville to Sunny South to increase the water supply for the generator plant an the Hidden Treasure mine at Sunny South.

At the Mayflower mine near Forest Hill the company is compelled to run their machinery by steam on account of the scarcity of water.

The Dutch Flat Blue Lead M. Co. has been formed in Sacramento to operate a mine near Dutch Flat.

At Alta the gravel mines are working steadily.

Republican-Argus: At the Bellvue mine, Ophir, work is continuing. Eight men are employed. The last cleanup from the milling rock ran about $38 per ton.——The Crandall mine, three miles from Auburn, will have a 5-stamp mill working Monday next. Provision has been made for five additional stamps. The tunnel is in 500 feet on the ledge. The mine is owned by W. A. Freeman, B. F. Hartley, Gov. Clough of Minnesota and others.

Plumas.

Mrs. Gruss is adding ten stamps to the mill on the Genesee M. Co.'s property in Genesee valley.

Mr. Summers has bonded the McGill & Standart and Johnny Bull mining properties and will prospect and work them.

The mine and mill of the Jamison M. Co., near Johnsville, are again being operated.

Riverside.

The Gold Canyon M. Co. near Salton has recently built a wagon road and will build a track 400 feet long to the foot of a tramway now being constructed. The ore at the mine is ready for stoping.

The new Mountain Beauty district is located in the foothills of the Chihuachon mountains. This spur forms the southernmost end of the San Jacinto mountain range, and is on the line of Riverside and San Diego counties. The district resembles that of Mesa Grande in San Diego county.

San Diego.

At the Stonewall mine R. Strauss is superintending the cyanide process. Eighteen men are at work. The stamp mill is crushing low-grade ore. Water for the mill is taken from the mine shaft. The tanks are completed and will soon be in operation. There are several thousand tons of tailings which will be treated by this plant.

The Ranchita mine, near Banner, is reported sold to the Colorado & California M. & D. Co. for a large sum.

Santa Barbara.

An experimental oil well is to be driven near Lompoc on the McKay ranch. It is said surface indications justify the expense of such experiment.

Press: Interest is centered in oil development and some contracts are being made to drill in new territory. E. Daily has leased two acres on the beach on his Rincon Hill property at Carpinteria to J. R. Heath, who will soon begin operations. The Rincon mountains show indications, asphaltum and oil springs showing up in various places.——The well on Dr. Hill's place at Rincon point is down through the second oil strata and going deeper.——The Pacific Whaling Co.'s well back of Shepard's is down 1100 feet and the tools are stuck. Some oil was encountered but not enough to justify stopping. As soon as the tools are out the well will be pushed on down. The first well was down 1900 feet but found no oil.

Shasta.

A quicksilver prospect has been discovered at the head of Clover creek. Last summer Sisk & Bryan located a ledge of porphyry and iron ore. On the south side of the iron is 10 feet of shale. A prospect was followed on an incline towards the shale to a vertical depth of 14 feet, where there is 1 foot of cinnabar.

At Delta the mill is to be moved from the Laconia to the Butler mine.

At Keswick 1000 men are on the payroll of the Mountain Copper Co., 600 about the smelters and 400 at the mine.

At Kennett twenty-two men are employed in the Uncle Sam mine.

At the Uncle Sam mine near Kennett the mine is being retimbered. Twenty men are employed and ten of the forty stamps are in operation.

J. Salee, the owner of the Copper City properties, reported about to pass into the hands of a syndicate, tells the *Searchlight* that the sale is off and the property is not now under bond to anyone. With good roads and a continuance of fair weather he would begin hauling the ore down and shipping it to the smelters.

Twenty-two men are developing the copper property recently bonded by the Lewishon Bros. for $130,000.

Sixty-four mining claims were located one day last week on Backbone creek, near Kennet, on the Southern Pacific, twelve miles north of Keswick. This was occasioned by the bonding of the Golinsky group of copper mines for $130,000 to New York men, who have twenty-five men at work. With the establishment of smelters there, a demand for quartz for fluxing purposes would be created.

A rich strike of free-gold ore is reported from North Cow creek by three prospectors—Dale, Moore and Silence—who took out $1000 apiece in three days. The discoverers had their gold reduced to a brick in the sampling works at Redding and shipped a $3757 brick to the San Francisco mint. The ore is contained in an 8-inch vein and the rock is wired with strings and sheets of gold. The men were washing gravel in the creek bed, encountering coarse gold and several specimens that had evidently come from a quartz seam. The water got low and they prospected for the vein. They found a trace and followed it into the hill, making an open cut. The seam rapidly widened out to 8 inches.

Siskiyou.

At the Best Chance mine on Yreka creek Supt. Austin has the old shaft pumped out and is hoisting pay gravel.

At the Commodore mine on Barkhouse creek the lower tunnel is being extended to crosscut the ledge. It is now in about 400 feet and another month's work will probably be required to reach the ore. Stoping is going on in the upper level. Thirty men are employed.

W. C. Stanley, Supt. Jillson mine, reports the February clean-up the largest in its history. The monthly payroll is $3500, there being about thirty men employed.

The first clean-up from the placer mine owned by Mr. Hutchinson on the Klamath amounts to $7000 and represents a short run with a No. 2 giant. The mine is located thirty miles below Happy Camp.

In the Blue Gravel mine, near Yreka, last week a cave imprisoned four miners who made their escape through an old unused shaft.

The *Journal* says the Sheba mine at Patterson creek is attracting attention. Shares held at 80 cents on first discovery have jumped to $5.——F. Beaudry will extensively operate in placer mining at Wild Cat on the south fork of Scott river.——The Little Wonder mine at Cherry Creek is turning out rich ore.——Hornbrook reports the lack of storms makes the outlook dark for this year's mining and farming. The only class rejoicing is the river miner. It will be another good season for wingdamming.

Trinity.

The discovery of sylvanite ore near Coffee creek is announced by G. L. Carr, who owns a number of claims in that district.

From the Golden Jubilee mine ore has been extracted worth over $1000 a ton, much of it having been shipped to Selby.

The Forget-Me-Not has ore running $1382.

Tuolumne.

(Special Correspondence).—The shaft of the Golden Crown M. Co. at the Big Betsy is now down 325 feet, the vein still showing favorably. It is understood here that the San Jose officers have advanced the price of the stock to $2.50 per share.

Groveland, March 1st, '99.

The Bown mill near Robinson's Ferry is nearly completed and the new hoist will be put in as quickly as possible. The shaft is about 500 feet deep.

At the Mazeppa mine the shaft is down 90 feet.

The new 20-stamp mill at the Bown mine, near Tuttletown, is expected to start up April 1st.

The Tarantula G. M. Co., Ltd., has incorporated at Sonora. The registered office of the company is in England; capital stock, £130,000.

The Leap Year Gravel M. Co. has incorporated at Sonora. C. J. Berry of Selma, C. L. Waters of Fresno, G. Eager of Carters, C. B. Hawley and F. M. Cook of Sonora are directors; capital stock, $35,000.

The pump at the Genevieve mine, near Soulsbyville, is operated by compressed air furnished by the Black Oak compressor, 4000 feet distant, through a 2-inch pipe line.

At the Santa Ysabel, near Stent, No. 1 shaft has been sunk to the 600 level, where the ore body will be opened. Work has been progressing on the 400 level, and at the 500 level the ore body has been opened 75 feet.

Union-Democrat: The 10-stamp mill on the Mammoth will crush ore from the Republican of Jacksonville. The hoist on the latter is operated by compressed air transmitted by pipe from the Mammoth mill.——At the Shawmut-Eagle sinking and general underground work is being done. The mill is running ten stamps by steam power, and water is used for the compressors.——The Grizzly shaft is 450 feet deep, at which point sinking was discontinued and crosscutting begun.——The Black Oak mine, near Soulsbyville, is 750 feet deep; is equipped throughout with steam and water plants, has two large air compressors, a 30-stamp mill, two complete cyanide plants (percolation and agitation), and 6000 square feet of canvas tables. It has both milling and shipping ore, and is equipped with electric lights.——It is reported the vein in the North Fork mine near Arrastraville, which was lost by a fault, has been rediscovered by the present operators.——Sinking in the Confidence shaft at Confidence has been discontinued.——The Mazeppa shaft, near Stent, is down 190 feet, where the vein is said to be 18 feet wide.——The Vine Spring mine, near Columbia, is being reopened after a long idleness.——The force on the North Star and Black

Warrior, on Moccasin creek, is to be increased.

Ventura.

The tract of land in Ventura county set aside as a forest reservation by the President, consists of 60,000 acres at the head of Trabuco canyon.

Yuba.

Marysville *Democrat*: The surveyors under direction of the U. S. Debris Commission are at work on the north side of the Yuba channel, in the vicinity of the Hall farm, where they are stopping at present. There are now four men in the party at that point, and one, H. Vischer, who is stopping in this city. The survey is under the direction of the latter gentleman, who is preparing plans for work in river betterment.

COLORADO.

Mining Investor: The books of the surveyor of customs show that for '98 there were imported into the port of Denver, from British Columbia and Mexico, 18,865,125 pounds of silver-lead ore valued at $214,502. About the same amount of refined lead was exported to England and France, via the port of Galveston. During '97 this custom house received from British Columbia and Mexico silver-lead ore to the extent of 20,000,000 pounds, valued at $300,000. In the last four months of '98 the lead importations fell off on account of a rise in railroad rates of transportation, and an increased supply of lead-silver ores from the Colorado, Idaho and Utah mines, now almost equal to the smelter demand.

BOULDER COUNTY.

Miner: The Newmarket leasers have sent three carloads of ore to Denver from the Puzzler, and the Ward-Rose leasers one carload. ——The Emancipation mine at Sunshine is producing steadily. The mine is now 470 feet deep and 50 feet is to be sunk at once. The mine employs twenty-six men.——On the 200 east level of the Ward-Rose mine a 6-inch streak of solid ore, rich in gold, has been found.——The B. & M. mine has opened a new body of ore in the east 500 level, 155 feet from the shaft. There are 18 inches of solid iron. In the west 600 level the ore body is from 3 to 5 feet wide.

CHAFFEE COUNTY.

Coarse gold has been found in Cat gulch below Turret. The claim has been sold and the purchasers will commence sinking.

CLEAR CREEK COUNTY.

The Knickerbocker tunnel has cut a good body of ore at the distance of 1300 feet from the mouth.

A rich strike is reported in the Mary Ellen mine near Silver Plume. There is a 3-inch streak of ore assaying 22 ounces gold and 275 ounces silver per ton.

The Corry City mine has a chimney of ore from which have been taken twelve tons a month for eight months that averages 500 ounces silver a ton.

J. Robenson, Supt. Pelican and Dives mines, and C. K. Wolfe, Mgr. Chamberlain sampler, have bought a controlling interest in the Stevens mine on McCleelan mountain.

EL PASO COUNTY.

The Victor tunnel has a vein of 6 feet of gold sulphides and peacock copper.

The Creston Leasing Co. at Cripple Creek report net proceeds for January $30,000.

A strike has been made on the Coriolanus on Battle mountain, Cripple Creek, which returns values of something like 140 ounces to the ton.

Goodall, Kinsella & Chatfield of the Hawkeye lease, on the Wisconsin group, near Victor, have made a shipment of sixteen tons of ore, divided into three grades, giving returns of $32, $47 and $155 to the ton.

The Atlanta shaft at Victor will be sunk 100 feet to the 400-foot point. Work has been commenced. Attention has been given to breaking ore in the first level. The veins cut in the shaft will not be exploited for the present.

At the Red Umbrella in Eclipse gulch near Victor there is now in the bottom of the shaft 6 inches of ore, the average of which is said to be seven ounces to the ton. A contract has been let for sinking the shaft 100 feet.

A strike is reported having been made on the Hiawatha on Beacon Hill, Cripple Creek.

Mining Record: Lessees Reardon, Sims and Hight, working on the Kimberly at Cripple Creek have made a phenomenal find. After a round of shots had been fired, two miners went down to see the result and picked up some thirty pounds of almost pure sylvanite, one chunk that would weigh fifteen pounds was entirely metal. Alongside of this high-grade seam is 15 inches of ore that will assay well.

FREMONT COUNTY.

Dawson City has made its first sale, a one-third interest in a claim in Jennings gulch changing hands for $1000.

GILPIN COUNTY.

The Fish group of mines in Pine Creek district has cut 17 feet of ore that has a gold value of $20 to the ton.

GUNNISON COUNTY.

(Special Correspondence).—A sale has just been closed on the Bull-Domingo group of three claims by Haynes, Parrault & McManus to S. I. Hallet of Aspen, Colo. Consideration, $50,000; $5000 cash was paid on contract.

R. L. Hammill, who has charge of the Luck Strike, has bought a half interest in the Little Jessie group, comprising five claims.

A contract is to be let for sinking the main shaft of the Gunnison mine another 100 feet. The mine is equipped with hoist and is now 150 feet deep. The vein is 20 feet wide at the 150 station and the ore will average over $20 per ton.

Gunnison, Colo., Feb. 20th, '99.

(Special Correspondence).—The Vulcan mine near Gunnison is reported to have 3 feet of rich ore on the lower levels.

The Good Hope mine near the Vulcan ships several cars of ore monthly. Fourteen men are employed.

The contract to sink another 100 feet on the Gunnison mine has been let and work will commence at once.

The Midland mine near Gunnison is shut down for the winter. It is stated on good authority that there is 18 feet of ore in the bottom of the shaft.

A bond and lease have been secured on the Belle Flora near Gunnison by Cunan and others for one year at $10,000. The property has at one time produced some good ores, which were milled at a 10-stamp mill on the ground. The property is in bad condition and a new shaft will likely be put down, there being 3 to 6 feet of milling ore.

The Western Federation has just perfected an organization at Vulcan. Mr. Davidson of the Vulcan mine is not a union man and as a consequence he has discharged fifteen men already, and others will follow. The wages at the Vulcan are $3 for 10-hour day shift and the same for 9-hour night shift for miners and $2.50 per shift for trammers.

Gunnison, Feb. 25th, '99.

LAKE COUNTY.

A discovery has recently been made in the Horseshoe district, just over the Mosquito range from the head of Iowa gulch, where a body of lead carbonate and galena ore was found. The ground on which the discovery was made is owned by the Hilda M. Co., of which Messrs. Kountze & Sheedy are in control, and is under a lease to Messrs. Wuensch & Root of Denver.

The Hibernia mine of Leadville has opened an ore body that runs thirty-four ounces of silver and 45% iron excess.

Leadville *Miner*: The smelter trust that is now forming seems to be a certainty. Lessees and mine owners don't look upon it as being of any advantage to them. The Guggenheim smelter interests did not enter the former combine and will not enter this one.——The New Jersey Zinc Co., a concern that has unlimited capital and owners of the large zinc works at Mineral Point, Wis., who recently purchased the Colonel Sellers mine here for $50,000, had 500 tons of dump ore from the mine shipped to their works for a test run. The increase in the price of zinc spelter should stimulate this industry, but Leadville ores are said to contain too much iron to make practical separation.——Other smelting propositions are known to be under way here. Ward, Colo., smelting people are anxious to get a lease on the Elgin smelter here to run a pyritic plant. Operators are also negotiating for a lease on the Harrison Reduction Works, at the foot of Harrison avenue, owned by the National Lead Co. of New York. The owners of these works are anxious to get them off their hands, as the expense and taxes are quite an item. The works would have to be improved to make a modern smelter. They are also badly hampered for dump room.

MINERAL COUNTY.

A body of high-grade lead ore has been encountered in the Ridge claim at Creede.

Creede has added the Alpha and Kentucky Belle mines to her list of shippers. The Yellow Jacket and Corsair will soon follow.

Creede shipped 2565 tons of ore last week.

The Iowa tunnel, on Mammoth mountain, near Creede, is now in 160 feet. It will require 140 feet of work to reach the vein, which will give a depth of about 300 feet.

The Creede Co-operative mine is regularly shipping three to four cars a day to the smelter. Several hundred tons of concentrating ore are stored to await the starting of the concentrator.

OURAY COUNTY.

A rich strike is reported in the Atlas mine near Ouray. A reduction plant is to be built.

PITKIN COUNTY.

(Special Correspondence).—It is reported that a 6-foot vein of gray copper has been discovered in the Citizen mine at Pitkin. It joins the Maid of Athens.

Pitkin, Feb. 23rd, '99.

SAN MIGUEL COUNTY.

At Telluride it is rumored that the Smuggler-Union group of mines has been sold to the Calumet & Hecla people of Michigan for a consideration ranging from $1,500,000 to $2,000,000. No papers relative to the purchase have been filed in the county recorder's office. It is said that the new owners will work the properties on an extensive scale and that improvements will be made. "The force employed in the mines will be increased by 400 or 500 men, and the big mill at Pandora, one and one-half miles above Telluride, greatly enlarged." The report is unconfirmed.

The company owning the Little Mary and Euclid Avenue mines, near Telluride, will build a mill this spring.

Many residents of Telluride are going to new copper discoveries near that town.

The Pennsylvania tunnel, being run to cut the Smuggler-Union vein at a great depth, on the line of which are numerous veins, has reached a depth of 1300 feet and met a flow of water estimated at 145,000 gallons in twenty-four hours, being the property of the Smuggler-Union Co., and cannot be appropriated until after it leaves their mill and is discharged into the river.

Near Telluride the Bessie mill is crushing Montezuma ore, on which the last cleanup of the plates gave a return of $12.50 to the ton. The Montezuma vein is gaining in extent with the drift.

The Liberty Bell mill in Telluride district has resumed. Through experimental stages the mill has been perfected until it is in shape to save a satisfactory per cent of the values of the ore.

Four cars of ore have recently been shipped from Ophir district—one from the Alta, one from the Silver Bell and two from the Carribeau.

IDAHO.

The Big Buffalo mine in the Buffalo Hump country near Grangeville, which was sold a short time ago to Toronto and Eastern parties, is described as a solid ridge of quartz standing 25 feet above the surface and 40 feet wide.

Fourteen men are at work on the Peacock mine in Seven Devils district. Two hundred feet of tunnel are completed and ore in sight.

The Buffalo Hump Development Co. has concluded the purchase of the remaining two-thirds of the Gem City claim in the Buffalo Hump camp, near Grangeville.

The Decora and Blue Jacket are working fifteen men.

C. H. Gilbreath is in Portland forming a company to place a dredge on 1000 acres he controls above Huntington near Old's Ferry. The mean depth of the gravel is 12 feet to bedrock and colors are found all the way from the grass roots down. The dredge will begin operations in the river and cut a channel 12 feet wide.

At Florence, the Florence Gold Dredging Co. is capitalized at $500,000 to operate this summer. R. G. Wood is secretary. The company will dredge in that vicinity. The company owns about 400 acres of placer ground. The prospecting already done shows the value to be 19 cents per yard; the proposed dredge has a capacity of 5000 yards per twenty-four hours.

The Poorman Co., at Silver City, has reduced its force of miners, and will try contracting.

It is said the Crackerjack mine, in the Buffalo Hump district, has a streak of quartz 10 inches wide which assays $2457.61 per ton.

In the south drift of the Trade Dollar mine at Silver City ore is being sacked that is streaked with gold. The ore is from 4 to 16 inches thick, the vein being from 2 to 4 feet thick.

In the Buffalo Hump country there are fifty men developing their own claims.

The De Lamar Co. at De Lamar is building a dyke of gunny sacks filled with sand placed along the side of the tailings dump to prevent the spring floods from washing it away.

In the Hiyu mine, near Florence, 2½ feet of solid ore has been encountered in the shaft at a depth of between 70 and 80 feet below the first level. The shaft is going down at the rate of a set of timbers for every two shifts. The work of sinking will continue to the depth of 200 feet below the first level.

The Florence Dredging Co., a corporation, has been organized to work placer mines at Florence by means of the New Zealand endless bucket system.

The Lucky Boy at Custer is reported to have made another strike. From two stations on the 700-foot level running west crosscuts have broken into ore and 15 feet is now exposed that is said to average $25 in gold and thirty ounces silver. In addition to this samples of ore were found that show native silver and free gold.

Libby *News*: The Bunker Hill & Sullivan tunnel, at Wardner, connecting the mine with the mill, is being driven 325 feet monthly. It is in 4000 feet with 6000 feet to go before completion. The 9-inch main from the compressor to the mine is two miles long and goes over a mountain. It will be laid in the tunnel when the latter is completed.——The mines at Wallace, Wardner and Mullan are mining 100,000 tons of ore per month, which is concentrated to 18,000 tons before shipping. The mines which produce this are the Bunker Hill & Sullivan and Last Chance at Wardner; the Tiger & Poorman, Helena & Frisco, Standard, Mammoth, Black Bear and Hecla near Wallace and the Morning at Mullan.——The Old Abe at Wardner is being developed by a 1500-foot crosscut tunnel. Bodies of silver-lead ores have been encountered, as well as streaks of copper glance. Its ore is chalcopyrite. This property belongs to J. Finch and St. Clair Bros. of Wardner, who will put in a compressor in the spring.

MONTANA.

It is expected that the Boston & Montana Co. will soon reach the $10,000,000 dividend mark. A regular dividend of $1 per share, paid Feb 20, brought the total dividend disbursements of this company up to $9,875,000. At the present price of copper it is calculated that the company will pay $24 per share this year. In '98 the company paid $16 and expended a large sum in improvements.

The First Shot mine at Basin has shipped its first carload of ore.

The crosscut from the shaft to the vein at the 600-foot level in the Hope mine in Basin is now in about 20 feet. Thirty feet more will bring it to the lead.

A report from the Wright & Edwards mine at Barker says a body of ore has been discovered in a crosscut at the 300 level.

The Sunbeam mine near Sheridan has been sold to J. H. Pankey.

The Chicago M. & D. Co. will operate a large dredge near Conrey, at the mouth of Alder gulch, the coming season. The dredge has the endless bucket system, moving at the rate of eighteen buckets per minute.

The annual report for '98 of the Hecla Con. M. Co. of Glendale shows shipments for the year as follows: Cars bullion, 40; cars matte, 9; cars ore, 3; total value, $273,687.85.

In the Parrot mine, at Butte, a strike has been made in which 11 feet of ore are exposed.

Messrs. Smith & Easton have commenced work in the Mystery tunnel, near Phillipsburg, formerly the property of the Phillipsbury M. & M. Co. Several hundred feet of tunnel have been driven into the mountain and some good ore has been found. The largest lead that has been cut is about 18 inches wide and the ore will average about forty ounces in silver, but it is base and must be shipped to Butte or other smelters for treatment.

A shipment of high-grade ore from the Levi Burr mine, at Hasmark, was recently made by T. E. Mitchell, lessee. A tunnel about 200 feet long has been driven on the lead and work is now in progress to connect the same with the shaft. The last car of ore was taken from the shaft.

NEVADA.

Supt. Ross, who has charge of the Comstock pumping, wired from Virginia last Thursday as follows: "The water has been lowered to 50 feet below the 1750-foot level, or 77 feet below the Sutro tunnel discharge. Several stops were made during the past twenty-four hours on account of shaft work. The water is still going down." After it goes down a few feet more the work of lowering the water must temporarily cease till the old pump rod, pipe, etc., are got out of the way, when unwatering will be resumed. Mgr. Ross made the following statement of the result of the Risdon pump Feb. 27th: "During the past week the Risdon pumping plant was tested under light pressure and every part of the system found in perfect order, from the connection with the Water Co.'s flume to the valves of the 1750 level. The pump or elevator was started under full head on Feb. 20th, and kept running until Feb. 25th, when a defective pipe in the discharge column gave way and the pump was stopped and lifted to the 1750 level. A duplicate pipe that the Risdon Co. had on hand will be substituted for the defective pipe. The pump will again be lowered and started after having made such changes in the working parts as the first work indicated as being necessary.

"During the operation of the pump water was lowered 53 feet below the 1750 station and elevated 28 feet above the station to the drain box leading to the Sutro tunnel, making a total lift of 81 feet.

"Quantity of water used ranged from 40 to 95 miners' inches and the quantity discharged has ranged from 3000 to 6000 gallons per minute; this includes the pressure of water. No attempt has been made to get at efficiency as the Risdon people regard their start as largely experimental. They made several changes in their original plans to accommodate the capacity of the Sutro tunnel drain boxes and have not stated what quantity of water they expect to pump at the start. A considerable area of ground has been drained as on our first stop of two hours the water rose over 17 feet. Since that time the water has raised in the shaft very slow during the stops and is now raising slowly. For and on account of the Savage M. Co. we are cleaning out the connecting drift with the main Sutro tunnel for the purpose of catching up and conveying such water as there is now flowing to the lower levels into the drain tunnel boxes. The water in the Combination shaft stands at a point 46 feet 8 inches below the station on the level of the connecting drift with the Sutro tunnel. We have continued the removal of rock and timbers at the connection of the Osbiston shaft with the Sutro tunnel for account of Gould & Curry and Best & Belcher Companies."

Work will be resumed in the Eureka Con. mine, Eureka. The company has let a contract to run a drift on the eighth level, to explore some new and promising ground. The Eureka Con. has paid $5,112,500 in dividends to date and levied $585,000 in assessments. The last dividend was paid Jan. 5th, '92, at 25 cents per share. The last assessment was Aug. 4th, '98, of 20 cents per share.

The Golconda smelting works employ about ninety men.

The April Fool mine in De Lamar district, Lincoln county, is producing twenty-five tons of high-grade ore daily.

In the Poorman mine, near Pioche, men are at work taking out galena. The Alps mine will again be started up.

Active work is in progress, under the direction of F. Mitchell, at New Pass, sixteen miles west of Austin, near Silver Peak. Developments thus far have been gratifying. The Gold Belt has been opened up through three different avenues, and shows ore running from $12 to $18 in gold per ton.

The Magnolia, at DeLamar, has shipped two carloads of ore to the Germania smelter at Salt Lake, Utah.

The Grand Prize and Buckeye mines at Tuscarora have been bonded by Holmes and Knox of Salt Lake City and R. R. Bowles of Denver. Electric energy from the Owyhee river, transmitted fifteen miles, is talked of.

Elko *Independent*. Good finds have been made in the old Delker district in Butte valley. Copper ore valued at $50 per ton and ore assaying $14.50 in gold have been found. There is a body of copper ore in the Emma. The district was prospected nine years ago and abandoned. Recent workings show bodies of ore carrying both gold and copper. A number of new locations have been made.

NEW MEXICO.

The Old Abe mine near White Oaks has been equipped with a cyanide plant with fifty tons daily capacity.

There are forty men leasing on the second and third levels of the Snake mine near Hillsboro, and making good wages.

John A. Kruse, a Chicago mining man, has purchased the Prosper mine; consideration, $10,000, one-half down.

From Jan. 1st to Feb. 23d, '99, the mines of Hillsboro produced 2315 tons of ore.

At Hillsboro there are seventy-eight men employed on the Richmond. The Trippe has increased its force to eighty men.

Two of the mines of the Golden Era group give employment to fifty-five lessees.

In the Mastodon mine, near Hillsboro, about 30 feet west of the old workings, a new strike is reported. The vein is 1 foot wide and assays $70 gold and $20 copper to the ton.

Keller & Galles have bought the American mine for $11,000. This property is the western extension of the Bonanza.

A discovery has been made in sinking the Blue Bandana shaft on the extension of the Red Bandana lode, near Elizabethtown. This shaft is 350 feet east of the point where the working tunnel of the Red Bandana cuts that lead. The Red Bandana has been opened up for 700 feet west. The new shaft is on a direct line with the lead. The object of sinking the shaft was to reach bedrock and then drift for the lead. The shaft is now 280 feet deep. At

70 feet it was discovered that they had truck placer ground.

The Silver City Reduction Co. has contracted with Mr. Chapin of Crittenden, rizona, for a minimum delivery of twenty ons of copper pyrites ore per day for one

At Chloride Flat fifteen miners are employed in the old mines three miles from Silver City. The ore produced is an iron-lead which averages about forty ounces silver.

OREGON.

On Deep creek, G. Snodderly has his placer ine, near Susanville, opened and is ready to tart his hydraulic when the water starts.

Smyers & Wasson are arranging to operate he Smyer placer mine on Deep creek, and a ydraulic on Quartz gulch.

The Urie Dredger Co., operating below the own of John Day, have prospected to the iver bars below Susanville.

The mill of the Badger Co., near Susanville, hich was shut down during the cold eather, is again in operation reducing ore rom the Badger mine, with the usual force f men at work.

At the E. & E. mine, Bourne, the Baker City *Republican* says trouble exists because f no regular payday since Nov. 1st, '98, attachments being levied and threats made by ome of the employes. Mgr. Searles was in San Francisco last week to get money to meet urrent obligations.

UTAH.

A new gold find is reported from the range ast of Minersville. Ore assaying $3000 per on is said to have been found.

A copper strike is reported from Beaver ake in the Beaver Lake Copper M. Co.'s roperty.

The East Dip G. M. Co. of Camp Floyd district has filed articles of incorporation. The ompany owns the Cortado Lode, Cortado ode No. 2, Cortado Lode No. 3 and the Corado Wedge, which are valued at $35,000.

The South Daisy M. Co. of West Dip, Camp loyd district will build a mill.

Rich copper prospects are reported from the egion south of Castledale. A district will be ormed embracing Cedar mountain country.

It is reported that the Markham mine at ingham has been sold to the Red Wing Co. or $40,000.

The Galena mine at Fish Springs is shipping ead-silver ore regularly to the Salt Lake melters.

The Eureka Hill mill, at Eureka, after running continuously for four years on 200 tons of ore a day, has been closed down for repairs.

The Boss Tweed of Tintic has shipped two carloads of high-grade ore to the sampler.

The Four Aces mine at Tintic has sent two carloads of ore from the galena streak in the property.

The Uncle Sam mine at Knightsville has shipped five carloads of ore to Salt Lake.

A cyanide plant is to be built at the Midas mine, Deep Creek.

The Utah Con. at Tintic will sink a 500-foot shaft on the property.

The Eureka Hill mine and mill at Eureka has been closed down and seventy persons let out of employment, it is said, temporarily.

The Daisy of West Dip reports work on four new tanks at the mill. Regular shipments of gold dust are being made.

C. Butters will join the Raven M. Co. of Chicago and will undertake the introduction of the company's product from the elaterite and asphaltum deposits in the Uintah reservation abroad.

The Juab County *Republican* says that the Bullion-Beck has now five times more ore in sight than its Hill neighbor ever had.

Tribune: The Ore Producers' Association will hold a meeting soon to consider the question of admitting ores from Canada into the United States free of duty.

Park *Record*: The final clean-up on the run of Ontario tailings at the Marsac mill is completed and the mill, leachers and refinery are closed. The mill was started on this run June 1st of last year.——The Anchor mine at Park City is to have a new mill in the spring.

Tribune: The Annie Laurie M. Co., whose ground joins the Martha Washington at Provo has let a contract to B. G. Milner to sink their shaft 100 feet. The shaft is now 100 feet deep.

Tribune: At the Midas mine, Deep Creek, a strike has been made in which the ores show a valuation ranging from $16 to $238 per ton. Four feet of ore has been exposed that averages $40 per ton.

WASHINGTON.

The Princess Maud ledge, at Republic, has been encountered in the tunnel at a depth of 284 feet, midway between the two shafts on the property.

According to a daily newspaper dispatch seventeen quartz claims in the glacier mining district, near Tacoma, owned by J. W. Knapp and associates of Buckley, are bonded to A. M. Hitchcock of Alameda county, Cal., for $250,000. The sum of $15,000 is paid down, $15,000 more is to be paid when possession is taken and the balance in 1900.

Fifteen new mining companies were organized in Spokane last week.

The Insurgent mine at Republic is reported to have a 16-foot vein.

A new strike is reported from the Flag Hill claim at Republic.

In the Summit claim at Republic a blind lead has been cut in a crosscut tunnel.

In the east drift on Lone Pine at Republic the ore body has been crosscut and shows 15 feet of ore. This discovery is within a few feet of the side line where the Insurgent fraction joins the east side of the Lone Pine.

In the Princess Maud ledge at Republic there is nearly 5 feet of quartz in sight and footwall is not reached.

A telegram received by J. B. Dabney, president of the Agnes G. M. Co., which is operating in Republic, from T. A. Helm, states that the vein on the Agnes mine at Republic had been encountered and opened to a width of 16 feet without reaching the wall.

Considerable prospecting is being done in the Lake Chelan district near Railroad Creek Camp.

WYOMING.

A group of copper mines near Sherman Hill, thirty-five miles west of Cheyenne, are reported sold to a Denver company for $40,000.

FOREIGN.

BRITISH COLUMBIA.

A strike of high-grade ore has been made on the Jewel claim, near Greenwood, owned by the Jewel Development Co., London. They have a 275-foot shaft, and in a crosscut have a 9-foot ledge, which goes high in gold and copper.

In the Velvet property, on Sophie mountain, near Rossland, the crosscut from the 160-foot level, 40 feet from the shaft, is in an ore body 6 feet wide.

The Gray Horse, near Nelson, has 14 inches of high-grade ore and 3 feet of ore of a lower grade.

The Gray Eagle mine, thirteen miles from Davenport, on Hawk creek, has ore which assays $129 to the ton silver and lead, and 18 inches of solid galena have been struck.

The Dundee mill, at Ymir, is daily crushing forty tons of ore. The management of the company asserts that it can treat ore averaging $7.50 to the ton.

In the Columbia and Kootenay property at Rossland a strike has been made in a winze on the 350-foot level, said to extend entirely across the winze.

The litigation in the Le Roi case has been settled out of court.

It is reported that a Scotch syndicate has bonded the St. Eugene group of mines at Moyie in East Kootenay for $400,000.

The Slocan Ore Purchasing Co. is looking for a site to build a sampling works at Nelson.

The Fontony mine at Camp McKinney has been sold to a Victoria, B. C., syndicate headed by James Dunsmuir. Machinery is to be put on the mine at once.

The Comstock mine near Silverton has commenced the season's shipments.

The Union Jack group at Ymir will commence shipping as soon as the snow melts.

At the Dundee mine at Ymir the main shaft is down 263 feet. Drifting on ore is being carried on at the 200 level, where it is 18 feet thick.

The Montana shaft at Ymir is sinking in a body of solid ore the full width of the shaft.

The shaft on the Evening Star at Ymir is now 75 feet deep.

Nelson expects the Slocan Ore Purchasing Co. to erect sampling works there.

Gold-bearing quartz has recently been discovered in the vicinity of Quesnelle.

An electric plant is being added to the Coxey at Rossland of 15 H. P.

The plant at the Velvet mine, Rossland, is being augmented by a 60 H. P. boiler and a large pump.

A 60 H. P. boiler is being added to the plant on the Green Mountain mine near Rossland.

In the Velvet at Rossland an ore body has been crosscut on the 100-foot level of shipping grade. This ore shoot is known to be 170 feet in length, 160 feet in depth and from 4 to 10 feet in width.

A strike has been made in the Kootenay Columbia near Rossland in the 350-foot level.

One hundred and forty tons of ore from the St. Eugene mine at Moyie has been shipped to the smelter at Trail. This is the first shipment from the St. Eugene.

Economist: The new working shaft on the Cariboo, in Camp McKinney, has reached the 300-level and drifting for the ledge is now in progress.

Commercial Paragraphs.

GEO. E. TRUAX, the Denver manufacturer of the Truax ore car, proposes to locate at 114 First St., San Francisco, there to continue its manufacture on a larger scale.

THE Electrical Engineering Co. has just moved into its new brick building, erected for its special use, at 509-511 Howard St., San Francisco, Cal. As in the past, this company will give particular attention to all electrical machinery pertaining to mines.

THE San Antonio Water Co. of Ontario, Cal., have recently purchased from the Machinery & Electrical Co. of Los Angeles, Cal., two Downie double-acting deep-well pumps, for the Twenty-first and Twenty-second St. wells in North Ontario. These pumps are reported to be the largest, heaviest and most expensive ever installed in southern California. The M. & E. people have just completed the installation of their No. 6 Wonder pump for the same company, the same to be used in the Sixteenth St. well in North Ontario. The Machinery & Electrical Co. have just received a new type of the Snow duplex sinking pump, Renshaw's patent. They have also added a line of heavy-pressure pumps for mine use. The San Antonio Water Co. of Ontario have purchased of them a strong developing outfit, to be used in sinking new wells.

Recently Declared Mining Dividends.

Mead G. M. & M. Co., S. F., 10%; payable March 2.

Boston & California G. M. & M. Co., 1½%; payable March 2.

Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000; payable March 4.

Calumet & Hecla, Michigan, $10 a share and $30 extra; payable March 23; with the $40 thus declared, the 110th dividend declared by the company, the total dividend disbursements aggregate $59,850,000. This is the fourth for the fiscal year, beginning May 1, and makes $70 thus far declared, as against $40 last year.

Industrial Notes.

—Stockton, Cal., wants the S. F. & S. J. V. R. R. shops located there.

—Great Northern surveyors are said to be working for a route to Republic.

—Southern California stockmen are looking for pasturage near Flagstaff, Ariz.

—A $50,000 pulp factory is to be built near Floriston, Cal., on the Truckee river.

—Modoc Co., Cal., owners are refusing 9 cents per pound, on foot, for beef cattle.

—The Sierra Valley Railroad is to be extended from Claireville to Mohawk Valley, Cal.—fifteen miles.

—Last month was the dryest February on record in California. The previous dryest February in that State was in '96, when .09 inches fell.

—The Humboldt river, Nevada, is now running bank full, enough water going to waste which, if stored in reservoirs, would irrigate millions of acres of land in the broad valley through which it flows.

—Supt. Dame of Tacoma, Wash., says that the Washington Power Transmission Co. has been incorporated under the laws of New Jersey, with a capital stock of $1,250,000, to develop electrical power at Cedar river.

—Building the railroad from Skaguay to the summit of White pass at an elevation of nearly 3000 feet is completed. The event was made the occasion for an exchange of courtesies between the railway and Canadian officials.

—The Utah, Nevada & Southern Railroad has filed articles of incorporation in Nevada to build a railroad from the Utah-Nevada State line southwest across Lincoln county, Nev., to Vanderbilt, Cal., to be an extension of the Utah & Pacific.

—The Salt River Valley & Globe Toll Road Co. has incorporated at Phœnix, Ariz. The road has the financial backing of the Black Warrior Copper M. Co. of Globe. By the projected route the distance from Phœnix to Globe will be ninety-three miles.

—The President has issued proclamations setting aside the following as forest reserves: The Trabuco canyon forest reserve in California, 109,920 acres; the Fish Lake forest reserve in Utah, 67,840 acres; and the Gallatin forest reserve in Montana, 40,330 acres.

—The 50-mile gap between Surf and Elwood, Cal., on the coast division of the Southern Pacific, is to be built, completing a new line from San Francisco to Los Angeles. A direct connecting line between Ventura and Santa Monica along the coast is also contemplated.

—At the Sacramento, Cal., railroad shops last Saturday was forged a walking beam for the steamer Piedmont, said to be the first work of the kind ever done west of Pittsburg. It is a diamond-shaped piece of framework of wrought and cast iron to avoid expansion from heat. With its equipments the beam weighs about twenty tons.

—A number of California capitalists have formed a company in Reno, Nev., and have incorporated under the laws of Nevada, taking the name of the Nevada-Sierra Oil Co. The object of the company is to engage in the operation of mines, lands, ditches, canals, pipe lines for oil and water; to distribute to cities and communities water, oil and power. The amount of capital stock in the company is $400,000.

—The manager of one of the meat markets at Dawson has reached the coast and is reported as saying: "At one time the retail price of the best beef was $1.50 per pound, and it was not at all plentiful then. For a year or more it remained at this high figure, but last winter the price began to fall, and it has been going down ever since. The wholesale price is from 15 to 25 cents per pound by the carcass and the retail price is from 20 to 50 cents per pound."

—The North Fork Ditch Co. of Auburn, Cal., proposes to supply Sacramento with water, to be carried in a covered cement pipe to Folsom; a filter plant to be erected there to clarify the water, then to be conveyed in a large steel pipe to the eastern boundary of Sacramento; a stand pipe to be put up there and from that the water flows into the mains; the city to pay about $40,000 per year interest on the amount of the $800,000 investment.

—It is locally asserted that the much-talked-of Port Angeles, Wash., steel and tin plate works will soon be an assured fact. Cronemyer of Pittsburg is reported investigating the Barclay sound iron mines. He has a 99-year lease on the Barclay sound properties on Vancouver island, forty-five miles north of Port Angeles. Under the terms of the lease work must commence on the iron mines before April 1st. Work is to begin at Port Angeles on the tin plate factory and steel rolling mills. It is estimated that it will take from $1,500,000 to $2,000,000 to start the industry.

—A new land district in Alaska is created by a proclamation signed by President McKinley, north of the Porcupine and Yukon rivers, except as to the latter river only, from its intersection with the sixty-sixth parallel and north of that parallel as it extends to the Bering sea and west of the 154th meridian. This leaves a strip 160 miles in length, extending from the Yukon to the Arctic ocean, which is still retained in the district of which Weare is the land office location. The United States Land Office will establish a new town, Peavy, located at the head of navigation on the Koyukuk river, about 800 miles from its junction with the Yukon.

—At Suisun, Cal., E. H. Winship of the Clear Lake Power Co. says that Cache creek of Lake county will furnish water power to generate electricity for light and power for Santa Rosa, Petaluma, St. Helena, Napa, Vallejo and Benicia. A diverting dam will guide the water into a flume 4x8 feet, following the contour of the mountains for five miles, the flume having a fall of five to the mile and an elevation of 262 feet above the creek bed at the terminus of the flume. The water is then to be conducted in three 40-inch pipes 950 feet to the turbines in the power-house, on the same shaft as the dynamos. From the power-house a pole line holding six wires, carrying 40,000 volts, will be constructed to Calistoga. At Calistoga the line divides, forming two circuits of three wires each.

—E. C. Hawkins, chief engineer White Pass & Yukon Railway, says that since the British Columbia alien mining law went into force, Skaguay and Juneau have been very dull, due to the exclusion of American miners from Atlin. The majority of the miners in that district are Americans. The exclusion act is driving the miners into Alaska from Atlin. Many are prospecting in various parts of the Northwest. His company will build the line through to Bennett, as they regard the Klondike as a permanent camp. There are now 1600 men at work on the road.

Personal.

W. J. ADAMS has returned to San Francisco.

S. DANA GREENE is the new Gen. Sales Mgr. General Electric Co.

W. C. RALSTON returns to California from New York this week.

O. S. GABBS of San Francisco is examining mines near Tucson, Arizona.

J. S. LAWSON is the new Supt. Deadwood & Detroit M. Co., Deadwood, S. D.

GEO. W. COOK resumes charge of the Garden City property at Leadville, Colo.

F. C. FENNER has been appointed Supt. Lowell & Arizona C. M. & S. Co., Bisbee, Ariz.

J. A. PANTING has been appointed Gen. Mgr. Burnt River G. M. & M. Co., Baker City, Or.

E. H. WEBSTER, Supt. Grand Central mine, Minas Prietas, Sonora, Mexico, has resigned.

G. T. RIVES, Supt. Golden Cache mine, has returned from San Francisco to Lillooett, B. C.

W. G. DODD and D. E. Bigelow of the Union Iron Works have returned from Randsburg, Cal.

W. S. WEBB, third Vice-Pres. New York Central, is at Los Angeles, Cal., with a party of thirty-five.

G. F. BEVERIDGE of San Francisco has taken hold of a mining property near Dolores, in the Sierra Madres, Sonora, Mexico.

O. A. VANDERCOOK has gone to the Sheep-trail mine, near Kingman, Ariz., to take charge of the mill at that place.

STIRLEY MAHON, formerly foreman Creston mine, Minas Prietas, Sonora, Mexico, is now foreman Yellow Aster mine, Randsburg, Cal.

W. H. BRADFORD, former Supt. La Grange mine, Trinity Co., Cal., is in Arizona with A. J. Otis of the Santa Ana M. Co., on an extensive prospecting expedition.

W. C. QUINBY, who has represented the MINING AND SCIENTIFIC PRESS in various parts of the earth, has returned from Australia and will shortly leave for the west coast of South America.

A. P. DAVIS of the United States Geological Survey, who made the original report on the Buttes reservoir and dam, is in Florence, Arizona, in charge of the work now in progress.

CHAS. BUTTERS of Oakland, Cal., has gone to New York City and will shortly leave for Europe for the purpose of introducing abroad the product of the elaterite and asphaltum mines of Utah, in which he is interested.

JOHN M. BECKWITH, formerly Supt. of the Silver King (Ltd.) mines of Calico, Cal., is now at Goongarrie, Western Australia, managing mines for an English company. As a result of promising development a 20-stamp mill is to be built.

THE following have been appointed trustees of the Colorado School of Mines: Frank Bulkely, Mgr. Ibex mines at Leadville; Dr. Paul, Mgr. Aspen mine, Aspen: W. S. Stratton, owner Independence mine at Victor, Colorado Springs; Col. E. L. Bertoud, Georgetown.

MAJOR F. A. CLARK of San Francisco has built a unique model of the Golden Gate mine, Tuolumne Co., Cal., a decided novelty in material, method and construction. It is built of blocked wood and admits of being readily taken apart at any level. Looking from the front it shows the footwall stripped, the various levels and all the stoping and pillars. The ground surface is a shell of wood cut to contours, with buildings and plant thereon in colors, the whole thing being accurately drawn to a scale, and constituting an admirable illustration of the actual workings of the mine.

A. MCDONALD, the Klondike millionaire, is in Glasgow, Scotland, where he is trying to float a company to develop his Klondike property. The McDonald's Bonanza, Ltd., is the name of the company that has been incorporated, with a capital of £450,000. It is the intention of the organization to acquire from McDonald & Ferguson the following claims in the Klondike: No. 2 above Discovery on Bonanza creek, and Nos. 1, 2, 3, 7 and 8 on Skookum gulch. The prospectus of the company states that in '97 gold to the value of $32,000 was taken from one of the claims, an average of $40 to the ton of gravel removed, and that another claim in '98 yielded $175,000, an average of $50 to the ton. The value of the gold deposits is estimated as follows: No. 2, above Bonanza, $4,500,000; Nos. 1, 2 and 8 on Skookum, $1,435,000, and Nos. 7 and 8 on Skookum, $785,000—a total of $6,720,000.

Obituary.

JNO. FRANCIS, Gen. Mgr. Tucson, Arizona, smelter, died of Bright's disease, Feb. 21st, aged 51.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING FEBRUARY 21, 1899.

619,933.—STOVE POLISH—W. Q. Adams, Portland, Or.
619,934.—WOODEN PAVEMENT—J. Bucktel, Portland, Or.
620,084.—CANNED TOMALES—J. Burozl, S. F.
619,865.—WINDOW FLY ESCAPE—A. J. Collar, Yreka, Cal.
619,868—TELEPHONE APPARATUS—Cranston & William, S. F.
619,725.—HAY PRESS—J. Cruickshank, Woodland, Cal.
619,727.—GOLD COLLECTING APPARATUS—J. T. Davis, S F
619,728.—ARTIFICIAL FUEL—J. T. Davis, S. F.
619,720.—ARTIFICIAL FUEL—J. T. Davis, S. F.
619,876.—WATER HEATER—M. H. Dorgan, S. F.
619,958.—WIRE SCREEN—Hipolito & Mastin, Los Angeles, Cal.
619,964.—PIANO ACTION—F. W. Kringel, Los Angeles, Cal.
620,045.—FRUIT GRADER—Morley & Patrick, Salem, Or.
619,904.—SINGLETREE—W. P. Murphy, San Jose, Cal.
619,989.—CAR FENDER—V. Pfaff, S. F.
619,991—ANIMAL NOZZLE—J. R. Reynolds, Healdsburg, Cal.
619,841.—CAR FENDER—G. Richmuller, S. F.
619,996.—GOPHER TRAP—C. W. Roth, Piru City, Cal.
620,060.—BICYCLE GEAR—W. A. Tickner, Marshall, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

WINDOW FLY ESCAPE.—A. J. Collar, Yreka, Cal. No. 619,865. Dated Feb. 21, 1899. This invention relates to a device and attachment for windows for the purpose of permitting and assisting the escape of flies from the interior of a room to the outside. It consists essentially in the novel construction of a horizontally disposed channel or channels formed in the bottom rail of the sash and beneath the glass, a smooth lining fitted therein and a shield and revolving roller contained in the shield having a periphery of light hair, fur or felt which contacts with the glass and assists in carrying the insects down into the channels beneath. It is the tendency of flies to move downward on the glass, and if there was no obstruction at the lower edge, they would escape beneath it, but the thickness of the sash offers such an obstruction, and this the present device avoids.

COIN CONTROLLED AND REGISTERING TELEPHONE APPARATUS.—Messrs. R. D. Cranston and S. M. Williams, San Francisco, Cal. No. 619,868. Dated Feb. 21, 1899. The object of this invention is to provide a coin-controlled registering apparatus which may be used in conjunction with any device where such an apparatus is applicable, and especially in connection with telephones. The apparatus comprises a normally locked mechanism and means whereby it is released by a current from the central station to open a circuit and a coin-controlled means for restoring a broken circuit after it had been broken by the central office so that the user may restore the telephone to a condition for use with the subscriber after the coin has been so inserted.

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WANTED.—Millman thoroughly understanding concentrating and amalgamating by stamps or Huntingtons, all latest methods known, desires position at an early date with some reliable company in U. S. or out. Best of references furnished. Address K. W. A., this office.

WANTED—Position by a Mining Engineer, Assayer and U. S. Mineral Surveyor.
Speaks Spanish fluently. Best of references. Address P. C., this office.

WANTED—SITUATION BY A PRACTICAL MILLMAN AND ASSAYER.
Would go anywhere. Best of reference. Address F. B., care of Mining and Scientific Press.

WANTED—POSITION BY A CHEMIST, ASSAYER and MINING ENGINEER.
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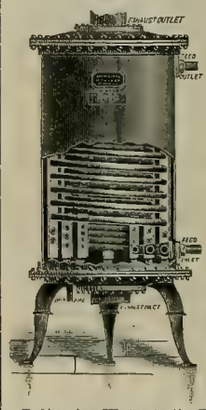

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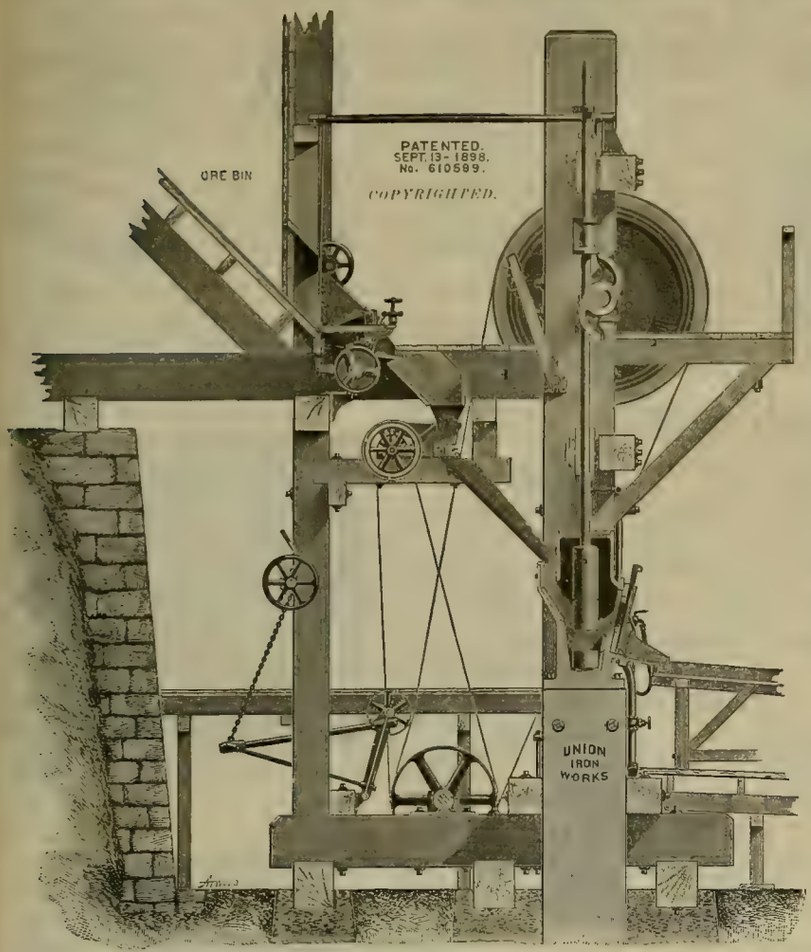

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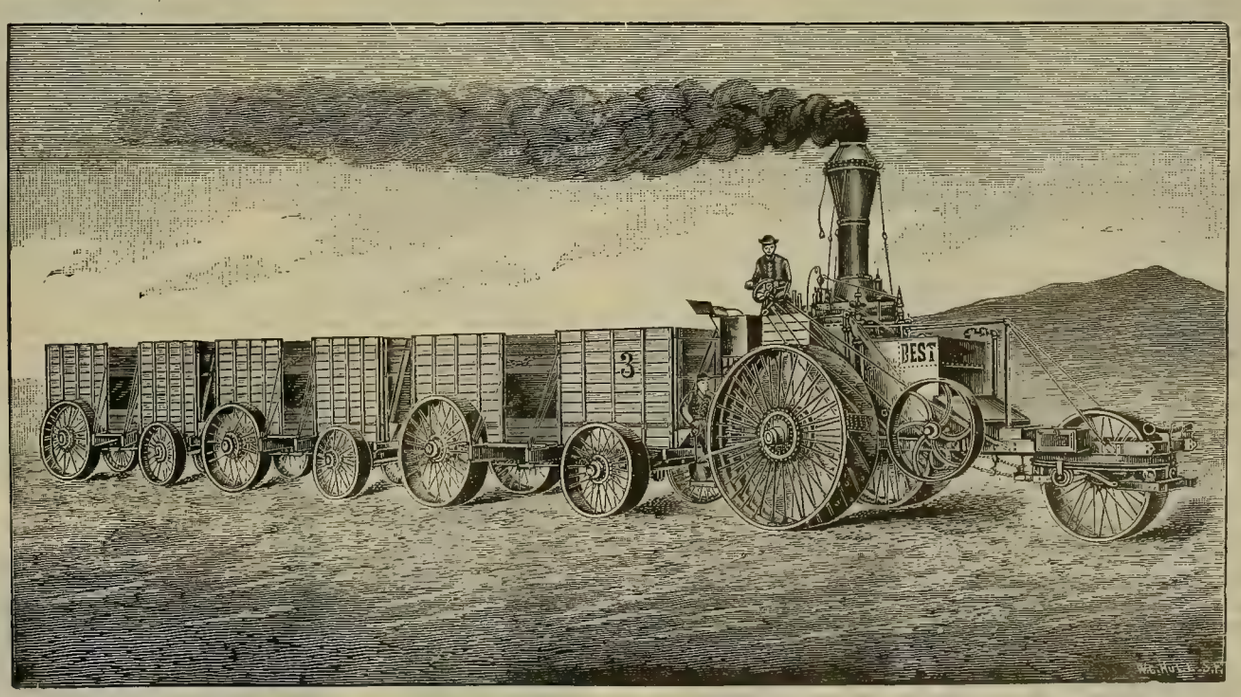

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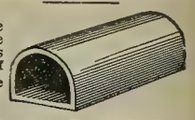
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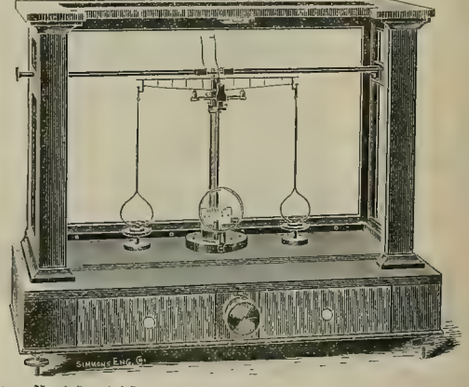
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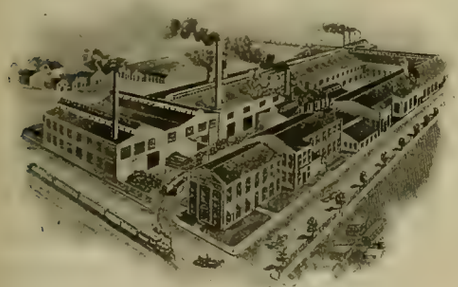

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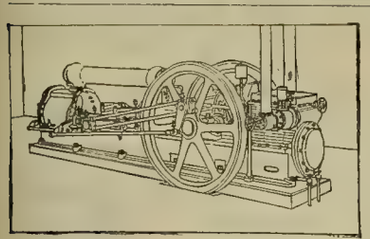

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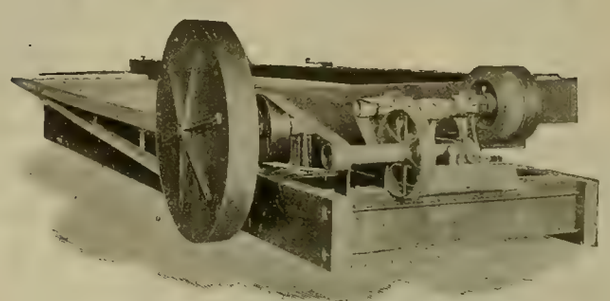

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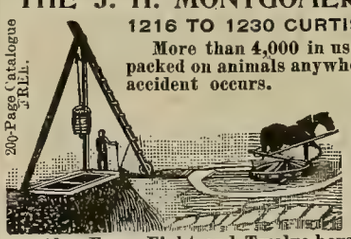

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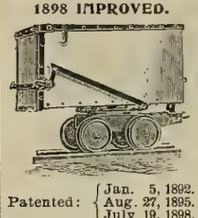

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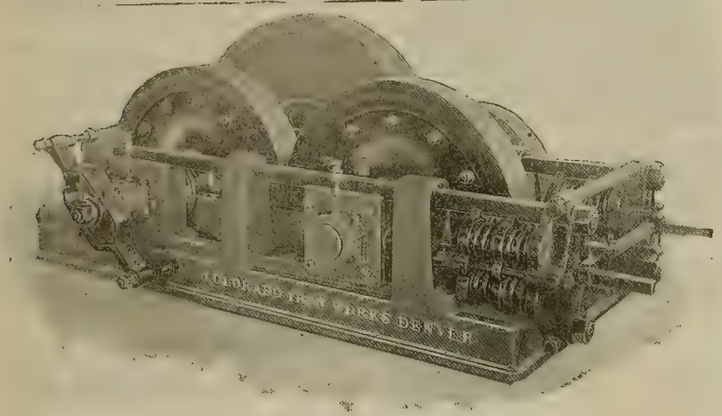

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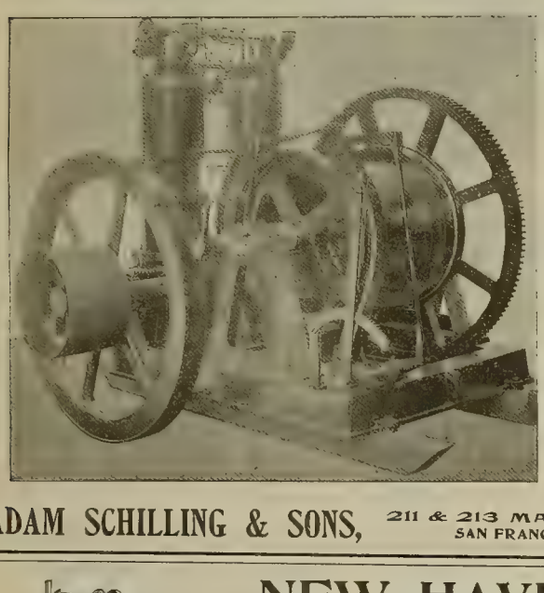

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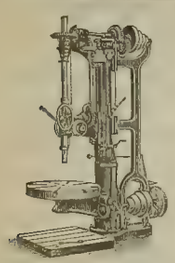

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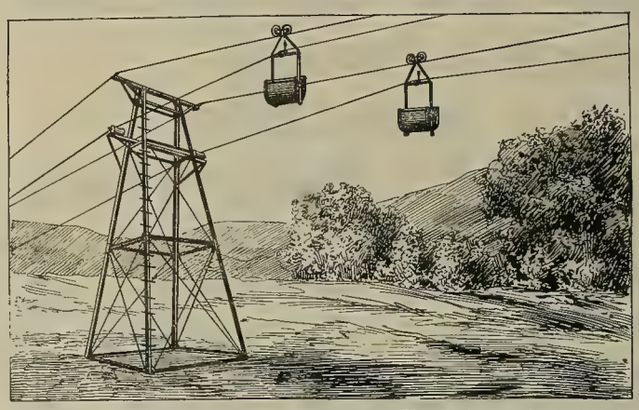

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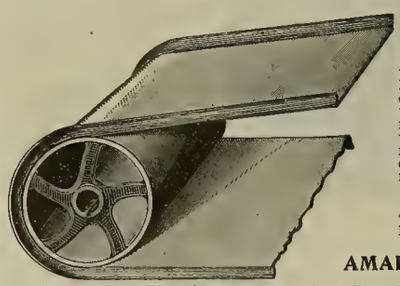

This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

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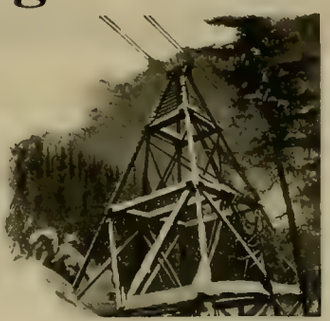

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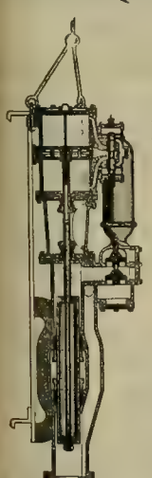

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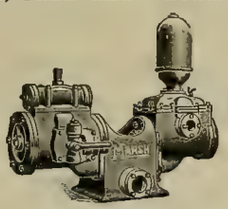

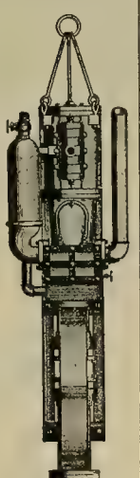

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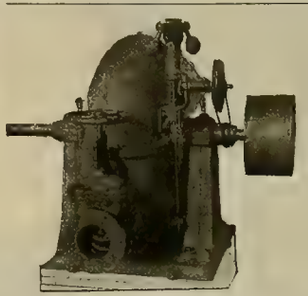

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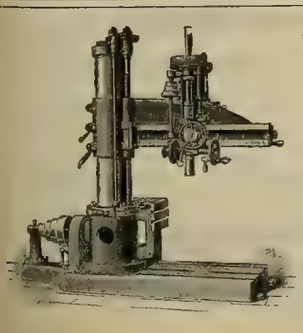

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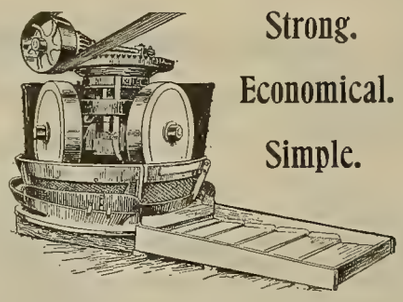

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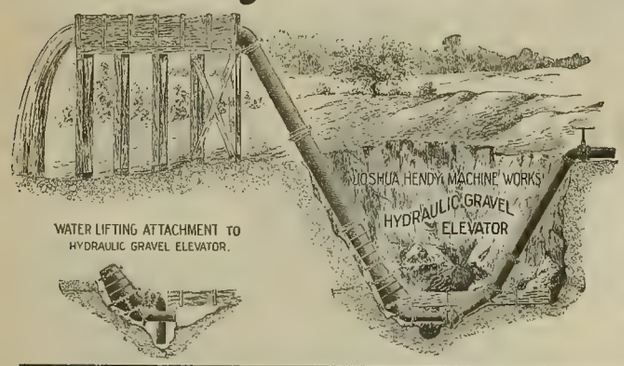

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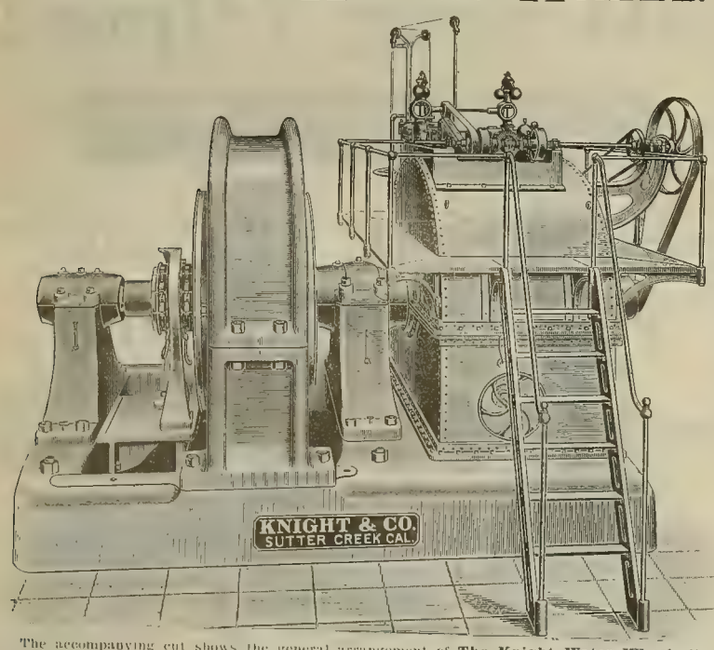

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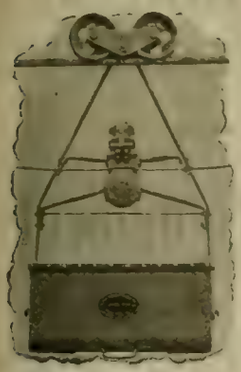

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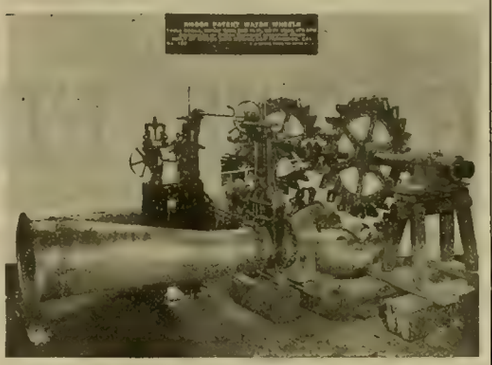

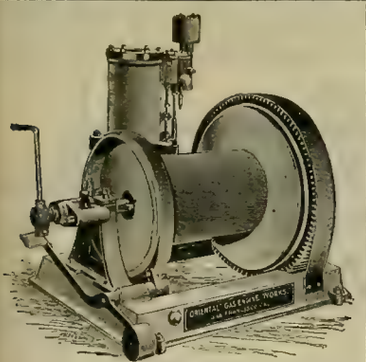

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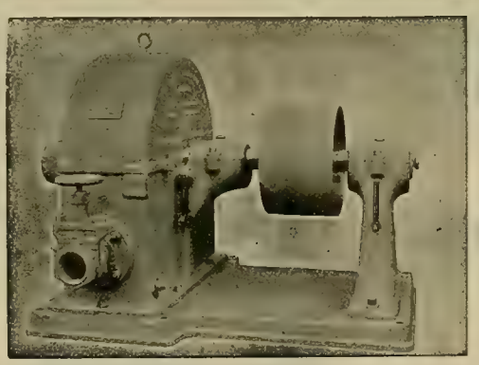

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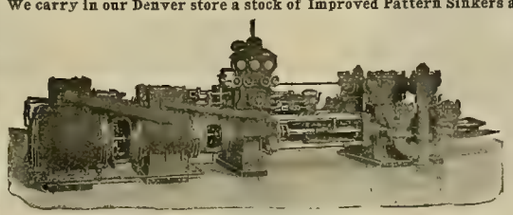

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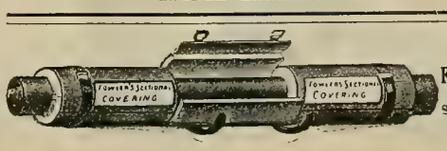

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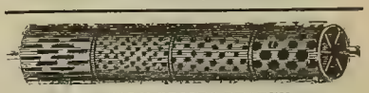

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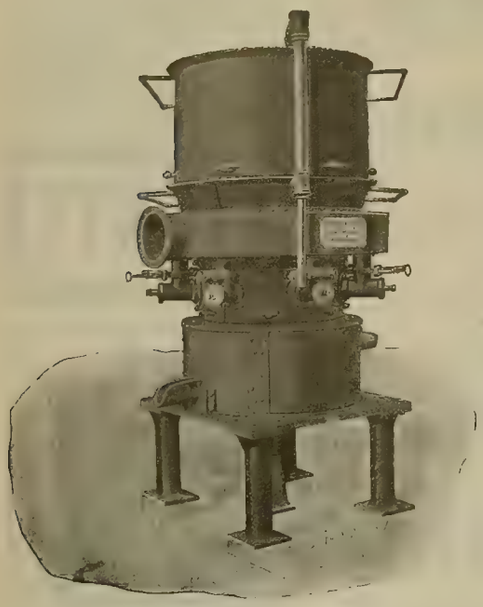

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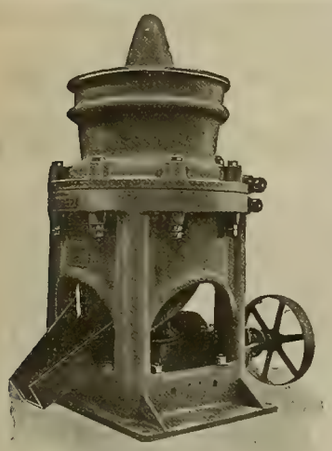

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The result of ten years' solid work. Success at last. What we wanted, and the public demanded, was a Gates Gyratory Rock and Ore Breaker (always adjustable and indestructible) so modified in design as to make one-half-inch product from three-inch sizes, rapidly and cheaply. The H Fine Crusher will do this work. It takes the place of expensive big rolls and often prepares ore, without further crushing, fine enough for coarse concentration or cyaniding. In any event, it is the greatest and best intermediate machine between the coarse breaker and the pulverizer.

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IMPROVED Gold Pans.

First Invoice at Hand..... $1.50 Each.

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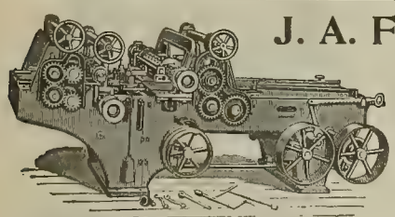

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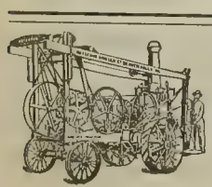

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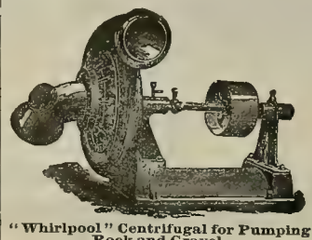
Will pump rocks as large as will pass through the pipes. Also Compound Centrifugal Pump for 200 feet or more lift.



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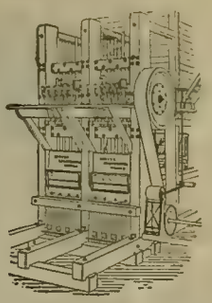

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For direct and alternating current circuits. The motor illustrated is of the same electrical design as the Westinghouse Multipolar Motor universally adopted.

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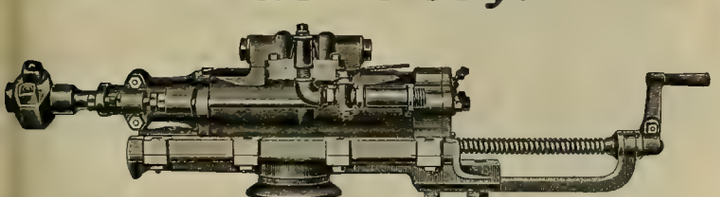

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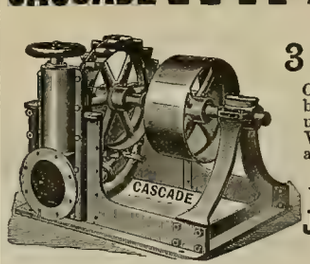

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Send for a Pamphlet of either Wheel and write full particulars.

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"DEARBORN SACCHARATED TANNINS"

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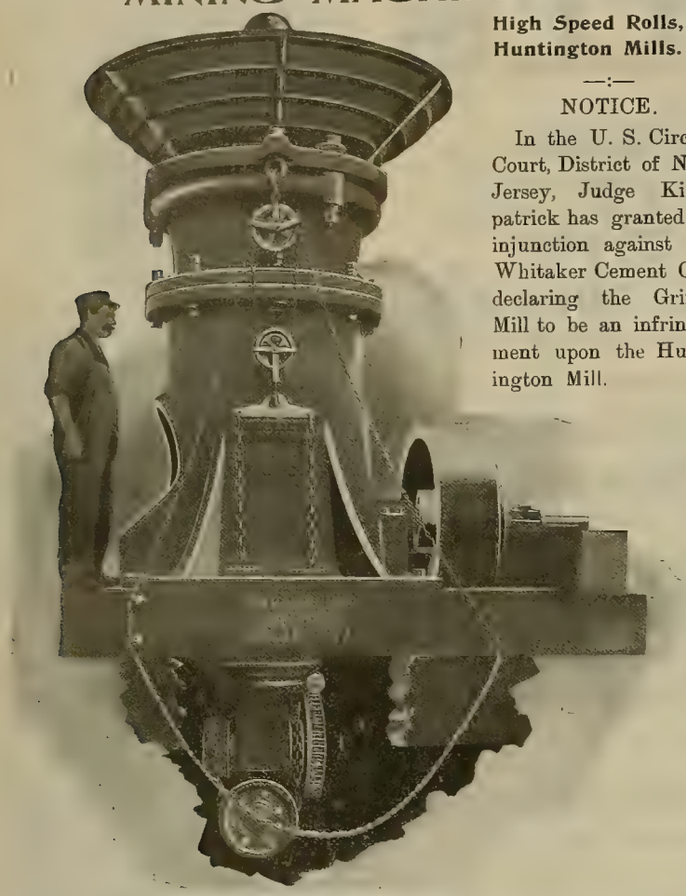
MINING MACHINERY.



High Speed Rolls, Huntington Mills.

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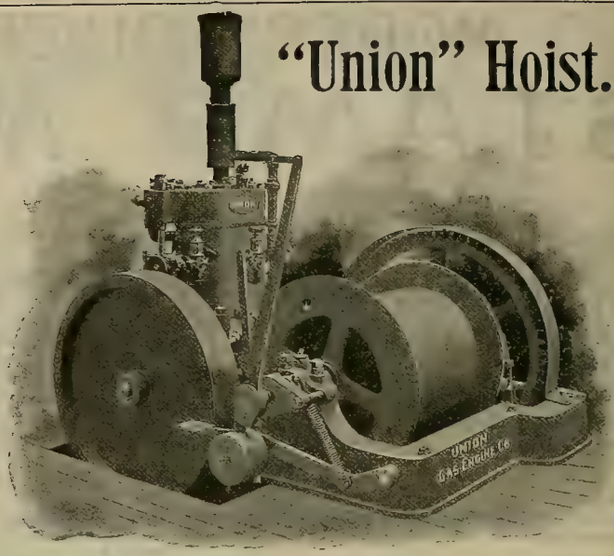
NOTICE.

In the U. S. Circuit Court, District of New Jersey, Judge Kirkpatrick has granted an injunction against the Whitaker Cement Co., declaring the Griffin Mill to be an infringement upon the Huntington Mill.

The Above Picture Shows Our IMPROVED ADJUSTABLE COMET CRUSHER.
We Invite Correspondence on Any Mining Plant.

FRASER & CHALMERS, General Agents for GREEN BLOWERS.

"Union" Hoist.



The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined o
strong iron base. This hoist is designed to raise one ton 125 feet per minute from an inclined shaft, c
1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The ou
fit weighs 3500 pounds.

THE UNION GAS ENGINE CO.

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"Union" Gas Engines,

Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
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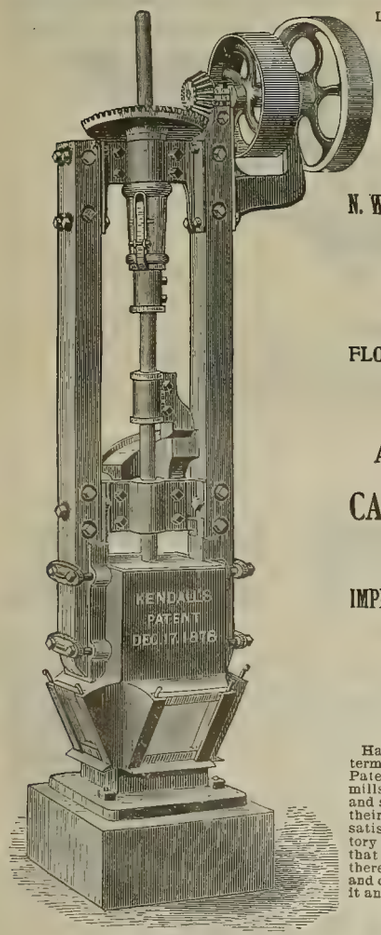

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OF EVERY DESCRIPTION.
All work tested and guaranteed.

IMPROVED PORTABLE HOISTING ENGINES

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Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

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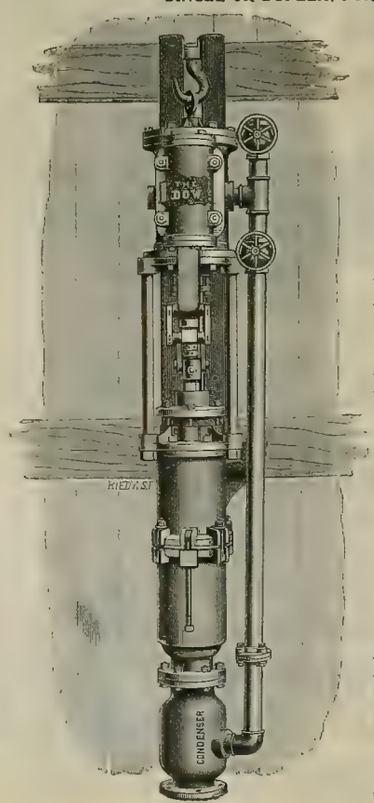

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THE SNOW Sinking Pump.

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GENERAL MINING SUPPLIES.

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ENGINES { "Oil City" Stationary, "Bates" Corliss, "Oil City" Gasoline.

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Miners' Supply House.

We keep in stock almost everything that a miner or mine superintendent may need. Anything from a pick to an ore car—of course we sell Dynamite and Black Powder.

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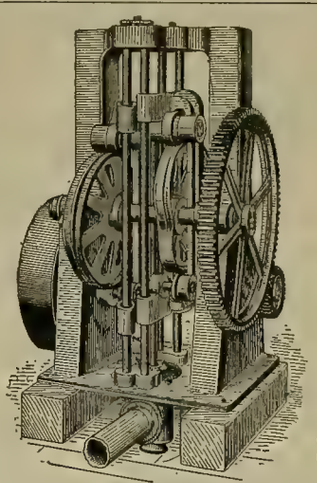

Our 12-in. Duplex Deep Well Pump, 4 ft. 4 in. high, weighs 1000 lbs.

THE LUITWIELER System of Pumping Water is Perfect.

Our Triumph pump throws a perfect fire stream. No pulsation. No water hammer. No fly wheels. No air chamber. No dead centers. Will work without foundation bolts. Show us a plunger or piston pump to match this—we pay you $500 gold coin.

SEND FOR CIRCULAR.

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Lumber, Shingles, Shakes, R. R. Ties.

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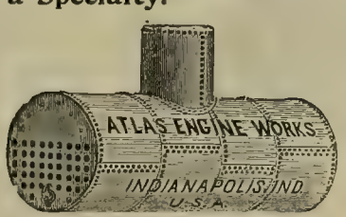

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General Foundry Work And All Kinds of Heavy Forgings.

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We manufacture Water Pipe for

Hydraulic Mining and Irrigation.

IRRIGATION SUPPLIES OF ALL KINDS.

WELL CASING, OIL TANKS,

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General Sheet Iron Work.

Write to us for an estimate on your next job.

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MINERS' HEAVY BLANKETS.

HYDRAULIC HOSE.

A full line of Miners' Supplies, including Picks and other tools.

WM. H. HOEGEE,
140 South Main Street, Los Angeles.

Market Reports.

The Markets.

SAN FRANCISCO, March 2, 1899.

SILVER. — London, 27¾d; New York, 59⅛; San Francisco, 59¼; Mexican Dollars, 47⅛@48. New York exchange, sight, 17½; telegraphic, 20 cents premium.

LEAD.—New York reports $4.30 bid, $4.35 asked; brokers' price, $4.20.

Local, pipe, 7@7¼c; sheet, 7@8c; pig, 6¾c; bar, 7c.

COPPER.—New York reports Lake unchanged, $17.75 bid, $18 asked. Local, bar, 21½c per lb.

Copper has risen so rapidly in market value during the past sixty days that there is a feeling among the trade, says the Boston News Bureau, that 18 cents for copper means a sensitive if not a dangerous market. The copper market has its pros and cons, but, whatever view is taken, it must be admitted that there is a legitimate basis for the strong movement which has taken place in the copper markets of the world. But, while recognizing the fact that the operation of the law of supply and demand in this case has certainly conduced to the recent advance in the price of this commodity, there is a danger that the excessive rise, if pushed too far, may terminate in a disastrous reaction.

While there are legitimate reasons why copper should command the highest market experienced in a period of ten years, there are manipulators who have taken advantage of the present favorable position of the metal to boom and inflate copper stocks to an enormous degree, giving many of them a value far beyond anything ever known before, and raising quotations of shares to a pitch that would seem indicative that some investors have lost the ability to calculate values and the relation between the producing capacity of a property, its earning power, its market worth and the investment prospects. How much copper has any of the mining companies sold at 18 cents? Producers were so well sold up when the market was 12, 13 and 15 cents that they had comparatively little copper to sell when higher figures were obtainable. Therefore to figure out earnings based on a market at 18 cents, when deliveries are taking place at 13 cents or over, is not strictly correct. The heavy buying was done before copper reached 18 cents and at present Europe cannot pay the parity of this market, while neither domestic nor foreign buyers show much boldness in making new purchases at present prices, except for prompt shipment.

A London metal house comments in an interesting way on the position of copper as follows: "The market has continued to advance by leaps and bounds. The reactions have been small and very short-lived. On Feb. 3rd cash copper touched £74 7s 6d, but declined to £71 15s, which is the first serious break that has taken place. Forward delivery is at a considerable discount. What this advance means is worth consideration. It means that the profit to copper producers is raised from about £6,000,000 per annum to about £12,000,000. Is this necessary to secure an adequate supply? We should say certainly not, for on the basis of last year's prices increased mining activity was set going, which competent authorities calculate at 50,000 tons for '99, or about 15%. We further wish to point out that, so far as fine copper is concerned, we have now reached the level which ruined the Secretan syndicate. By maintaining fine copper at the basis of £75 to £80 for a year, the visible supplies were raised from 42,500 tons to 104,000 tons in the twelve months. Who wants to see a repetition of that folly? In the neck-and-neck race between consumption and production last year, the excess of the former was only 1½%. How easily, on such a narrow basis, can the position become seriously reversed? Already India is sending back ingot copper, and very large contracts here have been arranged for shipment from Japan. As to the American syndicate, it is merely a sink for superfluous cash. It is vague in its purposes so far as disclosed, and does not contain either the Anaconda or Calumet mines, nor, so far as we know, any of the leading European. We say without the slightest hesitation that any advance over £80 per ton is pernicious and opposed to the true interests of stability in the trade."

IRON.—American, soft, $22@24 per ton; Scotch, $27. Local bar, 2½c per lb.

TIN.—Pig, 30c per lb.; Bar, 29c. New York reports "unchanged" at $17.

ANTIMONY.—16.

BABBITT METAL.—No. 3, 8c.

QUICKSILVER.—Local, $42; export, $39.00 @39.50; carload lots, special rates.

California quicksilver mines are largely owned and managed by Boston men. The three companies mentioned below are organized under the laws of Wyoming. The News Bureau says: "There are no cheaper stocks to-day than Boston's quicksilver properties, although it is useless to call attention to them as probably 1000 shares of any one of them could not be purchased without advancing the price materially."

All three of the companies are organized under the laws of Wyoming. It is the policy of the management which operates these properties to keep at least $100,000 cash as reserve in each treasury. The mines are opened up years ahead.

The situation as regards quicksilver to-day is phenomenally strong. The visible supply in this country does not exceed 4000 flasks. The price to-day is strong at $44 per flask (76½ pounds).

We give in the annexed table a few items which may be interesting regarding these three companies:

	Napa.	*Ætna.*	*New Idria.*
Share capital.....	100,000	100,000	100,000
Par value.....	$7	$5	$5
Present price.....	8½	4	11
Dividend per annum.	80c	40c	80c
Investment returns.	9½%	10%	7¼%
Dividends to date..	$990,000	$170,000	$100,000

The Napa was not floated by present managers, but was bought from former owners and old capitalization retained. The Ætna was floated at $2.50 per share, and the New Idria floated about two years ago at $5 per share; 2000 shares sold yesterday at $11 per share. The stocks are very closely held and frequently transfers are not made for months at a time.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13¼c; less than one ton, 15¼c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 30 @ 31c per lb.; carloads, 29c; in 10-lb. tins 37c; sulphuric acid, 2¼c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9½@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French. 2½@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 7½c; 6s, 14 oz., 6½c; 6s, 12 oz., 5½c; 6s, 10 oz., 4½c; Granite (Mining) Candles—6s, 16 oz., 8¾c, 6s, 14 oz., 7¾c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $2.50; cut, $2.35; 10 to 20d, wire, $2.55; cut, $2.40; 8d, wire, $2.60; cut, $2.45; 6 and 7d, wire, $2.70; cut, $2.55; 4 and 5d, wire, $2.80; cut, $2.65; 3d, wire, $2.95; cut, $2.80; 2d, wire, $3.20; cut, $3.05. In carload lots, 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 2, 1899.

9:30 A. M. SESSION.

300 Andes	23c	500 Mexican	80c
100 Belcher	24c	400 Ophir	$1 15
800 Best & Belcher	57c	400 Potosi	30c
1000 Bullion	06c	800 Savage	30c
100 Chollar	40c	500 Seg. Belcher	05c
500 Con. Cal. & Va.	$2 05	100 Sierra Nevada	$1 50
700 Gould & Curry	43c	400 Union Con	63c
1700 H. & N.	40c	400 Yellow Jacket	30c
900 Justice	21c		

2:30 P. M. SESSION.

450 Ophir	$1 10	550 Sierra Nevada	$1 45
200 Mexican	80c	200 Bullion	07c
100 Best & Belcher	56c	100 Overman	12c
600 C. Cal. & Va.	$1 85	100 Justice	21c
400 Savage	33c	400 Union Con	64c
600 Hale & Norc's	42c	100 Challenge	32c
1400 Yellow Jacket	30c	100 Andes	21c
500 Belcher	23c		

Mines or prospects operated on contract to purchase, MONEY or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

Cable address Either Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from D. M. Butterfield, in the Santa Cruz Placer Mine, near Quincy, Plumas Co., to deposit tailings in a worked-out pit; from the Horg Fat Company, in the Doherty Mine, at Howland Flat, Sierra Co., to deposit tailings in the East Branch of Slate Creek; from Sam Ahtye, in the Spanish Flat Mine, near La Porte, Plumas Co., to deposit tailings in worked-out pits; and from J. D. Wetmore and Martin Tufford, in the Dry Creek Mine near Brownsville, Yuba Co., to deposit tailings in Dry Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on March 20, 1899, at 1:30 P. M.

Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

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Bought and sold for non-residents. SOLID DIVIDEND PAYERS as an investment. Prospective producers as a speculation. Write for information.

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Exchange Nat. Bank Bldg., SPOKANE, WASH.

DOBLE ROCK DRILLS AIR AND COMPRESSORS

SIMPLEST.

BEST.

Write for Catalogue.

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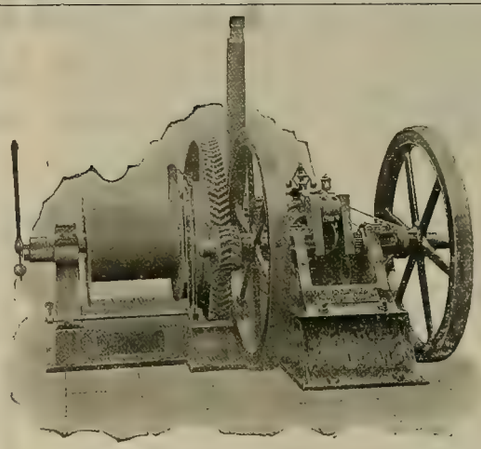

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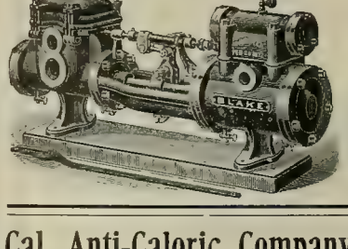

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Assessment Notices.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of February, 1899, an assessment (No. 23) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of March, 1899, will be delinquent and advertised for sale at public auction, and unless payment is made before, will be sold on MONDAY, the 3rd day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of February, 1899, an assessment (No. 8, new series) of seven (7) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of March, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 5th day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. P. THURSTON, Secretary.

Office—324 Pine St., San Francisco, California.

DELINQUENT SALE NOTICE.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 12) levied on the 2nd day of January, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Marcus Schwab	1	500	$50 00
Marcus Schwab	64	500	50 00
Thos Hennings n	105	100	10 00
Wm. Schmitz	140	1,500	150 00
Wm. Schmitz	165	1,000	100 00
N. Rienecker	228	100	10 00
Peter Kruckel	232	62½	6 25
J. Beck	233	62½	6 25
Peter Kruckel	250	110	11 00
Andreas Kruckel	251	100	10 00
George Schafer	297	194	19 40
Chas. Strohmaier	304	200	20 00
Richard Schneider	309	100	10 00
George Schafer	323	500	50 00
George Schafer	324	300	30 00
George Schafer	325	200	20 00
George Schafer	326	200	20 00
George Schafer	327	200	20 00
George Schafer	329	100	10 00
George Schafer	333	50	5 00
George Schafer	334	50	5 00
George Schafer	342	544	54 40
Adam Miller	350	125	12 50
N. Rienecker	351	200	20 00
B. Egenberger	352	275	27 50
George Schafer	354	52	5 20

And in accordance with law and an order from the Board of Directors, made on the 2nd day of January, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 237 Twelfth street, San Francisco, California, on MONDAY, the 6th day of March, 1899, at the hour of 5:30 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

F. METTMANN, Secretary.

Office—237 Twelfth street, San Francisco, California.

DELINQUENT SALE NOTICE.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 20) levied on the 10th day of January, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Mrs. Helen M. Stanley	4,201	25	$6 25
W. P. Stanley	6,453	25	6 25
Geo. B. Root, Trustee	6,817	100	25 00
Geo. B. Root, Trustee	6,818	100	25 00
Geo. B. Root, Trustee	6,819	100	25 00
Geo. B. Root, Trustee	7,157	200	50 00
Geo. B. Root, Trustee	7,178	50	12 50
Geo. B. Root, Trustee	7,289	100	25 00
Geo. B. Root, Trustee	7,290	100	25 00
Geo. B. Root, Trustee	7,291	25	6 25
Geo. B. Root, Trustee	7,292	100	25 00
Geo. B Root, Trustee	7,334	25	6 25
F. Avery, Trustee	7,393	1,000	250 00
T. F. Bean	7,397	100	25 00
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Herman Cohen	120	50	12 50
Mrs. Mary E. Wright Smith	1,000	50	12 50

And in accordance with law, and an order from the Board of Directors, made on the 10th day of January, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, No. 310 Pine street, Rooms 15 and 17, San Francisco, California, on TUESDAY, the 21st day of March, 1899, at the hour of 1 o clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

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G. GALL, Secretary. JOHN C. JENS, President.

DIVIDEND NOTICE.

BOSTON & CALIFORNIA GOLD MINING AND MILLING COMPANY.—A regular quarterly dividend, No. 1, at the rate of six (6) per cent per annum on the par value of the issued capital stock of the company has been declared, payable March 2, 1899, at the office of the company, 411 Claus Spreckels building, San Francisco. Transfer books close Feb. 28, 1899.

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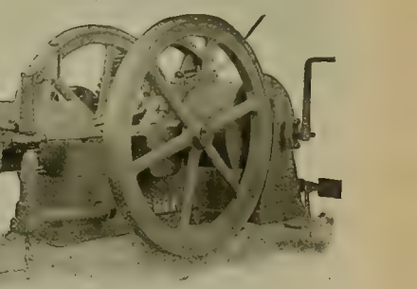

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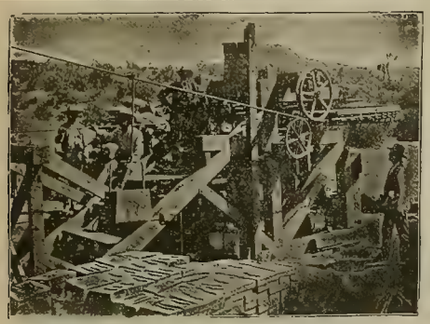

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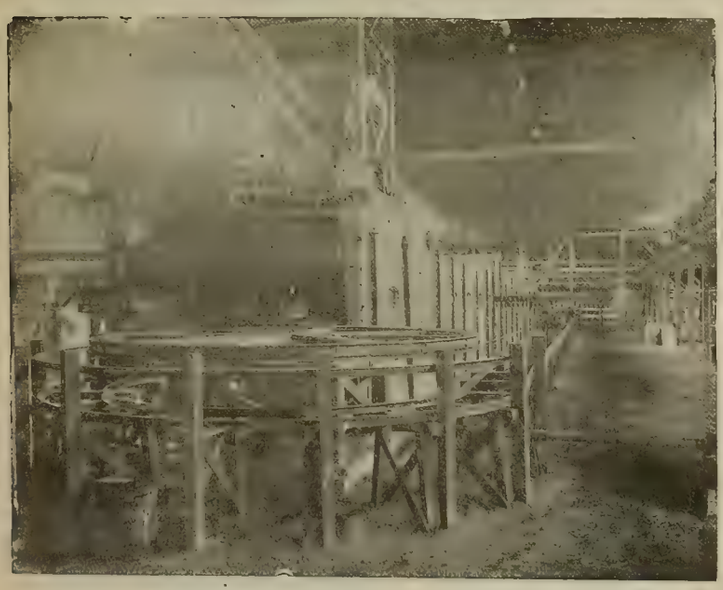

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AND PACIFIC ELECTRICAL REVIEW.

No. 2018.—VOLUME LXXVIII. Number 10. SAN FRANCISCO, SATURDAY, MARCH 11, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Avalanches Among Colorado Gold Mines.

A striking and peculiar characteristic of Colorado's mines is that the lowest altitude of a Colorado mine is about equal to the highest altitude of a California mine. In Colorado a mine is rarely less than 8000 feet above the sea: in California a mine is rarely more than 8000 feet above the sea, the bottoms of the shafts of many of California's greatest gold producers being below the level of the sea, while in Colorado the collar of the shaft is in many cases at an altitude of 12,000 feet above the ocean level.

The Colorado miner surmounts many disadvantages and, despite the obstacles of cold and snow, usually continues development work throughout the entire season. In such winters as the present one, however, the unusual snowfall occasioned cessation of work in numerous high mines, and in several instances caused loss of life and property. In a few reported casualties snowslides wreaked ruin.

A recent number of the Telluride *Journal*, published near the summit of one of the highest ranges of the Rocky mountains in San Miguel Co., Colorado, briefly describes an avalanche that on February 12th at Ophir wrecked a stamp mill and killed the mill man, J. C. Vardell. (A week after came the brief statement from Ophir, Colo.: "Jim was killed in the snowslide, stop his paper.") Accordingly the name of the unfortunate Colorado miner was taken from the mail list of the MINING AND SCIENTIFIC PRESS. Poor fellow! he lost his life trying to save others, as many a brave miner has done before. A picture of the Ophir tunnel is presented, as it appears on the trail to Smuggler. It was the Carribou mill that was wrecked, and in it Vardell was killed. In its account the *Journal* says: "The slide came down on Silver mountain, starting near the summit, up in the vicinity of the Suffolk mine. It ran across the valley with its force nearly spent, striking the Carribou mill just at the foot of Yellow mountain and crushed in the lower story but did not knock the mill down. The mill was running and a number of men were at work on the upper floors. A man who was on the ground floor had just been called upstairs by one of the workmen to fix some machine that had become clogged. He left Mr. Vardell standing at the foot of the stairs and had only reached the third floor when the timbers carried by the slide crashed into the lower rooms killing and burying Mr. Vardell. The snow was packed so hard it was slow digging and a hose under high pressure was used in digging for the body which was reached about 11:30 Monday morning. The body was badly crushed under heavy timbers and death must have been instantaneous."

On this page also appears a portrayal of the Suffolk mill, a 40-stamp concern, the largest mill in Ophir. It was from the mountain in the background that the fatal snowslide started. Not in a generation has there been such a heavy snowfall throughout Colorado as in the early weeks of '99, and while it insures abundant water for the season, the discomfort and, as in the above cases, the resultant disaster make dismal the present condition of many a miner in the high altitudes of that State.

OPHIR TUNNEL, COLORADO, ON THE WAY TO SMUGGLER. (THE FIRST BUILDING AND SHED AT THE BOTTOM OF THE PICTURE ARE AT THE ENTRANCE TO THE TUNNEL.)

THE SUFFOLK MILL, OPHIR, COLORADO. (WHERE THE FEBRUARY 12TH SNOWSLIDE STARTED.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....Publisher

San Francisco, March 11, 1899.

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It is now suggested that a medal be struck and presented to each of the Sacramento, Cal., legislators who "held out" for Burns for U. S. Senator. Good idea! Make it of beaten brass.

There is now in the field a small army of "experts," whose business it is to go about the country making examinations of mining claims in all stages of development. Men thus engaged have assumed a great responsibility and in passing judgment on mines have not only their own interest at stake but their opinion usually affects many others. A realizing sense of this responsibility seems to make some men overcautious and others pay little heed to the result of their report, being satisfied to receive the agreed fee for their opinion. Fortunately the tendency seems to be towards the conservative side, for the most prominent men in the business are generally well-known conservatives, and the lesser lights, finding that a bad error of judgment is likely to result disastrously in the future, are falling in line and condemning almost everything they go to see, and perhaps by so doing make fewer mistakes. A would-be investor may have occasion to look back with regret at a lost opportunity, but such regrets are of a somewhat different nature from those occasioned by large sums lost on unsuccessful "good things."

In driving the Yak tunnel at Leadville, Colorado, under Breece Hill, an almost insurmountable obstacle has been found in the Pilot fault which crosses the line of the tunnel. The rock in the fault plane is crushed and heavy. Timber sets are broken and forced out of position by the persistent encroachment of the moving mass of rock. In the endeavor to overcome the difficulty, and to relieve the timbers, the ground has been repeatedly cut away and the space filled with timbers. The latest reports from the tunnel, which is now in over 7000 feet, are to the effect that the timber now in place looks as though it would stand. Everyone acquainted with heavy swelling ground knows that timber, no matter how arranged, can only sustain the enormous pressure for a brief period. Perhaps a few weeks, oftener but a few days, when it must be replaced. California miners are familiar with the irresistible pressure of the swelling slate walls in many of the mines. New timbers are required constantly to keep drifts and shafts open. It has become a recognized fact among mine superintendents that it pays to sink shafts in the hard country rock at double the expense of sinking in the soft fissure, for when the shaft is completed the expense of keeping it open is practically nothing, while in swelling ground the expense continues until the shaft is abandoned. Timbers have to be renewed from time to time at various points in shafts sunk in hard rock, but not for several years after being put in place. The Yak tunnel is run through hard ground, but in the plane of the Pilot fault they have found the difficulty which has cost so much time and money. When such conditions are met in the progress of underground development of mines it would seem that steel frames either arched or angular could be substituted to good advantage for wood. The first cost would, of course, greatly exceed that of wood, but if it were found to give the desired permanent support it would eventually prove to be cheaper than timber. In England and Germany iron and steel have been used for supporting mine workings for years.

A Few Metal Statistics.

History is precept teaching by example in a large way. Present prophecies regarding prices of metals, etc., may, in some cases, be modified by the presentation of a few statistics, believed to be accurate. The figures on lead and iron indicate the beats of the nation's industrial pulse. Those pertaining to gold and silver are additionally suggestive when widespread political action is taken into account. Men who insist that copper supply cannot equal demand, and that its price must constantly appreciate, might with profit note the figures relative to that important metal. For purposes of convenience the figures are necessarily condensed:

ANNUAL PRODUCTION FOR THE LAST THIRTEEN YEARS OF FIVE PRINCIPAL METALS.

	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.
Pig iron, million tons.....	5.68	6.42	6.49	7.60	9.20	8.28	9.16	7.12	6.66	9.45	8.62	9.65	11.71
Silver, million ounces.....	39.45	41.27	45.78	51.35	54.50	58.33	63.50	60.00	49.50	55.73	58 83	53.86	64.06
Gold, million ounces.....	1.88	1.85	1.60	1.59	1.59	1.60	1.60	1.74	1.91	2.25	2.57	2.77	3.11
Copper, million pounds.....	161	185	231	231	265	296	353	340	365	393	460	492	545
Lead, thousand tons.....	131	147	152	156	144	179	174	164	159	170	188	208	217

The above figures constitute a striking compendium of the industrial history of the nation during the period under discussion, being as exact as a barometer. Silver was steadily prosperous till '93, since which time it has been erratic, till '98. It is incidentally noticeable, in this connection, that last year silver fluctuated, proportionately, in price less than any other metal, and less than any other year since records of silver's price have been kept. The year that marked silver's demonetization showed an increase in gold production that has since gone steadily forward nearly 10% annually. Copper shows the greatest percentage of increased output—over 338%. The great demand swept away the enormous reserves and called for a tremendously increased supply. This increased electrical and general industrial demand, a genuine business requirement, was a boon and a boom to copper on hand and copper stocks. Whether such demand is destined to continue, or whether copper is to ultimately drop considerably below its present figure, is a question that does not admit of ordinary success in present effort to answer.

There is a tendency on the part of quartz-mill builders to secure greater rigidity in mortar blocks. Twenty years ago solid blocks of timber were used for this purpose, and, where single blocks could not be found of sufficient size, two or three blocks were bolted together. Later the built-up blocks constructed of 2-inch planks securely spiked together were tried, and, being found satisfactory, came generally into use and are usually better than blocks made from large timbers. More recently several mills have been built in which concrete mortar blocks were introduced. These latter have not been in use long enough to determine whether they are in any way superior to wooden blocks or not. Iron mortar blocks are now being tried, with what result the future must determine. Mortars are much longer lived now than formerly, since they are cast somewhat heavier and are provided with false bottoms and side linings to protect all parts exposed to wear, consequently the necessity for replacing old mortars with new is less frequent, and a mortar block which will last as long as the mortar, at least, becomes very desirable. The new 500-stamp Alaska-Treadwell mill is supplied with iron mortar blocks weighing about 10,000 pounds, resting upon broad concrete foundations.

Relation of Depth and Values.

At the conclusion of the annual address of Mr. James Stirling, government geologist for Victoria, delivered recently in Melbourne, Australia, before the Geological Society of Australasia, Mr. E. L. Rosman, in seconding a vote of thanks to the lecturer, remarked that the thanks of the society were due to Messrs. Bell and Watson and Mr. George Lansel. "for the enterprise shown by them in exploding the idea of geologists that payable gold could not be got at a greater depth from the surface than 400 feet." Mr. Stirling, in reply, pointed out that when the assertion alluded to was made by Professor McCoy and Mr. Panton, Dr. Selwyn publicly stated his opinion to the contrary, and refused to sign the memorandum submitted to Parliament on the subject.

The statement elicited a reply from Sir Frederick McCoy, who wrote to the Melbourne daily papers to the following effect: "I never wrote, said, or thought any such thing, and I challenge anyone to produce any such statement. I believe, as a rule, the upper portion of gold veins is richer than the lower, but that there is no limit to the depth at which traces of gold may be found."

The latter clause of the above, coming from such a distinguished source, leads to the inquiry, "Do gold-bearing veins deteriorate in value with depth?" As the depth at which veins become so impoverished as to be valueless has never been reached in many good mines in the United States, it is a matter of theory, unsubstantiated by fact, that mineral veins deteriorate with depth. The relation of value to depth is always determined by economic conditions. A few years ago mines worked to the depth of 1000 feet were looked upon as approaching the limit at which mines could be practicably worked; but the shafts have gone steadily deeper until now there are many mines more than 2000 feet deep still paying, and with no noticeable falling off in value. In California there are a number of mines near or below the 2500-foot mark, and these, with a single exception, are all paying, and at one of these mines at least—the Kennedy at Jackson, Amador county—a new vertical shaft is being sunk through which the mine will probably be worked to a depth of 4000 feet or perhaps deeper. Mining at such great depths is somewhat more expensive than nearer the surface, for the reason that they require heavier and more expensive hoisting and pumping machinery, which, requiring more power, are operated at greater expense. But as an offset to this, more material can be hoisted in a given time through a well-equipped vertical shaft than through some of the old inclines in which skips are used.

In California mines the ore, taking one level or shoot with another, averages in any particular mine about the same. Ore of every grade can be found on almost any level, though some levels have no ore at all. Undoubtedly there is a depth at which any mine will cease to pay and that depth will be found where the cost of mining equals or exceeds the commercial value of the output, and this depth will vary with the local condition. In some mines extreme heat is the prohibitory factor, in others too much water, and in some both. The causes are always of a physical character in gold mines, for the market price of the metal does not fluctuate. Because the operating expense of a mine exceeds the value of the product, which at a higher level may have afforded a profit, does not determine that the ore has deteriorated, but that the expense has increased.

It is true of many veins, particularly those soft, porous "honey combed" zones, that they are often found richest at the surface, but this is a local condition which should not enter into the general discussion of the relation of depth to the gold value contained in veins.

Concentrates.

THERE is more friction on a wood pulley than on a turned cast iron pulley.

CHALK may be used to advantage on the brakes of hoisting engines to prevent slipping.

KEYS for securing pulleys, cams, etc., to shafting should taper one-sixteenth of an inch in 4 inches.

RUBBER belts must not be greased. To prevent slipping use boiled linseed oil and sprinkle a little chalk.

DURING the week ending Feb. 25 fifteen new mining companies filed articles of incorporation in Spokane, Wash.

READERS remailing an issue of this paper to any part of the U. S. should affix 1 cent postage: foreign, 2 cents.

BATTERY water which is run into settling tanks or reservoirs may be pumped back and reused at a loss of about 25%.

THERE has been no recent rise in the British Columbia tax on the output of metalliferous mines in that province.

THE water-jacket smelting furnace is mentioned and illustrated in "Overman's Metallurgy," published fifty years ago.

GEORGIA gold miners in convention at Atlanta this week organized the Southern Gold Miners' Association. They want concentrators and chlorination.

IN estimating the quantity of water required for steam making in boilers, seven and one-half gallons per hour per horse power is generally figured as correct.

ALLISON RANCH, Grass Valley, Cal., miners objected to go to work one night last week by reason of the alleged presence of a ghost therein. Most miners have seen too many ghosts to believe in them.

AN attempt is being made in southern Oregon to smelt ores on a commercial scale by the use of oxygen and hydrogen gases with carbon generated from crude petroleum. It is, in fact, a huge oxy-hydrogen blowpipe.

IF 500 gallons of water can be pressed through a 6-inch pipe per minute, with a head of 40 feet, the length of a 12-inch pipe to pass the same quantity of water per minute with the same head of pressure should be 32 feet.

THE steamer Alameda, at San Francisco this week from Sydney, reports the finding of a gold nugget in Western Australia weighing twenty and a half pounds in February, twenty miles from Marble bar, in the Pilbarra gold field.

SOMETHING new in "stamp mill practice" is reported from Baker City, Or., where the municipality will supply the adjacent stamp mills with water at a regular stated price.

THE specific gravity of quicksilver is 13.6 at 32° F. It evaporates slightly at ordinary temperature, melts at minus 39° F. and boils at 680° F. The melting point of gold is 1915°; that of silver 1750°; of copper 1930°; of cast iron 2500°; of lead 625° F.

TO FILL holes in castings take one part gum arabic, one part plaster and one part iron filings and mix with a little water. Some metals expand in cooling when alloyed with other metals, as lead 75 parts; antimony 16.7 parts; bismuth 8.3 parts.

AMALGAM plates may be cleaned very closely by pouring a quantity of scalding hot water over them for some time. This process is known as sweating and should only be employed at long intervals or when shutting a mill down for an indefinite time.

TO FIND the diameter of a pump cylinder to move a given quantity of water per minute (piston speed being 100 feet per minute), divide the number of gallons by 4, then extract the square root, and the result will be the diameter in inches very nearly.

METAL mines are not ordinarily troubled with fire damp, though there are exceptions. In the Abbott quicksilver mine, Lake Co., Cal., this explosive gas occurs in considerable abundance. It is fired frequently to prevent an accumulation of a large body of gas.

THERE is no limit to the number of mining claims that can be taken up in the name of a man, woman, minor or corporation, provided he, she or it can do the annual work necessary to hold them or make would-be relocators believe that such work was done.

WHERE Smith locates a placer claim, pure and simple, without reference to any lode claims thereon, Brown can locate and hold a lode claim, if he can find one, within the limits of Smith's claim, any time before Smith has received a U. S. patent to his placer claim.

DRILLS for hard granite or greenstone should be tempered light yellow to straw color. Too light is too hard, and darker than straw color is too soft. Care must be taken at all stages not to overheat the steel. A dark blue is a suitable temper for picks for most uses.

RESIDENTS of that vicinity prophecy a repetition of the formation of the Salton sea, as in '67 and '92, because of the presence of from 16 to 40 feet of snow on the headwaters of the Colorado river, which, if rapidly melted, would flood the Needles, Cal., and adjacent country.

A STEEL rope having a hempen core is more durable than one having a steel core for the reason that the strands about a steel core are bent and cut more or less by pressing on the steel core when bent over sheaves and the drums of hoisting engines. The hempen core being soft obviates this difficulty.

THE dividends declared by the Cripple Creek, Colorado, mines during February exceeds all previous records, aggregating $378,000, an increase of $176,000 compared with the January disbursements. The gold output was $1,257,250, a decrease of $500,000 compared with January, this being due to the unusual snowfall.

THE jury trial of F. L. Girom at Baker City, Or., resulted in acquittal. E. Imhaus, agent for the French company which paid defendant $20,000 for a mining property, claimed that the mine had been "salted." It was a case of buying a mine by sample. The samples assayed well. Indeed, Mr. Imhaus testified that in the aforesaid samples gold was visible to the nude eye. While the company is out $20,000, yet it saved the few hundred dollars that an expert report would have cost.

GOLD may be precipitated from bromine solutions containing gold by sulphuretted hydrogen, in the form of dark brown powder. The bromide process for treating gold ores is a chemical success, but has not been adopted because of the expense. A laboratory process is often satisfactory, when as a commercial proposition it would not produce good financial results.

ON the Comstock, at the time sinking was discontinued, the "combination shaft" of the C. & C. had reached the vertical depth of 3250 feet. There was then (March 28th, '82) only one deeper shaft anywhere—the Adalbert, Bohemia, 3280 feet. Now there are several deeper in this country, the Calumet & Hecla, Lake Superior district, being nearly 5000 feet deep.

THE latest in big sulphur deals is reported from the City of Mexico to the effect that C. S. Ocha has closed a deal for the sale of Popocatapetl to English capitalists for $250,000 in gold. An extensive sulphur deposit is located in the crater of the volcano, and it is the reported intention "to build a cog-wheel railroad to the top of the mountain in order to handle the product."

THE report of the Canada Geological Survey shows that in '98 there was an increase of over $9,000,000, or nearly 32%, in the production of minerals in Canada as compared with '97. In the more important mineral products the increases were as follows: Gold, $784,000; coal, $924,000; copper, $658,000; nickel, $422,000. The increase in Ontario was over 50%; the total value of metals produced was $21,622,601.

A RULE for finding the required length of belts is as follows: Add together the diameter of the two pulleys, multiply by 3⅛ and divide the product by 2; add to this twice the distance between the center of the shafts and the product will equal the length of belt required. The horse power of a belt may be found by multiplying its velocity in feet per minute by its width in inches and dividing by 1000.

TO FIND the capacity of a pump in gallons, square the diameter of the piston or plunger in inches, and multiply by .0034, which will give the number of gallons for each inch of stroke; then multiply by the length of the stroke in inches to get the number of gallons displaced at each stroke. This amount, multiplied by the number of strokes per minute, will give the quantity of water elevated by the pump in one minute.

AS ELSEWHERE, electrolysis in San Francisco has occasioned considerable injury to gas and water pipes. The pipe so destroyed by return currents from adjacent electric railways is usually in the vicinity of power houses, and is honeycombed with holes, being rendered useless. The current is particularly destructive to lead pipe. In thoroughly constructed electric railways provision is made for proper conveyance of the return current.

IN parts of California there will be a lack of water this season for mining purposes; the great area of the State and its topography fortunately makes a general drought impossible, though to those needing the usual water supply State lines afford no relief. With an axial line equaling in extent similar Atlantic area from Massachusetts to Georgia, it is not unusual to find floods and droughts and other eccentricities as on the sunrise slope of the continent.

ANSWERING Riverside, Cal., and Georgetown, Colo.: A grain equals 0.0648 gram; an avoirdupois ounce equals 28.3495 grams; a troy ounce equals 31.103 grams; a pound equals 453.59 grams; a milligram equals 0.015 of a grain. The "unit of weighing" in the metric system is the gram, which equals 15.432 grains. A kilogram of wolframite (or anything else measured by weight) is 1000 grams, or 2.204 pounds; powdered and 96% fine, that quantity is worth $2.38 in Germany.

IN stating last week that an assay ton contained 480 grains, "Concentrates" erred. The assay ton, which is the unit of the system, contains 29.166 grams. One pound avoirdupois contains 7000 grains; 2000 pounds = 1 ton. 2000 × 7000=14,000,000 troy grains in one ton avoirdupois. 480 troy grains = 1 ounce troy. 14,000,000 ÷ 480=29,166+ troy ounces in 2000 pounds avoirdupois. There are 29,166 milligrams in 1 assay ton, hence 2000 pounds is to 1 assay ton as 1 ounce troy is to 1 milligram.

F. A. PLENKER, Grangeville, Idaho, is an uncommonly good prospector or else is exaggerating facts when he states that he recently made a big discovery of a ledge of gold quartz. He says that "after looking around for a likely place to dig he sank through the snow 10 feet," and soon beneath the surface of the earth, about 18 feet from the snow level, found what he was looking for. It is fortunate the snow was only 10 feet deep. Had it been 11, he might have had difficulty in accurately determining just where to dig.

ONE of the greatest evidences of Colorado's mineral wealth and prominence is the recent contest in the Colorado Legislature over the proposed creation of Teller county, as a Cripple Creek expansion proposition. The speeches, charges, bribes, allegations, etc., were the sensation of the session, being to Colorado what the lofty Senatorial contest has been to California, Montana, Utah and other great commonwealths where the best man is always sent to the U. S. Senate, neither wealth nor unworthy influence cutting any figure in such noble selection.

STATE Legislatures are busy over mining matters. In Colorado the Assembly has passed a bill prohibiting the consummation of a smelter and mining trust. In Montana the Legislature passed a law admitting the creation of a copper combine: the Governor vetoed it, and the Legislature passed it over his veto. Utah and Arizona have passed new bills looking to the interests of the miner and prospector; California again endorsed the Mineral Land bill, but Speaker Reed was again successful in the National Legislature in preventing the passage of that necessary measure.

"CONCENTRATES" was mistaken in the issue of the 4th inst., in an item on the first use in California and Colorado of electricity in mining, in saying: "The first time electricity was used for mining in California was in Placer county, in '89." Dr. N. S. Keith, the pioneer in many of these things, finds that the first mining electric power transmission plant in California, as described and illustrated in detail in the issue of the MINING AND SCIENTIFIC PRESS of Jan. 28th, '92, was a Brush dynamo, at Placerville, El Dorado Co., for the American River Syndicate, at the Dalmatia mill, May 19th, '90. So that it was at Placerville, and not in Placer county, that the first operation of that kind in California began.

IN California, Colorado and Utah electricity occupies a prominent place in mining operations, and its use is extending. In Montana, the new electrical plant, sixteen miles from Helena, just installed, gives promise of permanent reduction of cost charges in working the thirty miles of porphyry dike in that vicinity. It is locally calculated that the cost of treating the low-grade ore there can now be reduced from $2 a ton to 75 cents. The company figures on ultimately extending its lines forty miles to Butte. The idea is feasible. In southern California a 40,000 voltage is now transmitted eighty miles, and another California concern is preparing to transmit a 33,000 voltage 125 miles.

MODERN COMFORT, modern progress, the achievements of science, the daily requirements of every line of business, all depend upon the mining industry, which is the greatest factor in the industrial development of the nation. Nothing has done more for the country; nothing has had less recognition. The mining industry has developed this west half of America, has furnished the sinews of war and the requirements of peace, and its trials and successes rival the greatest of any other of the world's achievements. The mining industry is entitled to representation in the presidential cabinet, not as a favor or a fostering care, but as a matter of business, a necessary present demand, a measure of justice to the general public, whose needs could be better conserved thereby.

THE following (Sec. 2333, Revised Statutes of the United States) serves to completely answer several questions this week: Where the same person, association or corporation is in possession of a placer claim, and also a vein or lode included within the boundaries thereof, application shall be made for a patent for the placer claim, with the statement that it includes such vein or lode, and in such case a patent shall issue for the placer claim, subject to the provisions of this chapter, including such vein or lode, upon the payment of $5 per acre for such vein or lode claim, and 25 feet of surface on each side thereof. The remainder of the placer claim, or any placer claim not embracing any vein or lode claim, shall be paid for at the rate of $2 50 per acre, together with all costs of proceedings; and where a vein or lode, such as is described in Sec. 2320, is known to exist within the boundaries of a placer claim, an application for a patent for such placer claim which does not include an application for the vein or lode claim shall be construed as a conclusive declaration that the claimant of the placer claim has no right of possesion of the vein or lode claim; but where the existence of a vein or lode in a placer claim is not known, a patent for the placer shall convey all valuable mineral and other deposits within the boundaries thereof.

THE sale by H. R. Wolcott of the property of the Colorado Smelting & Mining Co., at Butte, Mont., for $2,500,000, is understood to definitely indicate the consolidation of numerous smelter interests, and that the new trust is the buyer of the Butte property. It is understood that the property of the Pennsylvania Lead Co., at Pittsburg, and the Pennsylvania Smelting Works at Salt Lake City, Utah, are also included in the deal, and it is reported that the officers of the new $65,000,000-combine will be elected April 1st. The following firms are said to be in the combine: The Omaha & Grant Smelting Co., with works at Omaha, Denver and Durango, Colo.; the Con. Smelting & Refining Co. of Kansas City, Mo., with works at Kansas City, Leadville, Colo., and El Paso, Tex.; the United States Smelting & Refining Co. of Chicago, with works at Chicago, Pueblo, Colo., Helena and Great Falls, Mont.; the Aurora Smelting & Refining Co., with works at Aurora, Ill.; the Pueblo Smelting & Refining Co., with works at Pueblo, Colo.; the Philadelphia Smelting & Refining Co., with works at Pueblo, Colo.; the Globe Smelting & Refining Co., with works at Denver, Colo.; the Germania Smelting & Refining Co., with works at Salt Lake City, Utah; the Bimetallic Smelting Co., with works at Leadville, Colo.; the Pennsylvania Smelting Co., Salt Lake City, Utah, and the Pennsylvania Lead Co. of Pittsburg, Pa. The combination incorporates at Trenton, N. J., under the name of the Consolidated Smelting & Refining Co. It is understood that the property at Butte, sold for $2,500,000, is of same company organized in 1880 by Colorado men, who put $100,000 into the enterprise, which amount has been paid back to the stockholders in dividends, and who now get twenty-five times what they originally put in.

ANSWERING practically the same question from Columbia, Cal., Gunnison, Colo., Harqua Hala, Arizona, and Bingham, Utah, it has been held by the Utah Supreme Court that where one or more locate a claim and fail to do required annual assessment work, any one of the former locators can relocate the claim, when it becomes subject to relocation, and by complying with all federal and local requirements can in law hold it. Such decision was subsequently appealed from to the Supreme Court of the U. S. At one time the acting commissioner of the General Land Office held that one of three locators, whose claims had lapsed, could relocate and hold the location against his former partners provided he complied with all the requirements. Both the Utah decision and the acting commissioner's ruling seem very shaky, and not in accord with even the letter of the law, much less its spirit. The law is very liberal, and if a man or men be permitted to take advantage of their own intentional failure or unintentional neglect, it would seem to be putting a premium on evasion and tending to perpetuate a wrong. The Supreme Court of California has held in a case of this kind that if the work prescribed in the federal act be not done the claim is open to relocation "unless work is resumed before the second location is made." If it be finally decided or admitted that the original locator is to be allowed to relocate as a sort of reward for his own neglect, it will result in an added inducement to further evasion of the liberal federal law. That law says that if a man or men locate a mining claim or claims, say today, March 11th, '99, he or they shall have till midnight, Dec. 31st, 1900, to put thereon the required amount of labor or improvements, and not till the latter date named shall noncompliance with the requirement regarding such work be deemed a failure, and that in case of such failure the claim or mine upon which such failure occurs shall be open to relocation in the same manner as if no location of the same had ever been made; provided, that the original locators or their heirs, assigns, or legal representatives, have not resumed work upon the claim after failure and before such location.

A Boston, Mass., Electric Power Station.

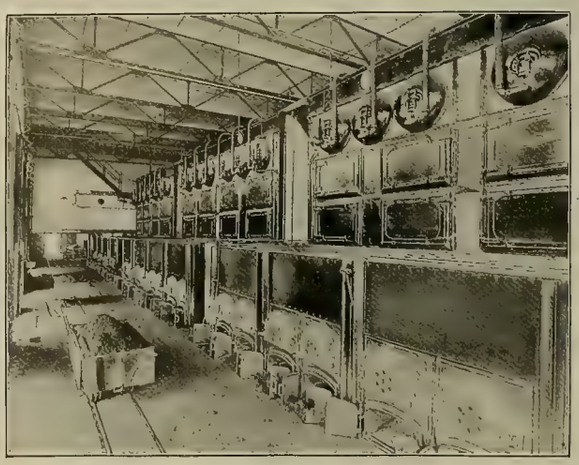
The latest of Boston's seven power stations installed is one on the Charles river, called the Harvard, which in its arrangement deserves illustrated notice. The station is designed for an ultimate capacity of 7200 K.W.; the present building is constructed to contain four units of 1200 K.W. each, three of which are installed. The building is 171x125 feet.

An illustration of the boiler room shows the full width of the building, 56 feet. Six boilers are installed in three batteries, with alleyways on each side and in the rear. Each boiler has a nominal capacity of 500 H. P., three water drums of open hearth steel, 60,000 pounds tensile strength, 42 inches in diameter, 22 feet long, the front end projecting through the setting. The boilers are double-decked, each deck consisting of twenty-one sections, each six tubes high, making 252 18-foot, 4-inch tubes in each boiler, with a total heating surface of 5124 square feet. The drums are protected by 4-inch pop safety valves, set to blow off at a pressure of 175 pounds to the square inch. The coal bins have a capacity of 750 tons and are provided with an inclined track running up from the street level and carried on trestle work round a loop and back over the top of the bins. The coal handling is done entirely by machinery up to the furnace door.

The gases from each boiler are passed into the chimney through a fuel economizer of fifty-six sections, each containing ten tubes and aggregating 6720 square feet of heating surface. The chimney is 226 feet high and has an inside diameter of 11 feet.

The engine room, illustrated herewith, is on the north side, 170 x 66 feet.

The basement floor is on a level with the boiler room and contains the pumps, condensers and heaters. The three vertical triplex power pumps, 6 inches in diameter by 8 inches stroke, are driven by belts and shafting from a 500-volt electric motor, and, being operated electrically, can be used to feed the boilers when steam is not available. There is also one duplex steam pump 14 inches by 8 5 inches by 10 inches stroke. Openings are left in the engine



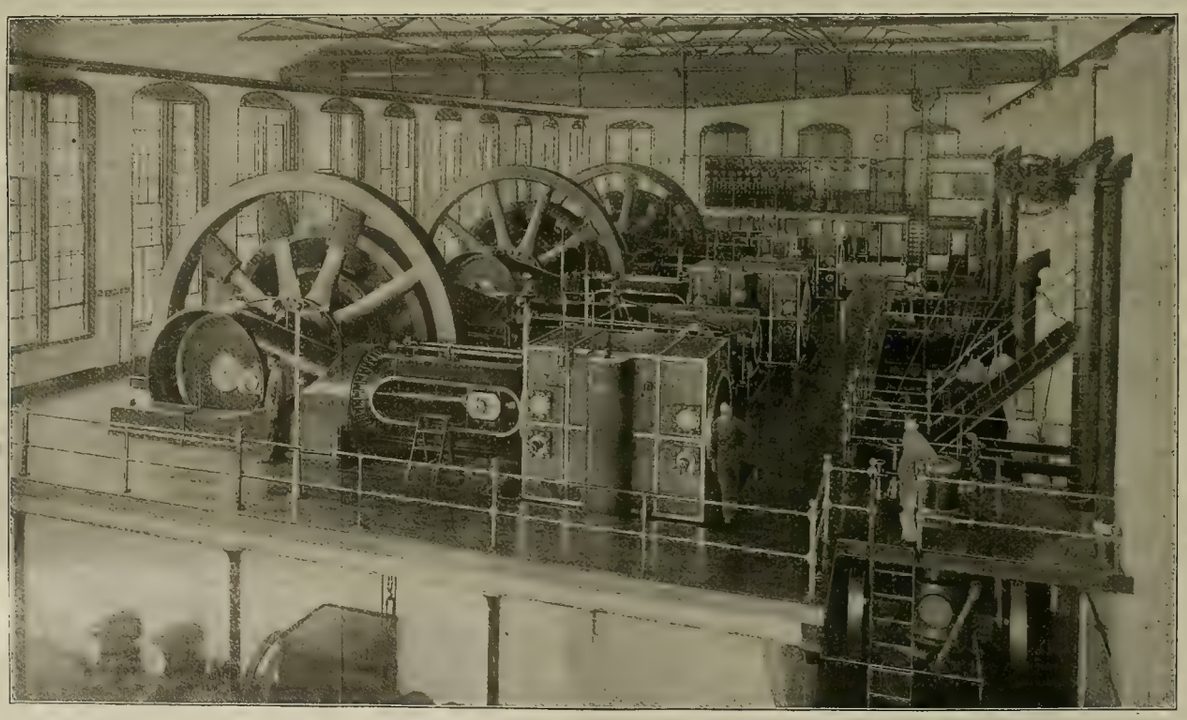
BOILER-ROOM OF THE HARVARD POWER STATION.

room floor to permit of the pumps and condensers being seen at all times by the engineers on duty, and are properly guarded by railings.

The engines are of the horizontal, cross-compound, condensing Corliss type, and are direct connected to the generators. The cylinders are 28 and 56 inches in diameter, with a 60-inch stroke, and are designed to run eighty revolutions per minute. The flywheels are 24 feet in diameter, built up in segments rigidly bolted together, and weighing about sixty tons. A reheater or receiver is placed between each of the high and low-pressure cylinders, and each cylinder may be run alone or run condensing or non-condensing by a suitable arrangement of the piping, which is all below the engine room floor. The main steam pipe is 14 inches in diameter, with 8-inch connections from each boiler.

Three direct-connected, twelve-pole, compound-wound generators have a capacity of 1200 K.W. each. The frames and pole pieces are cast steel; each field spool is arranged with separate spaces for the shunt and series windings. The series coils are wound with flat strips of copper; the shunt coils are composed of the usual round insulated copper wire.

The armatures are built up of laminated discs of soft iron, dovetailed into a spider and held securely in place by large cast iron rings bolted tightly together. Each frame rests on two foundation plates bolted down on the capstones. The switchboard is composed of thirteen feeder panels, three generator panels and one station panel. Each feeder panel carries two feeders and the necessary ammeters, switches and circuit breakers. Each generator panel has a 5000-ampere circuit breaker and ammeter, a 3000-ampere, double-pole switch and the field rheostat controller. A recording watt meter is provided, by which an account of the output of the station is kept. A recording voltmeter and recording steam gauge are installed in the office, keeping record of the voltage and steam pressure for reference. All the feeders from the station are carried underground in conduits. This station is connected with five other power stations, enabling the load to be distributed, in any manner, among the various stations, according to their capacity.



ENGINE-ROOM OF THE HARVARD POWER STATION, BOSTON, MASS.

Wave Vibrations.

F. W. Branson, as a result of recent experiments with sound waves and with the Hertzian waves to illustrate the dissimilarity of the radiations of the atmosphere and of the ether, gives the gradations which may be observed between sound, light, heat and electrical waves as follows:

Vibrations per second.

288,224,000,000,000,000	Roentgen rays.
1,125,899,906,842,624	Photographic limit of solar spectrum.
562,949,953,421,312	Green light.
281,474 976,710,656	Infra red.
70,368,744,177,664	Heat rays of solar spectrum.
67,108,864	Electric oscillations in Hertz resonator.
32,768	Audible vibration.
4,096	Music, highest note.
32	Music, lowest note.
16	Water surface waves of minimum velocity.

Some Experiences of a Working Miner.

NUMBER V.

Written for the MINING AND SCIENTIFIC PRESS.

Not all the mines I have visited are operated to their disadvantage, as might be assumed from reading the previous papers of this series of letters. Take, for instance, the G. G. mine. At the surface a small free-milling vein, it was equipped with small plant and under careful management slowly developed into a larger mine, with increasing value as development proceeded, and to the credit of the management it can be said that the work of exploration was always in advance of stoping. In time it became evident that the condition of the property justified a larger mill and an addition was made doubling its capacity. Still later a larger hoisting plant was deemed necessary and the addition was made at considerable expense, the mine paying for this and all other improvements. The mine is still working successfully and is thoroughly equipped in every department and is one of the best examples of legitimate mining in California.

In contrast with this look at the P—— mine. A deep shaft was planned, an expensive hoisting plant installed and everything was carried on with a rush. When the shaft was 300 feet deep, without a pound of ore in sight, a 40-stamp mill was rushed to completion under a sixty days contract, the men working night and day. The mill never dropped a stamp. Work in the shaft was stopped and the machinery was eventually moved elsewhere.

In its early history the H—— mine was a great producer. It was worked steadily and profitably for years, but at last the end came and the mine was shut down. After an idleness of many years M—— secured a bond on the property, and started in to rehabilitate it. A new dam was constructed in the river, a flume and ditch built, the air compressors removed to a new site, fifteen stamps of the mill were reset, the tramway relaid, buildings overhauled and the whole proposition on the surface gotten into good shape. Then work in the mine was recommenced. The shaft was pumped out and everyone expected to see sinking and systematic development begin, but in place of that all energies were directed to the recovery of old pillars standing in the mine, the faces of old stopes were cut into and every effort made to make a new mine out of one which had not only been carefully worked, but gouged to the last dollar's worth of ore. The natural result followed. The mine was closed down when the money was gone, and it stands idle to-day, though well-directed effort may make it again a paying mine. Had the money spent in rebuilding the mill and stoping worthless quartz been put into sensible development, it is my belief that the mine might possibly be in operation to-day.

A long crosscut tunnel was driven in the F—— mine, and considerable development done on the vein, but owing to the all but inaccessible location of the mine, it was shut down when the backs had been stoped out. A few years later it was deter-

mined to reopen the mine. The crosscut tunnel nearly 500 feet in length was found caved. One of the miners who had worked there in former days was in charge of the work. He asserted positively that he knew the ground thoroughly and in his opinion it was caved its entire length, and therefore it would be cheaper to drive a new tunnel than to reopen the old one and keep it open. Accordingly a new tunnel was driven and the vein reached. When the new crosscut entered the old workings the men explored the place to ascertain the condition of things. When they came to the old crosscut it was open so they walked into it to see how far it had caved. They walked out 450 feet toward the mouth. Only 50 feet was caved. The F—— mine had good ventilation now by reason of its two tunnels.

When the shaft in the G—— B—— mine had reached a depth of 300 feet, with levels run several hundred feet at 100 and 200, the vein was found intact throughout with a fine ore shoot which "feathered out" on all its edges. This shoot occurred in a broad crevice 4 to 20 feet wide. There was not a crosscut in the mine. The owners gave up the mine as not offering sufficient inducement under the circumstances to continue its development. Subsequent owners have deepened the shaft, crosscut the fissure and have developed a valuable mine, it having been found that the ore shoots reoccurred in depth, appearing as a succession of lenses. The fact demonstrates the necessity of crosscutting in soft fissures where well-defined ore shoots pinch out.

MINER.

That those who read these experiences of the writer may appreciate that they are not in the least overdrawn, being rather understated than exaggerated, the following letter written by a miner who evidently was at the mine referred to at a later period, is given as corroborative evidence:

"'Miner' has failed to do full justice to the transportation situation on Cedros Island. Take as an example the ore from a lower stope reached through Michaelson No. 2 tunnel: Hoisted 20 feet by hand; sacked; wheeled in barrows to mouth of tunnel; stacked; packed in burros to chute; stacked; chuted to platform over car of gravity tram; stacked; trammed one-quarter of a mile to end of wagon road; stacked; transported by wagon two and one-half miles to wharf and stacked. From there your correspondent has it correct. The average assay of this particular stope was $12.50. The ore was base and unsuited for milling." ANOTHER MINER.

Hedges, Cal., March 3rd, '99.

The Smelting of Ore in the Kootenays.*

It is now announced that the Canadian Pacific Railway Co. will commence, during the coming spring, the construction of a large reduction plant in the Boundary region. This scheme is in the line of the general policy of the company, as already outlined, namely, to give the miners in this section of British Columbia the benefit of the lowest possible smelting charges on all classes of ores, thus placing them, as regards the cost of reduction, upon the same footing with the miners of the older camps in the United States. At Trail, this has been already accomplished by the establishment of charges of $7 per ton (and, in some cases, even less) for the treatment of refractory ores, requiring roasting, and containing a high percentage of silica and alumina, while running very low in copper. It may be doubted whether more favorable rates are offered to miners of such ores even in Colorado or Montana.

The policy of building large smelters, which seems to have been adopted and to be in process of energetic execution by the Canadian Pacific Railway Co., with the aid of first-class metallurgical ability in the details of design and operation, has been sometimes criticised as detrimental to the general development of the smelting industry, and thus, indirectly, of the mining industry as well, in the Dominion. It is argued, sometimes, that the entrance into this field of a large corporation, controlling the business and rates of transportation, discourages private smelting enterprises, and thus deprives the miner of the advantages of free competition, such as is supposed to be prevalent in the United States. This is a plausible theory; and it is conceivable that, under certain circumstances, it might be confirmed in practice. For instance, if a large railway corporation, having excluded rivals from the field, should proceed to extort unreasonable profits from an industry at its mercy, there might be reason for complaint. But the remedy of such an evil lies in the nature of the case, even apart from legislative interference as to rates. A simple consideration of the amount of capital invested in a great railroad, as compared with that invested in a smelting works, or a dozen smelting works, will show that the transportation business is far more important than the contributory smelting business, and that no great railroad company can afford to restrict its transportation of ores, bullion and supplies by imposing high rates upon its customers in the comparatively subordinate business of smelting. If the smelting business should be owned by a favored "ring," which sacrificed to its special interest the interest of the railway company, the case, it must be confessed, would present a different aspect. But that evil has its own appropriate remedies; and, as it is not indicated in the situation now under consideration, it need not be considered here.

The general proposition as to the comparative benefit to the mining industry of a few large smelting works, located at suitable commercial centers, and numerous small works, located close to the mines, has been abundantly illustrated in the United States. All through Colorado, Montana and Utah are scattered the ruins of abandoned smelting works, which have been operated from a day to a year, it being only a question of time how long they could survive. Not one of them ever reduces ore cheaply. Without exception they have failed, in spite of high smelting charges, because such small concerns, located with reference to an adjacent ore supply only, without regard to the larger controlling conditions of success, could not possibly succeed. Only in a very few instances, such as the United Verde, the Anaconda and the Calumet & Hecla copper mines, or the great New Jersey zinc mines near New York City, can a single deposit or locality support its own reduction works and furnish them with ore mixtures adapted to economical reduction.

There is a stage in the development of every new mining region, in which the local rivalry of competing camps demands that each shall have its own "smelter," as an evidence of its permanent progress, and often goes so far as to offer "inducements" to capital, on the strength of which it may, perhaps, undertake the perilous venture. The (usually both ill-advised and inadequate) investment of capital on such conditions speedily comes to grief; and at last it is generally recognized that large smelting works, located at points where fuel, fluxes and ores can be economically assembled and scientifically mixed for the best metallurgical results, and able (by means of their size) to employ the best metallurgical talent, offer to the miner the highest rewards for his labor. Even in instances where small local establishments profess to offer better terms, there is the not uncommon risk that they may "get even" by various tricks of the trade, to which large concerns cannot afford to descend.

In short, the so-called "competition" of small local smelters is a matter which larger concerns in the United States have learned to despise and disregard, knowing that it must die from its own inherent impotence.

Meanwhile, it is a pertinent question: What is the effect of such temporary competition upon the mining industry itself? A small local concern may, for a while, by virtue of the ignorance of its management and the credulity or optimism of its shareholders, go on, in competition with larger, better located and better managed establishments, offering rates which it cannot afford to pay, and losing money without knowing it. There is scarcely any other business in which so great losses can be unconsciously incurred as in that of smelting. The periodical balance sheet is largely an estimate on paper. Values supposed to be contained in ores and by-products on hand are credited as assets, and nothing but an absolute and complete cleanup will demonstrate the actual situation. The management may go on, using up its working capital, for many months after real business failure has been experienced. During such a period individual ore sellers may receive, on individual lots often, prices higher than could fairly be paid; but the permanent interest of the mining industry has been really injured, and when the collapse comes the reaction is likely to more than outweigh the temporary gain.

In a word, the waste incurred by the crude and unskillful smelting of ores in small local works is absolute waste, which does no good to anybody. The saving effected by skillful treatment, under favorable conditions, in properly located large works, is an absolute saving, which involves no loss to anybody, and is large enough to give both higher prices to the miner and fair profits to the smelter. Consequently the latter system is more advantageous to both parties, and anything which hinders or delays its adoption is injurious to both.

* Canadian Mining Review.

A Long Canoe Trip.

On May 1st two men will leave Vancouver, B. C., on an unique trip across the continent. From the headwaters of the Fraser river to the source of the Bow river is only six miles, and there is a complete water route to the eastward. The men who will go across the continent in a canoe are A. J. Clark and T. A. Smith. They figure they will travel 5000 miles, visiting over 1000 towns and cities. A long, slender canvas canoe, weighing ninety pounds, will be the means of transportation. "We will make our journey up the Fraser to Banff," says Clark, "and then go down the Bow river to Saskatchewan. Then we go into Thunder creek, and finally reach the Qu'Appelle river. Next we come to the Asinaboine river, and this takes us to Winnipeg. Then we will go by way of St. Paul through rivers, canals and lakes to Washington, D. C."

Crushing Rolls.*

The reduction or granulation of coarse particles of ore by means of rolls, has been given much consideration during the past few years. The variety of crushing rolls are many and various in type and construction. Machines for this class of work have largely been evolved by American engineers, and proof of their superiority is to be found in the fact of their having gained admission to almost every large metallurgical works throughout the world. Notwithstanding the many changes that have been made during past years in all the various designs known to us, no special one has met with general approval. The most potent change has been in the adoption of steel as the material for use in the construction of the shells. The construction of the frame in one piece, having sufficient weight and strength to absorb the vibrations set up within the machine, and closer study has been given to the matter of the strains with the structure. Marked improvement over the older forms of crushing rolls has been made in the design of journal bearings, methods of lubrication, and the facilities for dismantling the machine if required.

Considerable ingenuity has been displayed to obtain complete and satisfactory methods for keeping the lateral adjustment of the rolls correct. The adoption of springs for that of levers and dead weights within the machine, to give crushing power to the rolls, is an important improvement, affording, as it does, a much more uniform product. The adoption of some form of housing obviates the wasteful and disagreeable nuisance of dust, usually found around rolls employed in dry crushing, and length of life to the machine is ensured.

The most marked change within recent years has been along the line of increased peripheral speed by the employment of rolls of larger diameters and narrower faces, the results being decrease of journal friction, increase of crushing surface, and reduction of spring pressures. Those changes are undoubtedly the direction in which modern practice is tending.

Peripheral speeds of 600 to 1000 feet per minute are now found to be practicable, but this change in speed has also brought about many of the improvements already mentioned. The aggregate spring pressure is now greater, ranging from two to three tons per inch width of face of roll shells. Change has also been made from gears to belts, proving a much more preferable method of driving.

In the earlier form of rolls the spring pressure was carried along the main tension bolts, making it a matter of considerable labor to adjust the rolls. The method now in use consists of enclosing the whole nest of springs between two washers, and constructing them so that each nest forms a complete washer, of an inelastic nature, until such time when the maximum pressure is reached, further compression taking place, relief is afforded to the rolls by the deflection of the springs.

Chilled iron shells in all probability will be displaced by steel shells. In the design of rolls presented all the above mentioned improvements have been embodied, simplicity of construction, fewness of parts, and interchange ability is to be found. The hopper underneath the rolls is constructed in such a manner that no pockets are permitted, all four sides declining towards the bottom at an angle of 45°, thus affording cleanliness at all times within the machine. The matter of sliding versus swing bearings for the removable roll, was decided in favor of swinging roll bearings. The wearing surfaces become reduced by means of their adoption. Any wear about the bearing surfaces of sliding roll bearings is an evil, which may result in damage to the frame of the machine; it is easier to maintain the alignment of the swinging bearing than in the sliding type of bearing.

In design for rolls, a feature worthy of consideration is that of the disposition of the bolts employed for the purpose of bolting the machine together, it is a desirable feature to have as few as possible, and so arranged that should they by any means become loose, they may not fall within the machine. The use of common nuts is not desirable, and recourse must be made to lock nuts or elastic nuts; this provision prevents the bolts becoming loose, and may help to preserve the machine from injury.

*A. C. McCallum before Canadian Inst. M. E., Mar. 2.

FROM experiments lately conducted at one of the Reichanstalten in Germany, on nickel-iron alloys, it has been developed that the coefficient of expansion of such alloys varies according to the percentages of the two metals present. Furthermore, it is said to have been experimentally demonstrated that an alloy of iron and nickel containing 45% of nickel possesses the same rate of expansion as platinum, and it is proposed to use this alloy to replace platinum in the manufacture of incandescent electric lamps.

A Mine Beyond the Arctic Circle.

When the British Iron and Steel Institute met in Stockholm, Sweden, last year, the Aktiebolaget Gellivare Malmfaelt invited some of the members to go on an excursion to the mines at Gellivare, Malmberget, etc. The greatest deposits are in the province of Norrbotten, Lapland, communication being by rail from Lulea, a port on the Gulf of Bothnia. This port is closed by ice for seven months of the year, so it is proposed to extend the line to Victoriahaven on Ofoten Fiord in Norway, which is open all the year round. The Gellivare deposits lie forty-three miles north of the Arctic Circle, and have been known since 1704, being referred to in a report of that year. The first concession for working them appears to be that of Lieut. Tingvall, 1735, who turned his rights over to a company in 1742, but the mining business did not thrive, as transportation facilities were very inadequate, and for many years there was but little business done there. In 1888 the railroad was completed from Lulea, a distance of 130 miles, and in 1892 there were shipped 139,194 tons of ore. Since this year the shipments have shown a steady growth, as the following figures will exhibit: Shipments to Lulea of Gellivare ores: 1892, 139,194 tons; 1893, 260,754; 1894, 525,728; 1895, 384,007; 1896, 614,262; 1897, 815,797; 1898, 804,732. The mine is described by D. A Louis in the *Engineering Magazine*.

The ore is for the most part magnetite, although hematite is also present. At the King Oscar mine, one of the largest in the district, the ore deposit on the outcrop is 670 feet long and from 27 to 337 feet wide, having a total area of 21,600 square yards. The system of working here, as indeed throughout the district generally, is by open-cast, bench work, and the ore is graded, according to its content of phosphorus, into five sorts, the phosphorus varying from below 0 05% to above 1.50%. Mr. Louis says that Grade E, having above 1.50% of phosphorus and some sulphur, is heated in order to separate the magnetite and hematite from the apatite. The magnetite is separated over magnetic separators, while the hematite is separated from the apatite by means of jigs, riddles, and shaking tables. The fine ore is troublesome, and no means of disposing of it have been found as yet. The apatite, mixed with some quartz and feldspar, is dried, ground, and mixed with salt cake, and fritted into a mass which has a ready sale as a fertilizing material. Two hundred tons of ore are treated per dav, and the yield of this Wiborgh fertilizer is from 1% to 1.50% of the ore. The fertilizer is worth about $19 a ton.

The mines employ about 1500 men during the winter and 2000 during the summer. Considering the high latitude, nearly 68°, the temperature, even during the coldest part of the winter, is seldom lower than 20° below zero, and the snow and frost do not interfere with the working of the mines. The power for the various operations is supplied by three 120 H. P. and one 360 H. P. compound condensing engines coupled to dynamos. There are 130 arc lamps, 500 incandescent lamps, and sixteen motors in use. Mr. Louis does not quote any analyses, but it is known that the Gellivare magnetite used at Witkowitz carries from 61% to 64% of iron. There is a grade of Gellivare ore that carries about 69% of iron, but for the most part the ore carries from 60% to 65%. It is transported 1680 miles to the Cleveland district, England, and 1690 miles to Dortmund, and 1400 miles to Witkowitz, the distances being taken as an indication of the richness of the ore. These deposits are very large, and are worked with comparative cheapness, so much so, in fact, that the best grade ore is sold at Middlesborough for $4.50 per ton.

British Columbia Mining Requirements.

The following is a summary of the provisions of the Act passed during the recent session of the British Columbia Parliament, amending the Inspection of Metalliferous Mines Act. Among other things it provides that it shall be the duty of the inspector, in case a mine is in a dangerous state, to post up in a conspicuous place at the mouth a notice warning the workmen. Further, owners must give notice of any serious accident, and no person may be employed underground for more than eight hours in the twenty-four. Explosives must not be thawed underground in any mine. Following are other important sections:

Any adjoining owner may apply to the inspector for the purpose of learning whether such mine is being worked into his territory, and upon such application being made the inspector shall examine the plans of such mine, and if necessary examine the workings of such mine, and make report thereon to such adjoining owner as to whether his territory is or is not being encroached on.

Not less than 75 cubic feet of air per minute shall be made to pass through every mine for each man and beast employed therein.

All permanent buildings for housing boilers, engines and machinery shall be erected at a distance of not less than 50 feet from the mouth of any mine.

Slides, or conductors, for shafts which are at least 100 feet deep shall either be iron shod or all iron.

All vertical shafts of a depth of at least 50 feet shall be provided with a crosshead and guide, and such crosshead shall descend as such shaft is sunk, so that at no time shall it be at a greater distance from the bottom of the shaft than 30 feet.

No stope or drift shall be carried on in any shaft which shall have attained a depth of 200 feet unless suitable provision shall have been made for the protection of workmen engaged therein, by the construction of a bulkhead of sufficient strength or by leaving at least 15 feet of solid ground between said stope or drift and the workmen engaged in the bottom of such shaft.

A chain ladder 20 feet in length shall extend from the bottom of the wooden ladder to the bottom of the shaft.

An Automatic Accountant.

The latest thing a machine does is to "keep books." Such concerns are now in use in New York City. One in the Union Savings Bank is operated by electricity. It marks in a depositor's book the amount of his deposit, and makes a duplicate of the entry on a tape locked in a box attached to the machine. At the same time the amount of the deposit is automatically added to the total of the bank's transactions, so that a glance at the latter would tell just how much money the bank had received since its organization.

The machine is placed on a table at the teller's right hand. In front of it is a keyboard, with rows of figures arranged like the letters on a typewriter. When a deposit is made the teller places the depositor's book under a cylinder filled with movable figures on the side of the machine. Then he pulls the figures on the keyboard that represent the amount of the deposit. These figures are connected by wires with figures on the cylinder. The teller next moves a lever and that sets the machine in motion. The amount of the deposit is printed on the book and at the same time on a tape locked in a box placed just above the cylinder, so that a double entry is made. Should the teller make any mistake there in an ingenious contrivance attached to the machine that would prevent it from working and thus notify him of the error.

After the entries have been made in the depositor's book and on the bank's tape another cylinder is set in motion. This is in the middle of the machine and contains movable figures running up into the millions. These figures tell the total of the bank's receipts since it was organized and the amount that has just been deposited is added to it.

At the end of a day's business the officials of the bank add together the totals registered on the two receiving machines, deduct from them the total registered on the paying out machine, and strike a trial balance in a moment. The machines are inclosed in glass cases, so that every part can be readily seen.

Capacity in Gallons of Circular Tanks, Cisterns, Etc., for Each Foot in Depth.

Diameter in Feet.	Gallons.	Diameter in Feet.	Gallons.	Diameter in Feet.	Gallons.
1	5.87	12	846.03	23	3,108.0
2	23.50	13	992.91	24	3,384.1
3	52.88	14	1,151.5	25	3,672.0
4	94.00	15	1,321.9	26	3,971.6
5	146.88	16	1,504.1	27	4,283.0
6	211.51	17	1,697.9	28	4,606.2
7	287 88	18	1,903.6	29	4,941.0
8	376.01	19	2,120.9	30	5,287.7
9	475.89	20	2,350.1	31	5,646.1
10	587.52	21	2,591.0	32	6,016.2
11	710.90	22	2,843.6	33	6,398.1

Time Allowed for Assessment Work.

To the Editor:—If a quartz claim was located Feb. 3rd, '98, and $50 worth of work was done thereon inside of sixty days, work sworn in and recorded, no more work done on claim in '98, can this claim be jumped Jan. 1st, '99?

Chinese Camp, Tuolumne Co., Cal.

Not legally. In performing the $50 worth of work the State law has been complied with, and as the Federal law does not require the assessment to be done during the first current year after location, the claim was not open to relocation. The original locator has until Dec. 31st, '99, in which to complete his $100 worth of work.

Effect of the Smelter Trust.

Now that the big smelter combine is an assured fact, the next question of vital interest is: What will probably be the effect on the mine operator and the laborer in the enterprises which control the production of the ore and its transmission through the various stages up to the smelter?

It was predicted when the trust was in process of formation that its consummation would have a detrimental effect on the silver miner in various ways, and it was for the purpose of getting an expert guess on future developments that a reporter asked a prominent mine operator the general question: "What will be the probable effect on the producer?"

"It is almost too soon to make a close prediction," replied the operator. "But the combine is likely to close certain of the smelters after a time when they find they can produce bullion more cheaply without them. As to the bearing on ore producers, well—the trust dares not do too much. I anticipate its affairs will be regulated much as is the Standard Oil Co., keeping along in a pretty even way.

"There is one institution which will probably sooner or later become a reminiscence, and that is the public sampler. The ore will eventually go direct from the miner to the smelter. Now when a miner ships ore through a sampler, he is charged with the penalties, as on silica, for instance. The sampler mixes the ore to avoid the penalty and then sells to the smelter. The trust will undoubtedly take advantage of this, buy direct and do the mixing themselves. This phase of the situation will not, however, affect Aspen, as it is well known that the samplers here are run in connection with the big mining companies."

E. M. Taylor of the Taylor & Brunton Sampling Works Co. did not think there would be any appreciable change noticed by the producer for a period of at least eighteen months, on account of the formation of the trust. "After that time," said Mr. Taylor, "it depends somewhat on circumstances."

"I have reason to believe that there is no intention on the part of the combine to work against the producer and I do not think that any changes in the different smelting works are contemplated, at least not at present. Meanwhile, the holding for sale by one party of all the silver and lead produced in the country may have the effect of raising the price of those metals. The present management of the trust will certainly be favorable to the West and to the producer. Whether this condition will continue depends altogether, perphaps, on who will be elected in the future, and whether the future managements' affiliations will be with the Wall Street end of the combine more than with the West."—Aspen, Colo., Tribune.

A steel roadway, about 150 feet long, is being laid at the Minnesota Agricultural Experiment Station. The steel rails are 8 inches wide, with half inch flanges at the outer edge, and are 30 feet long. They are made of quarter-inch steel, with cross ties every 6 feet buried about a foot. On the ties are timber springs on which the rails lie. The width of the 8-inch rails takes in wagons of any width of tires. This demonstration of the steel roadway is being made in order to try to show its advantages over the ordinary macadamized road. It is asserted that such a road costs $2500 a mile, while a macadamized road costs from $3000 to $6000, and that the steel road will outlast the macadamized and be far more serviceable.

The chief of the Electrical Bureau of Philadelphia, Pa., David Walker, in his annual report states that at the close of the year '98 there were 7014 electric lamps in that city maintained at public expense—an increase of twenty-eight over '97. According to the returns made by the telegraph, electric light, telephone and street railway companies, there were in overhead service on the highways of the city, exclusive of those along railroad tracks, 54,795 poles and 10,100 miles of wires.

A new process is noted to preserve wooden telegraph and telephone poles. It is to surround that portion of the pole just below the surface of the ground with a terra cotta casing 24 inches long and of such a diameter as to leave a space of from 1 to 1½ inches between the pole and the casing. This space is then filled with pitch and clean gravel, forming a solid water and air tight casing around the pole to a depth of 24 inches.

The Commissioners of the Paris Exposition have been making some very satisfactory experiments with moving sidewalks for the transportation of sight-seers at the Exposition. These are similar to those at the Chicago and Berlin Expositions, but the Paris motive force will be supplied by electricity.

Latest Mining and Metallurgical Patents.

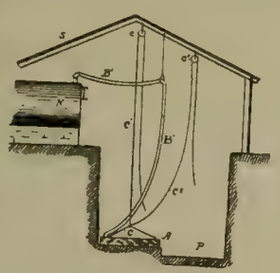
Patents Issued February 28, 1899.

Specially Prepared for the MINING AND SCIENTIFIC PRESS.

METHOD OF EXTRACTING GOLD FROM CYANIDE.—No. 620,100; W. A. Caldecott, Johannesburg, South African Republic.

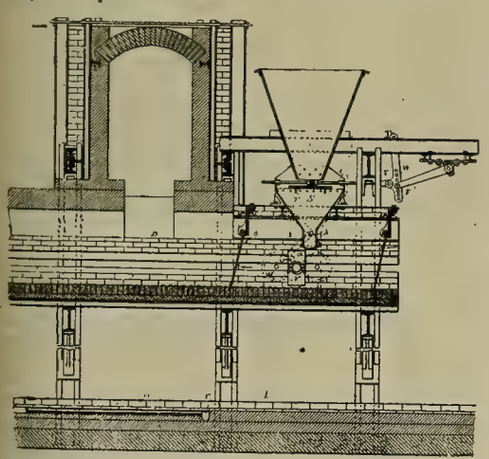
The claim is made of an improved method for the precipitation of gold from solutions containing gold-bearing cyanide solutions by the passing of such solutions over zinc shavings previously treated with a soluble salt of mercury, as perchloride of mercury.

STEAM THAWING APPARATUS.—No. 620,112; G. R. Elliott, Boston, Mass.



A thawing apparatus for sinking vertical shafts in frozen ground, combination of strong, flat, shallow box open at its under side, adapted to support men, tools and other heavy weight, coils of piping secured therein, an exterior supply of heated fluid and a flexible supply joining coils with supply, the box or hood being not half the area of the shaft floor, and transferring means whereby it being shifted back and forth upon the shaft floor, the latter can be continuously excavated and the work of the men not be materially interferred with. A combination of hood, steam coils suspended therein, source of steam supply, flexible connection uniting said steam source to coil, a structure supporting two pulleys at a distance apart equal to the width of hood, and ropes extending from hood over each pulley.

COMBINED ORE ROASTING OVEN AND COOLING HEARTH.—No. 620,132; H. C. Holthoff, Milwaukee, Wis., assignor of one-half to the Edward P. Allis Co., same place.

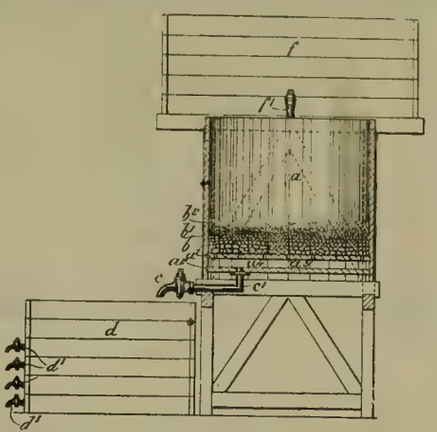


Apparatus for treating ore; combination of a hearth, chute located above, a gate or valve pivoted to chute, and designed normally to stand open; a rabble designed to pass over hearth beneath the chute; means for closing gate carried by the rabble; means carried by rabble for engaging downwardly-extending arm of bell-crank lever for closing valve as rabble passes beneath chute.

PROSPECTOR'S KNOCKDOWN CAMP STOVE.—No. 620,258; F. Stapp, Denver, Colo.

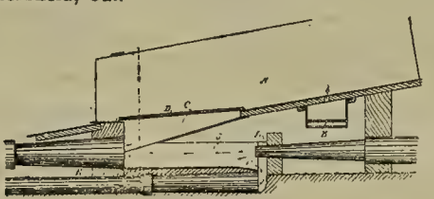
Combination of top plate; cooking apertures thereon having border edges trussed by two depressed curved steps; channel grooves all around edges of top plate and transverse truss between cooking apertures; sides and ends adapted to mesh in channels, base plate pivoted to ends, channel grooves therein adapted to receive and removably confine side pieces, with an oven supported between sides and compressing four independent side pieces arranged to interlock and intermesh at their edges; right-angled flanges at the ends of oven sides and clips secured to one side having a space between them and side adapted to receive flanges and projections on opposite side adapted to support adjacent ends of oven sides, oven, fire-box and oven doors.

PROCESS OF EXTRACTING GOLD FROM GOLD-BEARING SUBSTANCES.—No. 620,215; J. G. Black, Dunedin, and R. C. Skeet, Oamaru, N. Z.



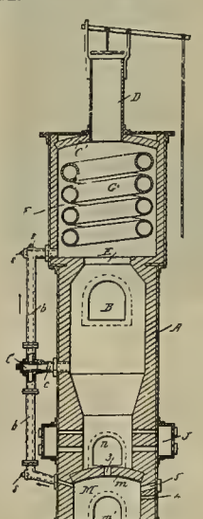
A process of extracting gold from ores, minerals or other gold-bearing substances, consisting in submitting such substances in a powdered condition to the action of solution containing sulphuric acid, chloride of sodium, and a manganate of an alkali metal and water, in the proportions of 100 gallons of water, from ten to twenty pounds of sulphuric acid, twelve to twenty pounds of chloride of sodium, and eight to nine ounces of a manganate of an alkali metal.

MINING APPARATUS.—No. 620,264; S. W. Wible, Bakersfield, Cal.



A combination with sluice having grating at discharge end adapted to separate larger from smaller material, the sluice having inclined bottom below grating and made convergent at discharge end; a conveying pipe, the inlet of which is substantially in line with and receives the discharge of the bottom; a concave segmental receiver in line with pipe and having its forward portion intersecting discharge of the inclined bottom at a point proximate to the inlet end of conveying pipe; and a jet nozzle in line with receiver and substantially in line with the flow of material down the sluice, whereby the jet discharged thereby joins the material moving down the inclined bottom of the sluice and directs the same into pipe.

CUPOLA FURNACE.—No. 620,339; H. E. Machell, London, England.

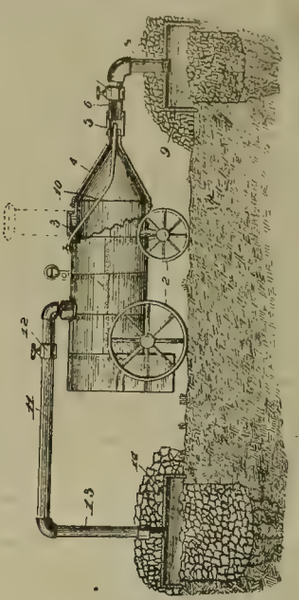


In a blast furnace, the combination, with a melting chamber open at the top and having a bottom *m* provided with a hole, a receiver M for the molten metal arranged below this bottom, and a heating chamber F above the top of the melting chamber and communicating directly with its upper part; of a blast pipe which passes through the heating chamber and is connected with the lower part of the melting chamber; a pipe *b* connecting the upper part of the receiver M with the lower part of the chamber F, and a branch pipe *c* connecting the pipe *b* with the middle part of the melting chamber above the point where the blast enters it.

AMALGAMATOR.—No. 620,328; A. H. Jocelyn, New York.

An amalgamating apparatus consisting of devices for supplying pulp and water, a sluice box and a loose-jointed amalgamating bed arranged in sluice box, consisting of removable amalgamating plates which interlock one with another so as to form a continuous amalgamating surface and prevent leakage at the joints, each amalgamating plate consisting of a stiff supplementary backing or body and a removable metal foil attached thereto.

PROCESS OF THAWING FROZEN GROUND.—No. 620,402; P. Anderson, Xenia, Ill.



First forming a shallow hole in the ground, then placing a charge of explosive material upon the ground and exploding it; then placing an open-bottomed box over the depression caused by the explosion and forcing heat into it from a suitably located generator.

The Naval Repair Ship.

Every officer in the American fleet at Santiago, from the admiral down, has praised the usefulness of the Vulcan. Her equipment was equal to that of any but large repair plants on shore, and the work actually done by her covered almost every conceivable part of the machinery of a war vessel, including repairs to hulls, gun mounts, dynamos, main steam pipes, main piston rods (for small ships), brass castings without number, and a considerable quantity of iron castings. This last is an especially interesting feature, as it is believed that the Vulcan is the first vessel ever fitted with a cupola for making iron castings. The object of such a ship is readily seen; it enables the vessels to have every repair, short of a breakdown of some of the larger parts, made on the station, when otherwise they would have been compelled to go at least several hundred miles, and in some cases more than a thousand, to reach a repair yard.—G. W. Melville, in the Engineering Magazine for March.

IN a paper recently read before the American Society of Civil Engineers, Julian Kahn, Jr., describes an ingenious arrangement, called an automatic railway, in use by the Calumet & Hecla Copper Co. The object of the apparatus is to convey coal from the hopper of the hoist to the store. Connecting the hoisting machine and this store is a line of rails inclined at a small angle towards the store. The car, having been filled from the hopper, runs down this incline by gravity, and near the bottom of the descent strikes an oak frame lying across the track. Connected with this frame is a weighted triangle which is swung upwards as the frame is pushed forwards. The resistances thus called forth bring the car to rest when it is automatically dumped. The weight then swinging back starts the lightened car up the incline again, with sufficient velocity to reach the top, when it is ready to take a fresh load and repeat its journey.

FROM Washington, D. C., comes the surprising statement that the U. S. naval authorities have decided that electricity shall not be made use of for operating the auxiliaries on the five new battleships now in various stages of construction.

The Genesis of Petroleum and Asphaltum in California.

NUMBER VI.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

Phenomena Attending Red Shales.—They are discovered by their bright colors, by the heat of the earth in their vicinity, sometimes by smoke. Sulphurous and other vapors frequently occur. These vapors in their course upward are condensed and incrust the fissures of rocks and even the surface of the ground.

Mineral springs, hot and cold, issue from the ground in their vicinity. The earth is charged with salts and minerals occasioned by the percolation and evaporation of these mineral waters. Shales, through the joints of which these mineral waters have flowed, have become impregnated with salts and the salts subsequently to the flow have become vitrified by heat. They are further known by the issuance of warm or cold natural hydrocarbon gas, by seepages of bitumen in their neighborhood, by fissures, joints and porous rock filled with asphalt and by the almost total absence of fossils in the burnt shale porcelanite and clinkers, which have been obliterated by hot water and heat. Before chemical heat commenced these shales did not contain over 2% of carbonaceous matter, not sufficient for them to be set on fire at the surface.

Physical Characteristics. — When unburnt these shales are easily split along their lines of lamination, but when burnt to a tile red or to a greater degree their fissility is partly destroyed. When unburnt their lines of lamination are plainly visible, but when burnt their lines of lamination are obscured or obliterated. When unburnt they have a clayey-like smell when breathed upon, but this physical characteristic is partly if not altogether lost when they are burnt. When unburnt and suspended so as to freely vibrate they have a dull sound when struck, but when burnt they become resonant. In this characteristic they resemble brick. Chemical fires destroy or partly destroy their lines of lamination, their fissility and their argillaceous smell when breathed upon, but increase their resonance. These characteristics do not occur when these shales are discolored by the oxidation of the iron naturally contained in them through the agency of water without heat. Serpentine cups filled with a pigment made from these bright shales are dug from the graves of the aborigines.

About thirteen miles east of Santa Barbara city an excavation was made on the bluff of the ocean for the roadbed of the Southern Pacific Railroad, and the gray shale charged with chemical substances and carbonaceous matter taken from the excavation was thrown over the bluff, forming a conical shaped pile, composed of pieces of shale containing from 1 to 8 cubic inches. Water could easily penetrate the broken shale and air could easily circulate through the mass. When the winter rains fell upon this pile chemical action commenced, producing sufficient heat to vitrify and weld the pieces of shale together. A large part of this shale was burned to a red porcelanite and the remainder was colored a buff shade graduating into the deeper shades of red. Above the railroad track the face of the shale bluff has been cut off to the angle of repose by the railroad company. This smooth surface is a good place to observe the action of chemical heat and attending phenomena.

La Patera Mine.—La Patera mine lies nine miles west of the city of Santa Barbara. Its relation with a lake and the ocean is shown in Fig. 4. The lake contains about sixty acres. Along the periphery of the lake the stratification of the shale dips towards the lake at an angle varying from 30° to 40°. The composition and the arrangement of the component parts of the soil are the same upon the island as upon the mainland. The shale must have existed at a level shown by the dotted lines in Fig.

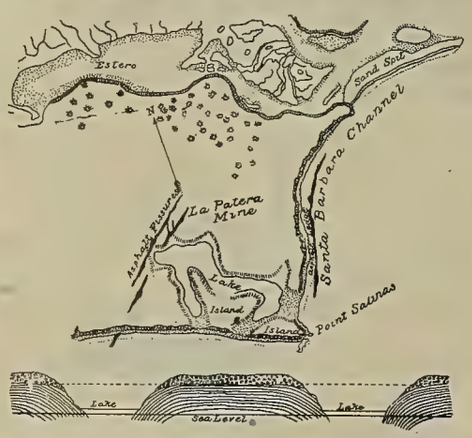


FIG. 4.—LA PATERA MINE, SANTA BARBARA, CAL.

4, and subsided after the deposition of the soil, otherwise the soil would not have been deposited upon the island in a manner similar to that of the mainland. This subsidence was probably occasioned by the contraction of the underlying shale, produced by chemical heat. Some idea of the contraction of the shale by burning may be learned from the contraction of brick through burning. Before burning and when in a dry condition a brick is 8 inches long; when burned—not vitrified—it is 7⅞ inches long, and when vitrified it is 7¾ inches long.

If the basin of the lake near the La Patera mine had been formed by erosion of the land by sea or surface water, the shale would have been squarely cut off and not contorted so as to dip towards the lake. In the excavation at the mine at the depth of 100 feet a temperature of 105° Fahr. is generated in the shales by chemical heat. Circumjacent to the lake are fissures filled with hard asphalt, through which comminuted shale and mineral water are disseminated.

Off the shore petroleum rises from submarine springs, covering a large surface of the ocean with a thin film of iridescent oil, the odor of which can be detected at a long distance. Ledges of hard asphalt exist in the ocean, below high tide, which run nearly parallel with the shore. Surface wells show the existence of water highly charged with mineral substances, in which petroleum is discovered. So far no potable water has been found near this mine.

Six miles west of Santa Barbara, on the Calera rancho, and on the ocean shore, an area of twenty acres has subsided some 25 feet; of this subsidence, 4 feet occurred in five years. This subsidence has occurred through the contraction of the shale. The surface of the subsidence is rifted and seamed, and from these rifts and seams sulphurous and other vapors ascend. The ground is hot. The bluff is composed of burnt shales showing tints from a cream color to brilliant red. Water containing salt seeps from the base of the bluff. Shales with carbonaceous material, shales saturated with bitumen and smoky-looking shales surround the hot places. Near the hot places heavy petroleum oils ooze through the shales. To the eastward and westward heavy and thick petroleum tars ascend through the cracks and seams and joints of the shale. Some of the seams of shales, containing a small proportion of bitumen, have hardened to such an extent that they resemble dark flint and will cut glass.

Lyell gives the following: "Captain Mallett quotes Guinillar, as stating in his description of the Orinoco, that about seventy years ago a spot of land on the western coast of Trinidad, near half-way between the capital and an Indian village, sunk suddenly, and was immediately replaced by a small lake of pitch, to the great terror of the inhabitants. A similar subsidence at an earlier period may probably have given rise to the great pitch lake of Trinidad, the cavity having become gradually filled with asphalt." There are a number of places in California near these red shales from which natural gas issues. Some are hot, showing that they are formed at high temperature. It may not be out of place to mention in this connection the occurrences of red shale in other parts of the world in which bituminous deposits are known to exist.

Fig. 5 is a view of a small lake formed by the subsidence of the land near Mount Solomon, in Santa Barbara county.

(To be Continued.)

FIG. 5.—LAKE FORMED BY SUBSIDENCE OF LAND.

The Feedwater of Stamp Mills.

In a paper prepared by Bernard MacDonald, M. E., of Montreal, Canada, read before the Canadian Mining Institute, March 1st, '99, the author has introduced a new idea in supplying mortars in gold mills with feedwater. The author of the paper says:

"In considering this question it should be understood that a continuous and uniform stream of water is required in the mortars of the stamp mill to mix with and form a thin pulp of the ore as it becomes pulverized beneath the blows of the falling stamps and in this condition (thin pulp) to carry it in suspension until discharged through the screen meshes.

"It is customary to introduce the water required for this purpose over the top of the mortar in iron pipes or rubber hose. Thus introduced the water falls about 3 feet before it reaches the top level of the pulp mass in the mortar where it is still about 7 inches above the crushing surfaces of the shoes and dies. On reaching this position it will be seen that a large portion of it must of necessity be discharged from the mortar before it can be mixed with the ore as it is pulverized. Therefore such portion fails to effect the purpose for which it was introduced. But perhaps the greatest defect in this system is the fact that the feedwater falling on the pulp mass has a tendency to settle the fine sands and slimes below the discharge level which not only lessens the discharging capacity of the mortar, but subjects the fine sands to further pulverization after having reached the proper degree of fineness to pass through the screens, thus producing loss by sliming the pulp and unnecessary abrasion of the free gold particles.

"The points of superiority claimed for the 'improved' method are that the water, being introduced below or on a level with the crushing surfaces of the shoes and dies under a static head, sweeps off at once from the dies and between them such portion of the ore as has been reduced to a sufficient degree of fineness, and carries it upward into the pulp mass, where it is immediately presented with the most favorable opportunity of being 'splashed' through the battery screens. This removes, to a very considerable degree, the cause of sliming the pulp for which the stamp mill has been noted, and, as will readily be seen, increases the discharging capacity of the mortar and hence its crushing capacity. In thus washing away the fine sands and slimes from around the dies, leaving only the coarser particles of ore to occupy these spaces, a favorable receptacle is provided into which the coarse gold may settle and be protected from unnecessary abrasion. Were the water introduced in the customary way, the spaces around the dies would be packed with an impenetrable mass of silt which would offer no hiding place for the coarse gold which would be lashed hither and thither through the mortar, losing by abrasion with every contact between the stamps and dies or with the sharp quartz. Summed up, the points of advantage in this method are:

"(1) Increase of crushing capacity.

"(2) Decrease of sliming.

"(3) Preparation of the bottom of the mortar to retain and protect the coarse gold from abrasion.

"It was feared at first that the holes for admitting the feedwater to the mortar might become choked up with pulp inside the mortar, but one month's continued operations without any symptoms of trouble from this source has proved these fears groundless.

"The head under which the water flowed to the mortars in the case under consideration was 30 feet."

This idea is in the experimental stage, though the writer states that it has been in use for a month. While it is quite possible that feedwater introduced at the level of the top of the die may give increased capacity, it seems unsuited for mills where amalgamation is practiced inside the battery. An insight into what really takes place within a battery can only be gained from a close inspection of the material in the mortar when the stamps are at rest. It is usually the aim of mill men to save all of the gold inside the mortars that can be secured without too seriously affecting the capacity of the battery. The MINING AND SCIENTIFIC PRESS will be pleased to receive from mill men opinions on this subject and on kindred subjects relating to the treatment of ores in stamp mills.

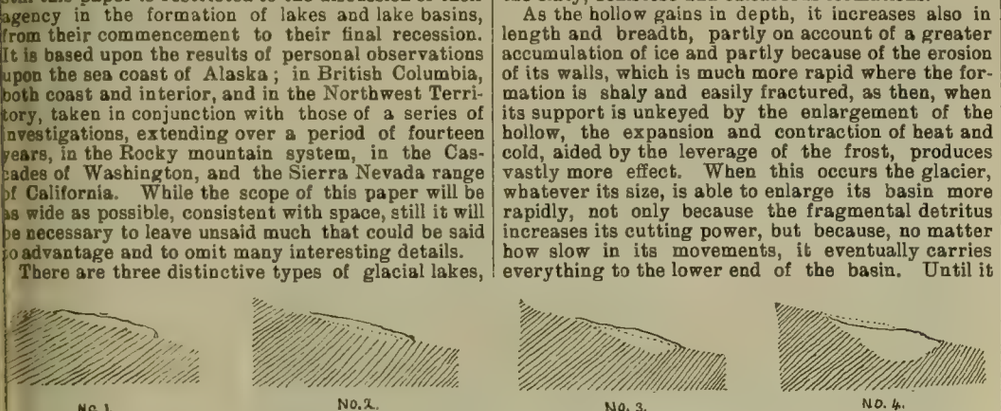
Glacial Agency in Lake Formation.

Written for the MINING AND SCIENTIFIC PRESS by A. THURSTON HEYDON, M. E.

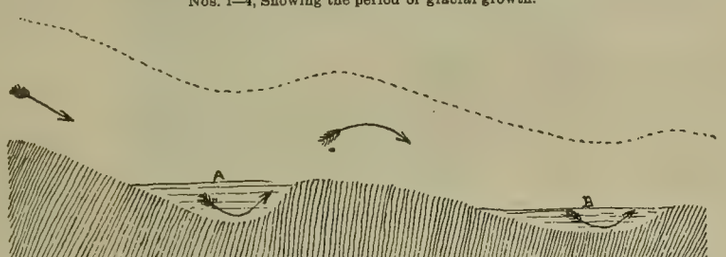
While many lands are either endowed with glaciers or else bear more or less well defined evidences of past glaciation, the far Northwest is the place of all places in which the various stages of glacial action can be studied to the best advantage. That region contains the whole history of glaciation in one volume, yet with a comprehensiveness and fullness of detail unobtainable elsewhere. There, glacial growth can be traced from the small patch of granular snow remaining upon a protected spot when the autumnal frosts return, to the immense iceberg-forming glaciers, such as the Muir, to its decadence, from the first evidences of recession to the vast areas planed off, the valleys carved and the lake systems scored out by the icecaps, whose degenerate remnants are still existing in the sheltered gorges of the higher mountains. Everything is there, without a missing page or an omitted paragraph.

While whole libraries could be written and illustrated without exhausting the subject of glaciers, still this paper is restricted to the discussion of their agency in the formation of lakes and lake basins, from their commencement to their final recession. It is based upon the results of personal observations upon the sea coast of Alaska; in British Columbia, both coast and interior, and in the Northwest Territory, taken in conjunction with those of a series of investigations, extending over a period of fourteen years, in the Rocky mountain system, in the Cascades of Washington, and the Sierra Nevada range of California. While the scope of this paper will be as wide as possible, consistent with space, still it will be necessary to leave unsaid much that could be said to advantage and to omit many interesting details.

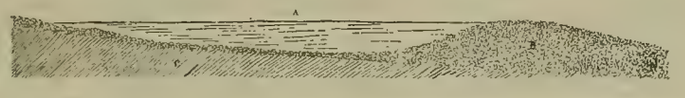
There are three distinctive types of glacial lakes, viz.: the first class, which are usually the first of a series or system or else either flank or are entirely independent of such series, and, being formed by local action, are typical of the rise of a glacial epoch; the second, which occupy basins hollowed out by the flowing glaciers and are typical of the maximum of the epoch; and the third class, which are restrained by morainic dams built by the retiring glaciers, and are characteristic of glacial decadence. Although these are the three distinctive types, the majority of the glacial lakes are a blending of two, and, occasionally, of all three types. For instance, what would have been a lake of the first class becomes one of the second when its basin was used by a glacier descending from above it, and the second partook of the characteristics of the third when its outlet was moraine dammed. The above types and variations are characteristic of glacial action, whether in one of the great icecaps or in a local glacier.



THE FORMATION OF GLACIAL LAKES OF THE FIRST CLASS.
Nos. 1—4, Showing the period of glacial growth.



A. B.—GLACIAL LAKES OF THE SECOND CLASS.
The dotted line represents the glacier which hollowed out the lake basins. The arrows represent the line of greatest force in the glacier.



A.—GLACIAL LAKE OF THE THIRD CLASS. *B.*—DAM FORMED OF GLACIAL DETRITUS. *C.*—BEDROCK.

The initial step in the formation of a lake of the first class is a patch of snow upon a flat or a relatively gentle slope, so situated that it remains unmelted until the snow flies again. As the formation beneath it is kept moist when that surrounding it is comparatively dry, or else thawed when the rest is frozen, it has more time for decomposition and so is more easily disintegrated. Unless the grade and formation or the vegetation at that point are just right, the waters from the melting snow will cut a channel, with the result that a ravine, instead of a lake basin, is formed; but if the overflow passes over a bit of harder formation, or clay or mossy ground, the disintegration of the formation beneath the snow is more rapid than the erosion immediately below it, and first a flat and then a hollow place is the result. While the fragmental rock, grit, etc., with which a glacier is shod, acts like a rasp upon the formations over which it passes, still the pressure and friction of the ice itself, with its various temperatures, play no inconsiderable part in glacial erosion, and both are greatly assisted by the water, which, in addition to its torrential force, aids in the chemical decomposition of the rocks. In the commencement of a glacial lake basin, the rasping action is relatively at a minimum, while that resulting from frost, ice and chemical decomposition is at a maximum.

The products of purely mechanical erosion at this stage are usually fine enough to flow off in suspension along with the insoluble products of chemical decomposition, while the others are carried off in solution. The milky, greenish and bluish-white, the green, bluish-green and blue tints of the various glacial streams simply result from the reflection of light by the infinitesimally fine particles of matter held in suspension. The effect of all this is to produce a hollow which all of the forces tend to enlarge at a rate commensurate with its increase in size. The more easily disintegrated or shaly the formation the greater the results in a given time. For this reason, although there are many glacial lakes in the granites, the larger and deeper ones are found in the slaty, schistose and calcareous formations.

As the hollow gains in depth, it increases also in length and breadth, partly on account of a greater accumulation of ice and partly because of the erosion of its walls, which is much more rapid where the formation is shaly and easily fractured, as then, when its support is unkeyed by the enlargement of the hollow, the expansion and contraction of heat and cold, aided by the leverage of the frost, produces vastly more effect. When this occurs the glacier, whatever its size, is able to enlarge its basin more rapidly, not only because the fragmental detritus increases its cutting power, but because, no matter how slow in its movements, it eventually carries everything to the lower end of the basin. Until it flows over the lip of the basin the glacier protects it by riprapping it with the morainic matter deposited upon it.

All of these forces tend steadily in one direction, viz., the enlargement of the basin, which increases in size from the dimensions of a puddle to those of a pond, and eventually to those of a lake, the size attained being regulated by the excess of the annual snowfall over the annual thaw, the changes of temperature and the life of the glacier. The life of the basin itself is limited by the ability of its lip to withstand the forces of erosion, and after it becomes a lake basin, in addition thereto, it is limited by the amount of sediment and drift deposited in it.

The second class of glacial lakes results, in favorable spots, from the action of a glacier, moving on its course, planing off eminences, obliterating some depressions and making or enlarging others. As the rock-shod glacier plows along, it cuts its way deeper and deeper. While at first it usually remodels a watercourse to suit its needs, still, after it has attained mass and momentum, it fills up old valleys with morainic detritus and carves new ones. Should a mountain range play the part of an obstructionist, it is cut through forthwith. The massing up of the ice before the passage of a range or other obstruction and its spreading out after the compression of the passage form basins on both sides, while smaller ones are scored out between.

The glacier glides on like water, only at an infinitely slower rate, up and down and around the obstructions in its course. A vertical section shows that its course consists of a series of convex descents and concave rises, which blend into each other with the most beautiful curves in a firm formation. The smaller ones are frequently very perfect, while the larger ones run on broader lines and are more subject to variation from changes in force and direction as well as differences in the hardness of the formations. But large or small the principle is the same. As in a glaciated surface, puddles lie before and after a pitch, so lakes are found in the same relative positions. Unless filled in by detritus, the deepest portion of the lakes, with the exception of the holes in easily disintegrated formations, as well as of the puddles, is near the lower end at the point where the downward force gained by the ice in its descent was spent and it arose on the rebound. The point down the lake at which this occurs depends upon the steepness of the pitch and the thickness of the glacier.

As long as a glacier is growing and moving forward, so long will it have no terminal moraine to speak of, but when it comes to a standstill and then begins to shrink, it builds a terminal moraine which varies in size with the speed of recession. As it will remain stationary longest where there is a narrow outlet for a large body of ice, the accumulation of drift will be the largest at such a point, and form a dam. While such dams are usually at the lower end of a basin where the waters supplanting the receding glacier would have formed a lake without their aid, still sometimes, from a temporary lull in the rate of recession, dams are made and form lakes of the third class where otherwise there would have been none.

It must not be supposed that lakes occupy all of the basins made by glaciers, as it depends upon their rates of recession as to how much of their courses are filled in with morainic matter, and the rolled gravels and silts resulting from the torrents to which their melting gives rise. The facts are that, on account of the lowering of the lake levels by the wearing away of the lips of their basins as well as the accumulations of silts, etc., a large percentage of the glacial lakes are extinct long before the glaciers which formed them have retired into the mountain fastnesses from whence they sprang. On account of the comparative ease with which lakes of the third class cut through the dams with their overflow, they are the shortest lived of all, while those of the first are the longest in proportion to their size, as having but little glacial detritus around them they are practically only filled in by the products of subsequent erosion.

Miners' Range, N. W. T.

The Science of Prospecting.

Written for the MINING AND SCIENTIFIC PRESS.

The question is frequently asked, "Why are not scientifically educated mining engineers the discoverers of more rich mines?" Briefly, the answer is: because they do not prospect. Undoubtedly men who have the advantage of a technical and scientific training in mineralogy, metallurgy, geology and engineering are better qualified to prospect intelligently than those who have not had these advantages, but usually such men are otherwise employed and have little time to prospect, even if so disposed.

A technical education without practical experience does not fit a man for even such an humble occupation as prospecting. While a prospector, whose chief reliance is in his muscle and not in his technical education, may accidentally stumble upon a valuable ore deposit, he is out looking for mines, and as all rocks look much the same to him it does not concern him whether he picks up quartz, limestone or a fragment of some eruptive rock, for either may contain precious metals, and his very ignorance of the character of the rock is his safeguard. All miners, whether technically educated or not, are prone to search for mineral deposits, veins, float, etc., similar to those they are familiar with. To the Comstock miner the ideal mine is found in the bonanzas of the Comstock; the Homestake miner looks for broad zones of quartz and schist colored red by oxidation; the Leadville miner is in search of a contact of lime and porphyry; the Californian wants black slate and greenstone; the Butte, Montana, miner thinks granite a fine formation for mineral; the Arizona prospector will camp with a rotten, iron-stained porphyry dyke; the development of the Cripple Creek mines has created a demand for phonolite, and in the Black Hills of South Dakota the discovery of gold near Ragged Top has made "arrowhead flint" the proper material in which to seek gold; the miner from Calico, California, is always on the lookout for large masses of peagreen breccia, in hope of finding chloride again; the digger from South Africa is satisfied with a conglomerate reef and recognizes one at sight; the miners familiar with Silver Reef, Utah, know that some white sandstones and drab clay shales contain high-grade silver ores. And so in endless variety of form and occurrence the miner from each region looks for the characteristics with which he is familiar. While the prospector may locate anything to which his notion inclines him, he locates much that is worthless and doubtless passes much that is valuable, where the technically educated mining engineer would probably recognize the worthlessness or the value of any particular occurrence were his attention directed to it; but, as previously stated, he is not prospecting. It is rarely that the technically educated, experienced mining engineer

makes a mistake by condemning a valuable mine, though he may admit possibilities for some undeveloped mines which never materialize. In all undeveloped mines there is an uncertainty and the element of chance cannot be disguised. Often a too great willingness to take this risk results disastrously. When the Commonwealth mine, in Cochise Co., Arizona, was in the prospective stage it was visited by a technically educated mining engineer, who, after an examination, purchased the property for a large sum. Those familiar with the history of the mine know no mistake was made. The existence of telluride ores rich in gold at Cripple Creek was made known through the discovery of float by a technically educated mining engineer, who recognized the telluride.

Since, then, gold is found in paying quantities in such a variety of rocks, of so many different geological ages, and is associated with such a variety of minerals, it may be considered unwise to pass any rock by without attention as unworthy of notice. Within the personal knowledge of the writer gold and silver occur in the United States in almost every kind of rock known to science, with the exception of feldspar-basalt and rocks of that extremely basic type and obsidians or vitropheres and rocks of the extremely acid type. Undoubtedly quartz is the mineral most commonly associated with gold, but gold also occurs with calcium carbonate, feldspar, garnet, in aggregates of mica scales, in hornblende, in coal, and in slates, in granite, sandstone, limestone, diorite, andesite, rhyolite, and, in fact, in every variety of rock. Some dykes are gold-bearing without showing any considerable alteration or silicification. It would seem, then, that the prospector should test every rock formation, whether familiar or not. The men who made the first quartz discoveries at Randsburg, California, were dry washing for placer gold, and, it is said, knew so little of mines and mineral veins that as they approached the croppings of one of the most famous veins in that camp, in the course of their placer work, used to sit upon the outcrop and eat their lunch, little dreaming that the blackened honeycombed rocks were rich in the very metal they were striving under such difficulties to obtain. Of the great army of prospectors who are found throughout the mining region there are, perhaps, comparatively few who would not recognize a vein when they saw one, but such cases are of record. W. H. S.

The Alluvial Deposits of Western Australia.*

NUMBER II.

By T. A. RICKARD, State Geologist, Denver, Colorado.

In mountainous regions the disintegration of the surface is mainly caused by the frost. Water penetrates into crevices and cracks, and, because its maximum density is at 4° C. and not at zero, it undergoes such expansion in the immediate approach to the freezing point as to become a powerful lever for tearing the rocks apart. Thus is loosened that material out of which eventually the alluvial deposits of the valley are formed. In warmer climates the contraction and expansion of water is likewise a ceaselessly destructive agent. Even in a dry, hot region, such as the interior of West Australia, the difference between the heat of day and cold of night causes the dew to play an important part in moulding the physiography of the country.

A low ridge of the desert is crested with the outcrop of a gold-bearing quartz vein, which, amid that surrounding sea of dark blue scrub, justifies its colonial designation, a "reef." On its flanks there is a thin cover of sandy soil which gradually thickens, a little lower down the slope, to a deposit of several feet. Sink a hole and you will find, first an inch or two of loose sand and dust, then a more solid layer of gravel and dirt, which in turn passes imperceptibly into a compact material consisting of fragments of rock and quartz, held firmly together by clay. It is called "cement," and it might better be termed an "agglomerate." It is an unclassified product of erosion and lies close to the place of its origin, as a mere collection of unsorted debris.

The rock on which the deposit rests is so softened by decomposition that it is frequently taken for a part of the overlying detritus. if the hole be continued so as to become a well or shaft, it will penetrate through additional oxidized ground until this suddenly gives place to diorite or granite (the two prevailing formations) at a depth varying from 75 to 200 feet, which is the drainage level of the region.

This deposit owes its existence to the wind and rain, assisted by gravity acting on a slightly inclined surface. Wind is ordinarily an insignificant geological agent, but in the constant and violent draughts of a high plateau there is a force which, working during long periods of time, is capable of producing notable results. In the vicinity of Coolgardie and Kalgoorlie, especially the latter, which has the less broken topography, the dust storms are almost ceaseless, and bear forceful testimony to the amount of material which can be conveyed in the air.

The whirlstorms spring up suddenly, rush madly across the plain, suck up everything lying loose on the surface, and as suddenly subside. These apparently erratic air disturbances are responsible for the transport of the greater part of the material which weathering and erosion have disintegrated.

In traveling over the country one is soon called upon to notice the broken white quartz scattered over the ground in big patches many acres wide.

The granite is kaolinized to an almost incoherent clay, and the diorite is rendered abnormally heavy in iron by the surface concentration of decomposition products. And as the rock is eroded the quartz, on account of its hardness, persists, so that a series of small stringers eventually yields an accumulation suggestive of its derivation from a large mass. It is a process of concentration which, there is reason to believe, has also affected the gold occurrence, the upper portions of veins being enriched by the deposition of the gold left behind from lode matter which was long ago disintegrated and removed by erosion.

If we now turn to the "dry blower" and watch

FIG. 2.—DRY BLOWER AT WORK.

him at his work we shall see the same processes utilized in the winnowing of the gold.

Dry Blowing.—In West Australia the absence of running water renders unavailable the cradle and the sluice box of ordinary placer mining, with the result that the prospector has learnt, intuitively, to utilize the agency which he sees incessantly at work in the nature around him. Wind replaces water. The method is simple. Taking two pans, which the Australian calls "dishes," he places one of them on the ground, empty, while into the other he puts a shovelful of the "dirt"—that is, the sandy detritus containing the gold. The material is shaken up so as to bring the big lumps on top, and then, resting the pan on one knee and holding it with his left hand, he uses the right hand to skim off the coarse particles. Then, standing erect and facing at right angles to the direction of the wind, he slowly empties the full pan into the empty one at his feet. As the stream of dry dirt falls, the wind selects the fine and blows it in a cloud of dust to leeward. The operation is then reversed, the pan which has just been emptied being placed on the ground so as to receive the contents of the other. This is repeated three or four times, according to the degree of concentration effected. In a strong breeze one operation may prove sufficient. To prevent the loss of the fine gold which is sometimes carried away with the dust, it is customary to spread a piece of canvas on the ground, one end being placed under the pan and the other extending to leeward. The next stage is to further winnow the material by tossing it up and down in the pan (see Fig. 2). The latter is held slanting forward, and is jerked so as to throw the dirt from the front to the back of the pan. The light particles ar separated, as chaff is driven from grain. Then, gi ing the dish a vanning movement, the prospect again removes the coarser particles that come t the surface by skimming them off with his han There now remains about half a pint of material, an this is diminished by panning, just as in water, th dry particles having a mobility permitting th method of treatment. Finally he drops on his kne and, holding the pan so that it is tilted forward, b raises it up to his mouth and uses the breath of h lungs to complete the process. The particles of gol are seen fringing the edge of the iron sand. If th yield consist of only a few minute particles he put his moist thumb on them, and so transfers them t his pocket; but if there be any coarse pieces—nug gets—they are put into the leather wallet attache to his belt.

In watching a dry blower at work it becomes ev dent that the operatio like every process of co centration when properl conducted, consists of si ing and classification. Th wind removes the fine san and the dust, the opera tor's hand skims off th larger lumps of dirt, s that there finally remain a collection of those heav particles of ironston which, as in ordinar placer mining, accompan the gold.

Owing to the perfec dryness of the dirt an the heat imparted to th surface of the iron pa under a tropical sun, th material behaves wit much of the mobilit which it would have i water and not air wer the vehicle employed. I reminds one of the be havior of a charge in th roasting furnace, in whic the hot air cushions eac particle so as to give t the mass an apparen fluidity.

The rapidity and com pleteness of the operatio depend on the strengt and uniformity of the wind. There is a constant light breeze on the gold fields, even during those happy intervals when the dust-whirls have tempora rily subsided; but the cloudy mornings of the wet season and the sultry days of the hottest sum mer months are alike unfavorable to dry blowing, because at such times the air is dead. Many of the mining camps are situated on a slight rise of ground, overlooking those desolate sinks of salt and sand which are called "lakes;" and the difference of level is marked by a constant breeze which is a good friend to the dry blower.

In the history of ordinary alluvial mining, washing with the pan was succeeded by the use of the sluice box and the cradle. Similarly the "dishes" of the dry blower are replaced by machines of several types, all of which, however, are based on the idea of a shaking movement in the presence of a current of air. The simplest contrivance is represented in Fig.

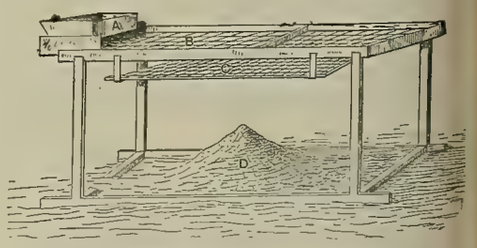


FIG. 3.—DRY BLOWING MACHINE.

3. This machine is 2 feet wide and 4 feet long. *A* is a hopper with a sheet iron bottom punched with 1-inch holes, *B* is a 12-mesh screen, *C* is an 18-mesh screen, and *D* is the final product of the operation. The dry blower empties a shovelful of dirt into the hopper, places his hands on the two sides of the machine and shakes it from side to side. There is sufficient play in the frame itself to permit a movement which causes the material to pass through the series of screens and accumulate underneath.

(*To be Continued.*)

* Condensed from paper read before the Am. Inst. M. E.

Mining Summary.

ARIZONA.

Near Prescott on the 3rd a fire in the Big Bug mine resulted in the complete destruction of the stamp mill and the hoist of the Red Rock Milling Co. The mill had just been completed at a cost of over $20,000 and had not been run. Loss $25,000, no insurance. The property belonged to Spruance, Stanley & Co. of San Francisco.

At the Black Diamond group of mines, in the Dragoon mountains, the contractors who are doing 200 feet of work report striking a rich body of sulphide copper ore; 20 feet of the ore is opened up.

A strike is reported in the Oriole mine, at old San Domingo, eight miles east of Wickenburg. The Oriole was located a year ago by the Ardath G. M. Co. of Indianapolis. The Ardath Co. have sunk a shaft to a depth of 100 feet and have done a good deal of drifting. They have now about 800 tons of ore on the dump. The new strike was made on the west drift, disclosing a vein 2 feet wide, which assays $300 a ton. Machinery for a stamp mill is on the way to the mine.

On the Silver Trail mine, one of the Sundance group on the Hassayampa, near the Senator mine, a rich strike is reported at a depth of 220 feet. The ore body is 4 feet wide.

J. H. Costello has started the mill on the Trilby mine, in White Picacho district. The mine is well opened.

The Black Warrior Copper Co. at Globe has let a contract to drive a crosscut tunnel 225 feet on the Dadeville.

The railroad to the Old Dominion mine is completed and the smelter operating. It is expected it will turn out 30,000 pounds per day. When the smelters have not been working the force has been reduced to 100 men. It is expected that 300 men will soon be employed by the company. The Old Dominion is still looking for sulphides to mix with its richer ores. Nearly all the other big copper mines in Arizona are now producing their copper from sulphides.

The Boston News Bureau asserts that Lewisohn Bros. & Co. backed the Arizona Copper Co. to the extent of some millions of dollars, and have finally brought it to such a state as to make its 160,000 shares, which are sold in the London market and mostly owned by Scotchmen, worth about $55 per share, or $8,000,000 for the property, whereas a few years ago it was heavily in debt and could be bought for less than $2 per share.

Journal-Miner: M. S. Taft has shipped five carloads of ore from the Sterling mine, on Big Bug, which netted him $800 per carload.——Preparations are being made to sink the Senator shaft to a greater depth.——On the Polar group of mines, in Black Rock district, a 75-foot shaft recently sunk develops a vein 30 inches across.

CALIFORNIA.

Amador.

The shaft at the Bay State mine, four miles north of Plymouth, is being sunk to 1000 feet by contract.

The shaft at the Amador Queen No. 2 is down 800 feet. Some valuable ore has been taken out.

It is reported that H. W. Brown of Salt Lake City, Utah, has paid $100,000 for a quarter interest in the Ivanhoe mine, two and one-half miles northeast of Plymouth. The Ivanhoe is about 40 feet between walls and consists of amphibolite schist through which occurs a reticulated mass of small quartz stringers. The ground is soft and is quarried at present at small expense.

Butte.

The new 40-stamp mill at the Banner mine near Oroville is running steadily and miners are being put on every day. The new mill is provided with cement mortar blocks and electrical power.

Calaveras.

The 10-stamp mill at the Ford mine near San Andreas was completed on the 1st inst. Electric power will furnish light and run the mill, concentrators and rock crusher, and the batteries will be supplied with water from the mine, for which purpose two 10,000-gallon tanks have been erected.

At the Gwin mine a new shaft is being sunk. The grading for the new mill is still in progress. Most of the grading was done by the hydraulic method under a pressure of 300 feet.

It is reported that pay gravel has been struck on French Hill one mile from the town of Mokelumne Hill, in a shaft at a depth of 75 feet.

The Lightner M. Co. at Angels have their electric machinery in place and the 20-stamp mill is run by electricity. The foundation for a new compressor is completed and the compressor is being set up. Three air receivers will be put in connecting with the compressor.

The machinery has been removed from the Great Western mine, near Altaville, by the Drake M. Co., Ltd., and has been taken to Ghost mine, near Angels. It is said that the Drake Co. has secured the extension between the Ghost claim and the cross shaft. The price is reported to be $90,000.

Work at the Green Mountain hydraulic mine on Chili gulch is progressing. At this mine is a derrick having a 75-foot "boom." Three hundred inches of water are used. J. Burton is operating the mine.

The Drake Properties, Limited, in the southeastern limits of Angels, has an option on the Last Chance mines, adjoining their property. The company has also bought a water right on Stanislaus river at Bostwick's Bar.

Work on the Admiral Von Tromp mine near Pine Log is to be resumed.

There are over 100 miles of ancient river channel in Calaveras Co., of which not less than twenty-five miles remain intact.

Boston capital is now invested in Melones G. M. Co. There are 200,000 shares, par value $10. The property was bought for $182,500 cash and 13,250 shares of the stock. The directors are W. E. C. Eustis, C. M. Weld, I. T. Burr, J. Parker, J. C. Whitney, C. N. Felton, W. C. Ralston. The 100-stamp mill will be completed in November, when it is expected to employ 175 men and mill the ore for less than $2 per ton. The stock sold in Boston last week for $6.50 per share.

There are rumors of the Fox or Tozier mine at Angels being reopened. This property joins the Utica on the north.

Del Norte.

Miners near Crescent City are making examination of their beach claims with a view to sinking deeper than has ever before been done by those who have carried on mining there.

El Dorado.

The Union mine at El Dorado has added an electric plant for lighting.

Work will soon begin by the Harpending Co. on the Central mine near Church Union.

The Starlight mill has started up.

The Morrison mine near El Dorado will be reopened.

Prospect: The Ritter mine on Murray creek ridge, two miles north of El Dorado, is an old location, covered by a U. S. patent, and was worked in the fifties but abandoned. It was reopened by E. C. Rigney last November and has been prospected to a large extent. The tunnel has reached a depth of 285 feet, 260 feet of that distance being on the pay shoot. The shaft, sunk from the apex of the ledge, is down 75 feet, and in 75 feet more will tap the tunnel.

Kern.

The St. Elmo near Randsburg is being worked again after an idleness of many months under a lease to the Johannesburg Reduction Works with W. Walker as Mgr. The lease requires that they sink a number of feet each month in addition to drifting and stoping.

Golden Bros. are shipping a carload of ore from the Slate range via Johannesburg to Selby & Co., San Francisco.

The California Borax Works northeast of Randsburg have commenced work and are shipping their first lot of borax.

The Little Butte Co. at Randsburg has built a stamp mill at Dove Springs which is now in operation.

A 20-ton capacity cyanide plant has been completed at the Red Dog mill. The mill is running on ore from the Kinyon and Ruby mines.

Miner: It is expected that the cyanide plant at Cuddeback Lake will begin operations the first of the week. They have a complete plant and will be able to handle twenty tons a day.

Mono.

The stockholders of the Standard Consolidated M. Co. have authorized a reduction of the capital from $20,000,000, divided into 200,000 shares of the par value of $100 each, to $2,000,000, divided into 200,000 shares of $10 each. Since the new mill started up the gross output has been $38,475.19.

Napa.

The Vallejo Quicksilver M. Co. has levied an assessment of 2 cents per share, delinquent March 20.

Nevada.

The Pennsylvania M. Co. of Grass Valley has paid a 5-cent dividend, making the 27th. A new mill building is about completed at this mine and the machinery is being put in place.

At the Eagle Bird mine in Maybert recently a rich strike was made on the sixth level, the ledge being 5 to 8 feet wide and the quartz showing free gold.

The *Union* says negotiations are pending for the sale of the Eagle Bird mine at Maybert to an English Co. C. R. Rowe, representing E. A. Burr & Co. of London, England, who transacts the business for the company is in Grass Valley.

Placer.

Herald: At the Marguerite, near Auburn, work is going on.——The tailings at the old Chicago mine are being treated by the cyanide process.——Rymal & Jones struck a pocket from which they took out over $1600. A few days ago after prospecting three days. The gold runs over $19 an ounce. The claim is near Pilot Hill.——The Hathaway, near Ophir, will soon extend its pipe line to the top of Boulder ridge.

Plumas.

The Genesee mill is again in operation. Mrs. Gruss has recently build a furnace provided with a boiler for supplying the batteries and plates with water at the desired temperature to improve amalgamation.

Riverside.

The Mammoth mine near Menifee has a large vein lying at a low angle in granite. It prospects quite regularly. The vein has been opened by several surface cuts and tunnels extending into the hill from which crosscuts have been run. Over an acre of quartz is blocked out, having a thickness of about 7 feet.

The mines at Virginia Dale owned by Ingersoll & Esler of San Bernardino are turning out over $100 per day.

Siskiyou.

The recent storm has resulted in starting work in several claims on the flats and in the gulches around Yreka.

The company which bonded Yreka creek also bonded Cottonwood creek, and will begin prospecting the ground on that creek with steam-boring apparatus.

A. Erno is putting up a new hoisting plant at his claim in Quartz valley.

A Denver, Colo., company has bonded a mile of Cottonwood creek, near Hornbrook, and also the ditches and property of W. H. Smith, near Henley, in the same section, with a view of putting in a dredger.

Negotiations are in progress for the Louis Nehrbass ranch at Greenhorn creek, adjoining the Blue Gravel mine, for mining purposes. A company represented by F. D. Frazer and W. H. Crooker, who are making this deal, will also bargain for Rostel's place.

E. Wallace has bonded land along Yreka creek for the purpose of mining by dredger process.

Some rich ore has been found in the Growler mine of Corbett & Parker, in the Wagner Creek district, recently.

Yreka *Journal*: Miners at Greenhorn Blue Gravel mine are getting back to the pay where the cave occurred lately. There is an abundance of water in the creek for washing and a better supply for pumping from the bedrock.——Mining at Cherry creek is in progress, since the late storm furnishes a supply of water for placer mining.——Spengler Bros. will start work at the mouth of Humbug, and with more rain or snow can continue steadily.——R. L. & S. M. Atkinson have located numerous quartz claims in Snowden district, on Shasta river. The quartz ledges in that section are similar to those in the Fool's Paradise district adjoining, and along Shasta and Klamath rivers.

San Diego.

It is claimed that the first run under the new management of the Ranchita mine, near Banner, resulted in a cleanup of $50 per ton. The ore was taken from the 450 level of the mine. The quartz occurs in a series of lenses in mica schist.

The Golden Chariot mine, six miles from Banner, was the richest mine ever found in that region. It was shut down years ago and has never been reopened, though many believe, in these days of improved methods and machinery, that it would become a paying property if reopened.

L. M. Bailey is driving a crosscut tunnel to strike the vein of the Kentuck S., near Banner. The formation is mica schist and some of the ground very hard. A power drill is in use. This mine was quite extensively worked on the surface years ago.

A 5-stamp mill is being built at the Old Escondido mines, near Escondido, replacing the Griffin rotary mill formerly there. The Escondido mine has been worked off and on for many years. It is a fissure in granite.

San Diego *Sun*: Receiver C. W. Pauley of the Golden Cross mines at Hedges has filed his fourteenth monthly report in court. The cleanup of the 100-stamp mill for December was $30,796.60, and $1086.99 was received from other sources. The payroll for the month was $8000, fuel cost $800, and the current expenses amounted to $8000.

Shasta.

(Special Correspondence). — The German Co. reported "receiving bids for a smelter" is not at Kennett, but at Stillwater. The representative is Geo. Bayha of Redding.

Stillwater, Cal., Mar. 4th, '99.

(Special Correspondence). — The Golinsky group of copper mines, including the Ferguson & Goss properties, comprising nine claims and 160 acres, which were bonded in January last for one year to Lewisohn Bros. of New Jersey, are undergoing development under the supervision of W. R. Kemp, employing thirty men. They are running tunnels and sinking shafts. The formation is porphyry, the veins having a gossan capping. The deposits are so large that they can scarcely be called veins. The property is four miles northwest of Kennett.

A company of New York capitalists is developing a group bonded from Salitzer & Co., also near Kennett, which comprises a section of R. R. land and numerous additional locations. A large force is at work. This is known as the Mammoth mine.

The Balakalela and Windy Camp group of copper properties is under development by C. A. Malm and others of San Francisco and New York. In this group are above twenty claims.

Friday & Lowden are developing a large area of copper country, and their ore carries a fair percentage of gold. Northwest of these lies a gold belt in which are the Clipper & Snyder, the Uncle Sam and the Riley mines, all of which have been dormant for some time. The Uncle Sam was recently bought by Daken & Newcome from the Sierra Buttes Co. On this property twenty-five men are at work.

On Backbone creek, Chas. Butters has put in order his water plant and built a four-mile ditch 6 feet wide and 2 feet deep. He contemplates installing an electric plant and putting in an experimental cyanide station.

The Herrin group of seven copper claims is being developed by tunnels and surface cuts. The ledge is 9 feet wide. The lowest assay ran 2½% and the highest 10% copper. The property is under option to New York people.

Smithson & Graves recently bonded a group of copper claims near Kennet to an Eastern company who are pushing development work with a large force.

The Stowell property, a large area of copper territory, is being developed on an extensive scale.

There is little if any unlocated mineral land in this section and there is consequently no inducement here for other than capitalists. The outlook for the investment of large capital in the several properties named and the building of smelters is practically assured from the successful results thus far attained in the work in progress.

Kennett, March 6th, '99.

A strike has been made in the Black Spider mine. Ten tons of ore it is reported returned $8000. The mine is near Keswick. About a month ago the owners started in to do their assessment work for '99. They were about to leave the claim, having done the $100 worth of work when they struck the rich pay streak.

Shattuck & Thompson have located eight claims since Christmas on the hill west of Keswick. They have shipped to the smelters 100 tons from the Home Run and the Much in Sight.

A deed was recorded February 25th in which O. O. Howard Jr. made a transfer of the Mount Shasta mine properties, including the Mount Shasta, Lucky Boy, El Chiquita and the Anglo-American quartz mines, to the Mount Shasta Gold Mines Corporation.

Free Press: The Dry Slide mine, owned by D. McCarthy of Keswick, between the smelters and mine, is shipping rock to the Keswick smelters which samples $365 a ton.—— J. Scranton has struck ore in his mining property on Nigger Hill.

Stanislaus.

A suit for $23,000 damages has been filed in the U. S. Circuit Court by the Huron M. Co. against the Turlock irrigation district. The complaint alleges that a dam in the Tuolumne river belonging to the defendants gave way in July, '98, preventing the plaintiffs from carrying on their mining operations in the bed of the river.

Tuolumne.

At the Turner Flat gravel mine, near Montezuma, the new shaft is down 25 feet. It is located 1400 feet north of the old shaft.

The long crosscut tunnel at the Hazel Dell mine, seven miles northwest of Soulsbyville, has reached the vein 450 feet from the mouth and 250 feet below the surface. The vein is 2 to 2½ feet wide. Drifts have been started.

The Purdy vein, near the Hazel Dell, is opened by a tunnel from which six tons shipped to Selby gave satisfactory returns. W. B. Moore of Sonora, formerly Supt. of the Draper, is president of the company and L. B. Doe Supt. A 10-stamp mill is contemplated.

It is rumored that the Belle mine, near Tuttletown, will be started up again. The vein is big and has been sunk on 400 feet.

Sinking in the Excelsior shaft, near Sugar Pine, continues at 4 feet per week. The company contemplates putting in machine drills.

Two large boilers are on the road to the Lost Fox mine, near Sonora.

The second three-drill air compressor has been set up at the Alameda mine and will soon be in operation. In the north and south drifts on the 900 level they run 4 feet daily in each.

At the Accident mine in Big Oak Flat a new hoist will be set up.

At the Longfellow mine, on the north side of Big Oak Flat, an air compressor is being placed in position.

At the Jumper mine, near Stent, steam power has been introduced owing to unreliability of water power.

W. P. Scott & Co. of Soulsbyville will develop the O. P. quartz mine on the Comstock ranch, ten miles east of Columbia.

At the Republican mine at Jacksonville sinking has been discontinued for the present, work being concentrated on the 200 level, where drifts are being run north and south. The ledge has an average width of 15 feet. The 10-stamp mill on the Mammoth is making a run on rock from the Republican, which latter has a six-drill compressor operated by air transmitted 3000 feet by pipe from the Mammoth mill. The mine is working eighteen men, Jas. Haggin Supt.

Santa Ysabel recently declined to 9½ from 17. The bursting of the main water supply pipe, which leads from the reservoir to the company's mill, only necessitated the temporary closing down of the mill, and was not at all serious. The installation of electric power is contemplated.

Curtis & Anderson have a 2-foot vein near Columbia which shows free gold.

The Enterprise mill, on Bald mountain, is treating custom ore.

Rich rock has been struck in the Arbona mine, at Tuttletown, in the lowest level.

Promising ore has been found in the Alameda mine. Coal is now being used as fuel to run hoist and mill.

A new air compressor has been put in at the Norwegian mine, near Tuttletown, and sinking is in progress.

The Hennessey mine, at Saw Mill Flat, has been started up again.

In Five-mile creek district a pocket estimated at from $900 to $1400 has been found while grading for a 5-stamp mill, to be erected by the Mt. Lily Co. While digging out for the mortar block, a blind vein was discovered with the above results.

Independent: The suit of the Gerrymander M. Co. against the Golden Gate M. Co., was dismissed in the Superior Court at the request of the attorney for the plaintiff. The suit was brought against the Golden Gate Co. for damages for ore alleged to have been mined from the Gerrymander's ground.——Twenty feet of water is reported in the Tuolumne Co. Water Co.'s new reservoir, due to recent thaws.

COLORADO.

CHAFFEE COUNTY.

Whitehorn *News*: The Gold Bug at Turret is taking out of the drift some $150 ore which is being sacked. The streak of high-grade ore is about 3 inches wide with 20 inches of low-grade quartz.

CLEAR CREEK COUNTY.

At the Hudson mine a shaft house will be built and a hoisting plant installed near Idaho Springs. The property has been secured under lease and option by the Delta-Hudson M. Co. The shaft will be sunk to a greater depth; levels will also be driven. The streak of ore is several feet wide. This is the mine that was worked by "Brick" Pomeroy several years ago.

In the bottom of the shaft on the Dictator mine at Lawson, Van Housen & Co. have a streak of talc that runs $150 a ton. They are sacking it after drying.

The Silver Horn mine on Ute creek has been leased and an option given to a Denver pool for the working of this and other claims of the group. Some high-grade mineral has been produced and is now showing in an adit.

The Clear Creek Power Co. has made a number of purchases of ground along the creek below Idaho Springs and above near Empire. The main plant will be installed at Dumont, where ground has also been acquired. It is the intention of the company to supply

electric power to the mines of this and Gilpin county.

The Gem Extension, Main Trunk and Santa Fe mines are consolidated under one management. The Gem Extension is down 560 feet, and six levels have been driven on the vein, running from 300 to 700 feet in length. In all these levels there is good ore. The property is worked by leasers.

Republican: A strike is reported at Idaho Springs in the Shakespeare tunnel.——In drifting east of the Prosperity they came upon a solid streak of smelting ore. Alongside it is quartz, which also shows good values. The smelting ore runs 86 ounces gold and 283 ounces silver. The quartz runs 14 ounces gold and 100 ounces silver to the ton.

DOLORES COUNTY.

McCombe & McCarthey of Leadville will operate the Union-Carbonate mine, near Rico, under bond and lease.

EL PASO COUNTY.

Denver *Record*: Shipments from mines controlled by Woods Syndicate for the past week aggregated 950 tons, made up as follows: The Gold Coin, 90 tons a day; the Wild Horse, 25 tons a day; the Deadwood, 10 tons a day.

GILPIN COUNTY.

A contract has been let to sink 100 feet in the Delaware mine in Russell gulch, which will make that shaft a depth of nearly 650 feet when completed.

At the Theodore mine in Illinois Central district the shaft was recently sunk to a depth of over 300 feet, and while a good body of ore has been uncovered, it is of too low grade at present to stand the heavy shipping charges. Drifting is in progress.

A contract has been let to sink 100 feet on the Prompt Pay in Russell district, by Aspen parties. The shaft is down 140 feet.

At the Susan Mary in Lake district the shaft is down 215 feet.

At the Chemung-Belmont on Bobtail hill the owners are driving the east 240-foot level with ore in sight and also sinking a winze from the 180 east level to the 240 level in ore. An upraise is being made from the 90-foot west level to the surface for air.

In the Topeka mine there are from 600 to 700 tons of ore ready to hoist. The mine will be started up as soon as the weather justifies such course.

Twenty men are at work on the Running Lode near Black Hawk on the leasing system. Considerable ore is being taken out which will be shipped as soon as the roads are open.

Work on the Mountain City mine on Mammoth hill has been resumed and the pool expects to continue operations steadily.

Ore haulers near Black Hawk have been unable to keep the roads open lately and many mines are accumulating ore or are idle as a consequence.

It is reported that a good strike has been made in the Plateau

The Centerville No. 1 claim, located in Moon gulch, Union mining district, has been sold to Cripple Creek parties, who were represented by M. P. J. Gill.

GUNNISON COUNTY.

(Special Correspondence).—Things seem to to be somewhat quieted down at the Vulcan mine since the arrest of fourteen of the union men, who are now in the county jail awaiting trial, presumably on several charges. They will likely have to answer to the charges of trespassing, conspiracy to destroy the mine with explosives, making the Supt. a prisoner for a number of days, interfering with the mails, and for the shooting of one man. It is understood to day the men will not have a hearing before next week. From a man who was on the ground I learn that the men who were in arms and did most of the duty in arms are men who do not belong in the camp at all, and must have come from a coal camp named Baldwin, about seventy-five miles from the Vulcan mine. Mr. Davidson's report of the matter is not yet at hand. He has charge of the Vulcan mine.

Report has just been received that a snowslide has occurred at the Magna Charta mine, about thirty-five miles from Gunnison, in which six lives are reported lost. It is said the boarding house and bunk houses were swept away. The snow is packed in 150 feet deep and it will be several days before full details can be had. The mine is equipped with a large steam plant, also an electric plant and large double compressor and good buildings. It is hoped the machinery has escaped, as it was pretty well protected against slides.

Gunnison, Colo., March 3rd, '99.

A snowlide at White Pine on March 3rd killed six persons.

A contract was recently let by Mgr. Holmes of the Venable mine at Gunnison for sinking the shaft an additional 350 feet, making a total depth of 510 feet. A power drill plant of three drills capacity has been ordered.

News: The rich strike in the Goodhope mine, with the Vulcan mine, demonstrates the richness of the Gunnison gold belt. The ore was encountered in the 220-foot level 40 feet from the shaft. Nine assays averaged $800. Two men stoped down and took out about ten tons in one day.

HINSDALE COUNTY.

Lake City *Phonograph*: A strike is reported from the Clara L. mine at the lake. It was made at the junction of two drifts, in an accidental manner, while blasting to make a larger turn for the car.

Supt. Dinsmore has commenced work on the Yellowstone mine with five men.

Ten mining claims and a mill site in Sneffels district were purchased recently by A. E. Reynolds for $14,500. None of the claims are developed.

LAKE COUNTY.

Leadville has been snow-bound for several days. Snowslides in various parts of the State are reported.

The condition of the workings in the mines under Leadville is better than was anticipated, and it is thought that within thirty days after the bottom is reached all of the principal producers of the district will be in active operation. Most of the companies in this territory are making arrangements to work. The Home M. Co., which has had charge of the unwatering operations, will work the Penrose and Bon Air shafts, and their lease of seventy-five acres on the Starr placer. The Bohn shaft will resume at once; the Weldon is ready to go to work on repairs as soon as it can do so.

The lessees of the Castle View shaft on Carbonate Hill, Leadville, shipped 3000 tons of sulphide ore during February, it is said, at a net value of $15 per ton.

Shaw & Webb of Leadville have taken a six years' lease on a copper property near Salida.

The Banker M. & M. Co. has made preparations to commence sinking another lift in the Banker shaft at Leadville.

Miner: The Leadville Pumping Association had the water out of the stopes above the main working level in the Penrose shaft early this week. The workings exposed so far show them to be in better condition than was expected. The Northern shaft will be the first to produce ore. The Sixth-street shaft workings will soon be dry, and Mgr. Osgood will then commence operations.

MONTROSE COUNTY.

The copper mines at Paradox valley, in the La Sal mountains, are described in the Denver, Co!., *Post* as follows: "The vein varies from a narrow seam up to 24 inches, carrying silver and copper. It is a red sandstone sedimentary formation and the values come in what might be called porphyritic conglomerate on the surface. The whole country is impregnated with these veins and while they may be only stringers, the principal mine seems to be on a strong vein which is being systematically developed. No stoping is being done and the shipments made have been of ores that were taken out in the necessary dead work. There is a 600-foot tunnel and two shafts, one being down 90 feet, the other 50 feet. The company is shipping ten tons per day to the Argo smelter of Denver. Thirty four and six-horse teams are hauling this ore to Placerville, the nearest station on the Rio Grande Southern railway. It is eighty-two miles from the mines and it costs $19 per ton to transport the ores to the railway. The mines are fifteen miles east of the Utah line, at an altitude of 5600 feet, on La Sal creek, and are 100 miles from Montrose."

OURAY COUNTY.

The Atlas mine sends news of the discovery of a new bonanza on Mt. Sneffles. The drift is in 150 feet. A few weeks ago the mine shipped forty-five pounds of gold that was picked from the ore left on the dump at the close of the season. There is a free-milling streak in the mine 2 to 3 feet wide which averages nearly $20 a ton, and the rich shipping streak about 8 inches wide runs about $100 to the ton. The company will erect a reduction plant as soon as the most economical method is ascertained, as the ores vary in character and the company wishes a process that will treat the entire product.

PITKIN COUNTY.

Aspen *Sun*: An underground trolley line operated by electricity is now working between the Mollie and A. J., over which run ore cars half a mile. The system employed is the same as that used by street car lines and it is said to work to perfection. The saving is considerable when it is necessary to handle large quantities of low-grade ore, such as is being treated at the Mollie mill. It is only by such methods that the silver mine manager can profitably work his property under the prevailing conditions of the silver market.

SAN MIGUEL COUNTY.

Telluride *Journal*: G. Rohwer, developing the Sunshine group near Ames, recently broke into a streak of quartz from 6 to 8 inches thick that is full of ruby and brittle silver. It runs from 400 to 500 ounces in silver per ton. The whole Sunshine vein, 5 feet wide in the breast, is good milling ore.——The Enterprise mine at Rico is now giving employment to 125 miners.——What is wanting at Rico is a big milling plant that will successfully concentrate the low-grade ores, and it is practically certain to be built the coming summer.— The strike in the Rock Island at Ophir, made a week or two since, continues to improve. The ore body is now 10 feet wide, free-milling ore that mills $15 per ton in gold.

The *Examiner* says most of the working force of the Carribeau has been laid off while repairs are being made on the mill, injured by the snowslide (referred to on page 257). Some additional machinery will be added when the vanners are repaired.——Another shipment will soon be made from the Attica.

IDAHO.

A stock company is being organized in Spokane, Wash., to operate the Morgan City claim in the Buffalo Hump country. This claim is within 1500 feet of the Big Buffalo. A ledge ranging from 5 to 8 feet in width is traceable for a distance of over 600 feet, having been opened up in several places, and a 10-foot shaft sunk at one point.

A Spokane corporation has been formed to operate in the Buffalo Hump camp, and is kown as the Yankee Girl M. & P. Co. The company owns the Yankee Girl and Eureka claims, about two miles south of the Big Buffals group. The property is so situated that a tunnel run upon the ledge will gain a depth of 500 feet in running 700 feet.

There is a rumor of resumption of work on the Gem mine, in the Cœur d'Alene.

It is reported that 3 feet of solid galena have been uncovered in the Fourth of July mine at Hailey. At one side of this is 12 inches of lead carbonate.

Spokesman-Review: W. D. McFadden, who has returned from Buffalo Hump, says: "No work is being done upon the Big Buffalo at present. When the deal was pending three crosscuts were run across the ledge and then the work was stopped. These crosscuts showed the presence of an immense body of ore, the ledge at one point being 41¼ feet between walls. It is expected that work will be resumed upon the Big Buffalo in a few days. The road from Badger is probably now completed, and the 10-stamp mill which the owners of the Big Buffalo have purchased will be set up at the mine in a short time. The entire Hump country is now covered with between 14 and 15 feet of snow, and it is foolish for anyone to go in there with the expectation of prospecting. The tunnel on the Jumbo is being run on the hanging wall and the ledge is crosscut every 50 feet. A tunnel on the Elberton is in between 50 and 60 feet. The ledge is 12 feet wide, with a 5-foot pay streak. There are only thirty people in camp."

Spokane *Review*: The work which is to begin upon the properties of the Idaho Con. M. Co. will be in charge of G. O. Walker, who has been in charge of the Sacramento mine, at Mercur, Utah. The properties of the company are in the Buffalo Hump district.

Mirror: A distinct earthquake shock was felt at Mullan a few nights ago. The shock was so severe the men at work in the 1500-foot level of one of the mines quit work. In the town it was thought a terrific explosion had occurred in the Tiger mine.

MICHIGAN.

The annual report of the Tamarack M. Co. shows a steady reduction in the cost of treating the rock. In '97 the company cheapened its cost of stamping per ton by 3¾ cents as compared with previous year and '98 shows an improvement of 4 cents over '97. The total cost per ton mined was $1.94 in '96 and $1.66 in '98, and the total cost per ton stamped has been reduced from $2.28 in '96 to $2.01 in '98.

The report of the Quincy Copper M. Co. shows a surplus of $18,103 for '98 against a deficit of $107,282 in '97.

The annual report of the Osceola Copper Co. for the year ending Dec. 31st, '98, shows an increase in output of $211,764. During the year dividends to the amount of $277,250 were paid, being an increase over the previous year of $33,639. In his report to the directors Supt. W. E. Parrell says: "The cost sheet gives concise detail of the cost of mining and treating the rock mined, together with the cost of construction, which alone is no small item. Rock mined for the year, from all branches, 637,603 tons; rock stamped for the year, from all branches, 505,008 tons; mineral obtained for the year, from all branches, 15,848,928 pounds. The cost of stamping was 28 94-100 cents per ton. This, you will notice, is in excess of cost of stamping the previous year by about 3 cents per ton. The principal cause of this increase lies in the fact that for nearly six months the coal used at the mill was what was saved from the fire at the Dollar Bay coal shed, and was much reduced in steaming quality. At the stamp mill the sandstone tunnel has been completed and has a suction supply well in the rock for the new pump of 40,000,000 gallons capacity, now being erected, to supply water to all the mills. The pump house is a combination of stone and steel. The stone foundation walls are 24 feet deep, on which are added 16-foot posts of structural steel, the floor space being 88x45 feet. The building is completed and the pump is being installed. The new stamp mill building is of steel. In size it is 215x135 feet and designed for three 20x24-inch cylinder heads. In many respects this new mill will be a departure from the old types in its operations of stamping. Mill machinery is being received and put in place, and if no unusual delays occur in the balance yet to be received the 1st of July ought to see the mill completed."

MINNESOTA.

Vermilion *Iron Journal*: One of the most promising veins of gold quartz that has been discovered in this section has been recently located. The vein is reported as averaging 22 feet in width and is traceable on the surface for a distance of nearly a mile. Various assays have been made from quartz taken from different portions of the vein, showing a richness of about $24 to the ton.

MONTANA.

All negotiations for the purchase of the Parrot by the Standard Oil Co. have just been broken off. The Standard Oil Co. offered $30 per share. Men who had options on 156,000 shares offered to sell at $40 and finally at $36, which was refused. Last year the Parrot Co. earned $750,000 net on a 15,000,000-pound copper output, or about $3.20 per share on its 230,000-share capital.

The Anaconda Copper Co. shipped last week ninety-one silver bars valued at $90,000.

B. F. Penn and O. S. Brooks are working the Standard mine, on Wisconsin creek, opposite Leiterville. They have out about twelve tons of ore ready for shipment.

The Revenue mine, which adjoins the Legal Tender at Bear Gulch, is being developed by the Bear Gulch M. Co. with a force of twenty men. The mill will be enlarged to eighty stamps.

The Levi Burr mine, at Hasmark, is shipping high-grade ore. A tunnel 20 feet long has been driven on the lead and work is in progress to connect it with the shaft.

The sale of the Colorado Smelting & Mining Co.'s property at Butte, Mont., to a New York company is announced, the price being $2,500,000.

The claims of the High Ore Gold & Copper M. Co., six miles from Boulder, are under lease to Orwell Bros. & Sanders, who are working in the tunnel, which is in 2000 feet. They have a 2-foot lead of ore, from which they are about to make their first shipment.

A steam stamp mill is being placed on the Mantle mine, near Basin.

At the Snowshoe mine the main tunnel is in 1260 feet. The crosscut tunnel is now in 135 feet, and it is expected that the ledge, which on the surface is parallel to the main lead, will be encountered in a few days.

A dredge, having a capacity of 3000 cubic yards per day, is being designed for the placer mines of Horse Prairie. It will be operated by the continuous-bucket line and will cost $40,000.

Missoulian: The Frazer & Chalmers Co. are figuring with the Snowshoe M. Co., in the Libby district, for a 500-ton concentrator, to be erected this spring. There is now a 100-ton concentrator on the property that has been in operation for some years.

NEVADA.

The enormous pressure in the discharge pipe at a point 5 feet above the turn in the pump in the C. & C. shaft on the Comstock occasioned a breakage several days ago. The Risdon Iron Works, in anticipation of such possibility, had a duplicate of phosphor-bronze which replaced the broken funnel-shaped joint of the discharge column that couples on the injector. Defects in construction are often found in work of any magnitude as it progresses and are to be remedied and obviated as they arise. Upon arrival the new piece was fitted and found satisfactory. Some other changes are required which will require a temporary cessation of all pumping operations. In future work sections of 150 feet each will be used instead of 50 feet, as heretofore. The report from the Con. Cal. & Va. mine for the past week states that the C. & C. shaft for 50 feet below the 1750 level has been cleaned out and repaired and the pump rod column, piping and stays have been taken out of the pump compartment. From the 1750 level down this compartment will be repaired so that the pump cage can be used for all work on the pumping plant after it has been installed, as during the installation they have to use the center hoist compartment. On the 1400 level the drift has been cleaned out and retimbered and track laid for a total distance of 264 feet. Work has been resumed on the 1750 station and has been continued on the electric installation.

On the Comstock the Kinkead M. & M. Co. is extracting low-grade ore fillings from the upper workings of the Gould & Curry, paying the G. & C. Co. a royalty of 10% on the gross bullion returns of ore milling $10 or less per ton. On the gross bullion returns of ore milling $11 per ton the G. & C. Co. is to receive 11%, and so on.

It is reported that well borers sinking at Cradlebaugh's at a depth of 150 feet struck a flow of 7 miner's inches of water.

The Golconda *News* says that there will be an electric car line from that place to the Adelaide copper mines in the near future.

Virginia *Chronicle*: W. H. Kent, who has a mine near Silver City and interested in Jumbo district on the west side of Mount Davidson, claims to have discovered a fissure vein in that district. He says an old tunnel in that vicinity barely missed cutting the point of contact, the men having followed an ore stringer which led away from the main fissure. By extending this tunnel in an opposite direction the point of contact of the main fissure was found and disclosed a wide vein of gold-bearing ore, the trend of which is from northwest and southeast. The fissure has well-defined walls with a heavy clay, 22 feet in breadth.

Virginia *Chronicle*: The sulphur properties in Humboldt county are being actively worked by a St. Louis firm.

NEW MEXICO.

On the 27th ult. was organized at Elizabethtown the E'town Tunnel Co., which has secured a concession from the Maxwell Grant Co. to tunnel old Baldy mountain crosscutting the formations.

At White Oaks the cyanide plant at the Old Abe mine has been completed and a test of the tailings piled up on the dumps made, which is reported satisfactory. The plant contains six tanks, each of which has a capacity of fifty tons.

At Bland the Cochiti G. M. Co. is taking from the third level rich ore.

The new mill of the Timber Peak M. Co., at Walter canyon, will be finished April 10th. The company controls twenty-six claims; the development work consists of 2000 feet of shafts and tunnels. The bank blasting system will be adopted in mining. Shafts are to be sunk 75 feet and small crosscuts run, in which will be placed from 5000 to 10,000 pounds of powder for each shot. The blast will raise 8000 tons of ore. It is locally figured that the cost of mining will not exceed 20 cents per ton. After blasting the ore, it will be shoveled into a derrick scoop and swung into cars of five tons capacity. The ore is porphyritic in character and the major portion of the values are found in the iron sulphides. Where the ore is decomposed or oxidized, free gold is frequently found. The mill will have a daily capacity of 150 tons.

The mines in the vicinity of Hillsboro, says the *Advocate*, have produced 2565 tons of ore since Jan. 1st last.

Hillsboro *Advocate*: A strike has been made on the 7-20 mine, at Hillsboro, by Wayland & Martin. The vein is 15 inches wide and the ore assays $120.——The Warren mine is in bonanza. ——The Opportunity leasers number fifty-eight, and they are all making more than $3 per day.——P. M. Porter, owner of the Snake and Opportunity mines at Hillsboro, is about to build another mill in order to handle the increased output of these properties.——The Richmond mine has again increased its force; there are now ninety-seven miners employed there.

OREGON.

At the sheriff's sale of the Hammersley mine at Grant's Pass the property was bid in for $2675.

Phillips & Stevenson are developing copper claims south of Waldo.

Sholtz & Cagle have a rich seam on Sharp's gulch, from which one week's panning netted $300.

Burlison & Booth are working the old Indian Girl property near mouth of Ash creek.

A brick of bullion containing 1360 ounces of gold valued $22,000, the results of the free

gold cleanup for February of the Bonanza mine near Baker City, was deposited in bank at Baker City by A. Geiser, Mgr., a few days since. There are also thirty tons of concentrates, valued at $5100, and one car of ore sacked for shipment to smelter, which is worth $10,000. The Bonanza and Columbia mines are sacking their richest ore. The Columbia has sold two cars of ore on track in Baker for a large sum.

F. A. Stewart, during the month of January, took out $500 from his beach mines. When the tide would become sufficiently low to permit of work, Stewart and his men would carry their machine down, set it up and shovel in the sand until the encroaching tide would compel them to pick up their machine and carry it above high water mark.

The Exchange and Paymaster mines, seven miles east of Baker City, discovered last fall, are reported to have made rich strikes. The Exchange shows an 18-inch vein, a 6-inch stringer, which has been found to be rich. The Paymaster has a 4-foot vein, on which development work is being pushed.

It is reported at Cornucopia that the deal for the purchase of the Cornucopia mines, of which H. A. Shippman is Mgr., to Youngtown, Ohio, capitalists is off. Improvements are to be made on the Last Chance and Red Jacket mines. It is proposed to put in an electric plant on Pine creek, construct a tramway and run many hundreds of feet of tunnel for the development of the mines.

The Minetta B. hydraulic mine, in the Happy Camp district, is working.

E. C. Palmer is putting in a MacArthur-Forrest cyanide plant to work 5000 tons of tailings from the Jilson & Roberts mine near Hornbrook. The plant will be of thirty tons per day capacity.

A cyaniding plant having a 25-ton capacity daily is in contemplation at Grant's Pass.

At the Ibex mine, near Sumpter, fifteen men are at work, drifting on the ledge, crosscutting, building the necessary houses, and otherwise employed.

The new $100,000 mill at the Golconda mine, near Baker City, is nearing completion. In this mill the bromo-chlorine process will be tried on a commercial scale.

The Baker City *Democrat* hears that the Bonanza mine management will increase the present 20-stamp mill to 100 stamps; A. Geiser is Mgr.

Near Baker City, the Elkhorn M. & M. Co., F. Pfau, Mgr., is arranging for increased development of the properties.

SOUTH DAKOTA.

A new steam hoisting plant has been purchased in Denver, Colo., for the Gold Coin mine, near Custer.

Sinking is in progress at the Sunny Side mine, near Hill City.

The cyanide works at Spearfish are in operation again, for the first time since the cold weather set in. During the lay-off new elevators have been put in and various other improvements made.

Messrs. Bowe, Cheeseman, Martin and Bartell, who own the Waco group of gold claims, near Hill City, will build a mill on the property.

UTAH.

Good finds have been made in the old Delker district in Butte valley near Elko. Rich copper ore valued at $50 per ton and ore assaying $14.50 in gold have been found. There is a large body of copper ore in the Emma claim.

The pumice mine near Black Rock shipped twenty-five cars to Chicago last year and is now shipping a car each week. Three men are employed in quarrying and sorting pumice. Mining and loading on cars costs $2 per ton.

Twenty-nine inches snow (rain measure) is Utah's February record. The greatest fall during any other February of which there is official record was 18.8 inches, in 1893.

Mgr. Daly of the Daly-West at Park City has resumed work with a full force.

The Tesora M. Co. last week made final payment of $10,000 on its property near Silver City, Tintic district.

A snowslide at Alta, at the head of Little Cottonwood canyon, on the 1st demolished the buildings of the camp. The slide started at the Flagstaff mine on the mountain side and swept down into the canyon. The Emma mines and some of the best buildings in the camp were directly in the path of the slide and, it is stated, they were all crushed.

Standish & Jimpson have secured a half interest in the Rogers mill and will increase its capacity to forty tons. The building is to be enlarged and supplied with new machinery. The new outfit will be known as the Rogers M. Co., with J. B. Rogers Mgr.

After lying idle since December, the Old Jordan and Galena mill has started on a several days' clean-up, when it is to be thoroughly overhauled and repaired.

Mgr. Bruback of the Herschel mine, at Mercur, has added another shift to his forces.

B. Sprenger has been at Stateline arranging for the resumption of work at the Ophir and other properties, upon which he recently procured an option.

The lessees on the Old Telegraph, at Bingham, have several hundred tons of copper and gold-bearing ore on the dump that will reach the market with the opening of the roads.

The management of the Snow Storm mine, West Dip, after an expenditure of over $5000 in exploring the ground, have run into a good-sized body of pay ore. A drift being run north about 30 feet from the main shaft on the 300-foot level broke into a shoot that carries $3 80.

The Jumbo claims, seven in number, are being developed under the direction of W. Bailey, who has a force of men at work. An incline is being driven on the vein and an excellent showing is being made. Values as high as $12 have been found, but the general average is $3 and $4.

The refinery at the Manning mill, at Mercur, is well under way.

A smelting plant is proposed, which will probably be built in the Jordan valley on the site of the old plant of the Telegraph mine. P. A. H. Franklin of Salt Lake is largely interested in the enterprise.

In the Lower Mammoth at Tintic the drift running north from the No. 5 level has broken into a full face of ore heavily copper-stained and showing a fine quality of galena. The territory from which the strike is reported has never been explored.

There is considerable activity on the South West-Dip around the hill from the Sunshine in Camp Floyd district, with encouraging results. At the Sindar the shaft is sinking on a new vein that is from 11 to 15 feet between walls.

The Daly-West at Park City has again resumed work with thirty-five men. When this force has gotten things in shape a much larger number will be employed.

A number of new finds are reported from Bingham, made by prospectors during the winter.

Tribune: The Bullion-Beck of Tintic last year produced and marketed 19,260 tons of ore, and distributed $90,000 among its shareholders. The workings of the property have now attained a depth of 1400 feet, at which point a gratifying body of ore is exposed; 120 persons appear upon the payroll. The regular meeting of directors will take place March 10th.

Bingham *Bulletin*: The lower tunnel of the Fortune group is now in 1600 feet. For a long distance it has followed a good ore streak that is "in and out" and carries copper. A raise of 1500 feet is up 70 feet, and not a pound of waste has come from it. The Keystone level, 100 feet above the Fortune, has been driven 1100 feet along footwall. A raise in this level near its face shows an 11-foot ore body.

WASHINGTON.

A $15,000 smelter is to be built on the Uncle Sam mine near Bossburg east of Republic.

The Princess Maud mine at Republic is now showing the granular white quartz that is characteristic of the Republic.

Work has been resumed on the El Caliph shaft. It is expected that the shaft will reach the tunnel level about the time the tunnel reaches the vein.

Three cars of ore have been received at the Northport smelter from the Second Relief mine near Erie, B. C. There are sixty-five tons in the shipment, which had a customs valuation of $41.20 per ton. This claim is owned by Finch & Campbell of Spokane.

On the Aspinwall at Republic the vein is stripped and exposed 6 feet across. The ore is a soft, bluish porphyritic quartz, resembling the ore which is now being taken from the Republic mine.

Thirty-five mines are in operation within three miles of the town of Republic, giving employment to 500 men, the Republic having 250 men on its payroll. The Mountain Lion is putting in a boiler and machine plant.

At the Castile mine the shaft is down 160 feet, following the lead, which is 8 feet between walls, the entire bottom being in ore. At a depth of 200 feet the ledge will be crosscut. The Castile is within a mile and a half of the Le Roi smelter.

Between 200 and 300 men are working in the Pierre Lake district, engaged in the development of claims and in prospecting.

The Queen of Sheba claims—the Queen of Sheba, Rose, Philadelphia and Montana—are eight miles east of Bossburg. The shaft on the Queen of Sheba is down 50 feet on an 8-foot ledge of ore. Six men are employed. This group is owned by the Queen of Sheba G. M. Co., a Bossburg corporation.

Another strike of telluride ore is reported from the Flaghill claim at Republic, and of gold ore in the Bunker Hill mine, Palmer mountain, Okanogan county.

A 5-stamp mill is in operation on the Mountain Goat mine near Winthrop. It was taken in some time ago. At the first run of a week they took from the stamps four pounds of gold, avoirdupois, besides the concentrates.

On the Eureka, owned by California capitalists, men have been at work all winter and more men were recently added to the force.

At Golden Zone, Okanogan Co., one and one-half miles south of the international line, A. C. Kingsbury has the Golden Zone mine, on which considerable development—mostly tunneling—shows $35 per ton gold. He will put in a sixty-ton concentrator.

At the Ben Hur, at Republic, it is the intention to sink a shaft to a depth of 500 feet, thoroughly opening up the ledge at various points. The location of the shaft has not yet been selected, but it will be at once and sinking started within ten days.

The New York-Republic G. M Co. has been organized by Spokane and Palouse City men, to operate a group of copper claims two miles northeast of Republic.

The Gold Mountain G. M. Co. will develop the Ground Hog claim, which adjoins the Gold Ledge, at Republic.

The Pontifex G. M. Co. has been formed at Spokane, with a capital of $50,000, to develop the Pontifex group on the Colville reservation, northeast of Republic. A. W. Siegel is Pres.

Near Conconully R. R. Hargrove has completed a 225-foot crosscut tunnel and cut into the ledge 14 feet on the Hidden Treasure, and has not yet reached the foot wall, the 14 feet being all in ore. Two hundred tons of ore were taken out in running this crosscut. The ore carries silver, a small percentage of lead and some gold. It is the principal location of a group of five claims on Salmon creek, one mile north of Conconully. The crosscut was started 500 feet above the creek and attains a depth of 200 feet where the ledge was cut. Among others interested in this property are M. M. Cowley and N. Clark.

The Bullion group of mines at Flat Creek Camp, nine miles west of Northport, is owned by a Spokane company. The principal vein is said to be 45 feet wide. The owners are doing development work. A shaft has been sunk 100 feet and a crosscut run 45 feet toward the hanging wall, but work was abandoned owing to water. The company is negotiating for pumping machinery.

Northport *News*: At the Le Roi smelter nearly all of the men have been laid off. Only a few of the machinists, the engineers and a few other workmen have been retained. When the company will resume smelting can not be ascertained, and it is doubtful if the company knows to a certainty. Ore bins and sheds for the reception of ores have been enlarged and fully made ready.

Spokesman-Review: About 925,000 of the 1,000,000 shares of the Republic G. M. Co have been pooled for six months. The Republic mill is working steadily.——The Lone Pine Con. M. Co. of Spokane will build a mill the coming summer. P. Clark, who is largely interested, says it will be a cyaniding plant.

Spokesman Review: A strike is reported rom North San Poil. The strike was made at the bottom of the 20-foot shaft and the entire bottom of the shaft is now in rock which will average over $200 per ton. The assays made Saturday ranged from $272 to $800. It has been known for some time that this property had a rich ledge but nothing of this sort was expected.

WYOMING.

The Cox copper mine on Big creek near Rawlins has been sold to Boston investors who have made the first payment of $5000 on the property.

FOREIGN.

AUSTRALIA.

Experiments at the Broken Hill mines, N. S. W., toward the separation of a fair-grade zinc concentrate, have been made during the past year, but, so far, only comparatively small quantities have been obtained.

The Broken Hill Proprietary Co. of New South Wales has declared 120 dividends, aggregating £6,760,000.

The total amount of water consumed during January at the Broken Hill mines amounted to 16,497,000 gallons.

BRITISH COLUMBIA.

Z. D. Brown, Mgr. of the Bullion M. Co., will buy machinery for the property, four claims in Flat Creek camp on the reservation, nine miles north of Northport. The ore is extra rich galena.

Electricity is coming into use in Rossland. The Coxey, War Eagle and Iron Mask have each installed plants driven by electricity. It is said that the British America Corporation has under contemplation the substituting of electricity for steam on its several properties.

British Columbia has ninety-four mines that produced ore in sufficient quantities in '98 to pay the tax to the provincial government as required by law.

The Hall Mines Co. at Nelson is erecting a silver-lead smelter, and the Canadian Pacific railway has material at Trail and expects shortly to have its silver-lead stacks in operation. This will greatly reduce the cost of treating ore.

The Relief G. M. Co. is making regular ore shipments to the Northport smelter. Besides the shipping ore they are piling up milling ore at the rate of fifteen tons per day from development work.

Twenty men are at work on the B. C. mine at Greenwood. A fund of $50,000 is reported on hand for development purposes.

The Boundary Creek country in British Columbia, adjoining the Colville reservation on the north, is attracting attention. The Ironsides & Nob Hill Co. contemplates the erection of a 1000-ton smelter. There are now about 3000 men engaged in constructing a railroad from Rossland through that mining region.

The Green Mountain, near Rossland, is still adding machinery to its plant. Recently a compressor plant was ordered and last week a 60 H P. boiler was put in. The shaft is down 125 feet. It will be sunk to the 500-foot level. Lately some ore showing native copper was found.

The Rossland *Miner* predicts a lively rivalry between the electric company and the new compressed air company when the latter is ready for business. There will doubtless be found a field for both.

The Emily Edith has lately developed new ore bodies at greater depth, and a concentrator will be erected on this property.

The Canadian Pacific Exploration Co., Ltd., operating the Porto Rico mine, are about to run a tunnel, at the mill, 2700 feet long, to tap the ledge at a depth of 1200 feet.

On the Yellowstone mine, near Ymir, there are eighteen men at work.

The Payne M. Co. of British Columbia, Ltd., capital stock 1,000,000 shares of $2 50, has been listed on the Toronto stock exchange. The price quoted per share is $3 30.

W. H. Norris and J. Beckwith will crosscut the ledge on their claim, the Lygia, which is situated on Ingram mountain near Midway. Surface work shows a vein 40 feet wide, between walls of granite and porphyry.

The drift on the 300-foot level in the Cariboo at Camp McKinney is now within a few feet of the vein.

February's shipments of ore from Slocan mines make a total since January 1 of 6500 tons. In the year 1898 the total amount of ore shipped from the Slocan reached 17,000 tons.

The Noble Five mine near Sandon, which was closed down last year for lack of ore, this year promises to be one of the heaviest shippers of that belt.

In the Slocan the Payne mine is shipping 200 tons a week. The Last Chance is shipping 120 tons, the Idaho Mines 80 tons, the Queen Bess 60 and the Whitewater from 60 to 75 tons. Other shippers are sending out smaller shipments weekly.

The Salmon River & Porcupine M. Co. intend introducing diamond drills in the Ymir district; the first drill will be placed on the Flossie R.

At the Ymir mine, Ymir district, in No. 3 tunnel, where a station is cut, from the footwall to the hanging wall there are 30 feet of ore.

Work on the Waterloo mine at Camp McKinney was commenced October 3d, '98, since which time a shaft has been sunk 83 feet, in an ore body the entire distance, the width of which was never less than 6 feet, cutting three shoots of free gold. The first shoot was at a depth of 5 feet, the second at a depth of 25, and the third at 51 feet. All three dipped west at an angle of 25 degrees. The shaft is 7 by 5 feet clear, timbered to the bottom. The first level was started at 65 feet, leaving 18 feet for a sump. From a station a drift has been run 60 feet on a ledge 5 feet 8 inches wide. At 15 feet from the station another shoot of free gold was encountered.

Cœur d'Alene *Press*: A strike has been made at the 70-foot level in the Golden Eagle, on the north fork of the Kettle river, in the Boundary country. The find consists of 4 feet of high-grade copper-gold ore, from which assays were had from $50 to $100.

The Dundee concentrator, capacity 50 tons, has been running steadily for a month or more, and the product hauled to the railway. The ore thus treated is the second and third grades, and yields in concentrated form $40 per ton.

Victoria *Times*: The Annie M. (Little Cariboo M. & M. Co.) shaft is now down 50 feet in ore. Water is getting troublesome and a hoist and pump will be in order on this claim.

Nelson *Tribune*: A foot of ore has been struck in the drift being run on the Mabou, which adjoins the Enterprise mine on Ten Mile, Kootenay district. The finding of this ore indicates that the ore bodies developed in the Enterprise extend into the Mabou.——At the Get-There-Eli claim on Twelve Mile, Kootenay district, the whole face of the drift at the present time is in ore. In four shifts ninety-five sorted sacks of this ore was put up ready for shipment by two men.

MEXICO.

Two Republics: Whether or not the prospector or and discoverer of the mine stands as good a chance of realizing from the results of his labor as the subsequent purchaser and speculator, we take it, depends very much upon the man himself. It is usually a case of each side trying to get all there is in sight, and the best man wins. The prospector will wait until he sees the mine developed; if it turns out to be a bonanza, and he gets nothing, he feels that he has been robbed; but if the other fellow spends all his money and finds nothing, the prospector who comes forward and offers to stand his share of the loss has yet to be discovered; he is in that case a very scarce animal. If the mine is no good, we think there is a greater demand for capital to develop it than vice versa; but if the property be really first-class, the demand is the other way.

Many prospectors, it is reported, are going into the newly discovered placer fields situated about eighty miles south of Calmalli, Lower California.

The placer gold mined at Juarez in Lower California is worth over $20 per ounce.

There is some activity again in the mines of Alamo, Lower California, the scene of a stampede in 1887 88.

At Sierra Mojada, Coahuila, R. M. Rich has struck a vein 4 feet wide which assays fifty ounces silver and 3% copper to the ton.

The Cobato copper mines in Sonora are reported sold.

The litigation involving the title to the La Brisca placer mines, forty miles east from Magdalena, having been settled, the owners expect to begin work upon the property soon.

The Otate mine, in the vicinity of Llano station, has a new hoist and sinking in the shaft is progressing.

J. F. Johnstone of the La Cruz mine near Parral is sinking two shafts.

J. M. Botello has made a strike in both the San Joaquin and the Providencia mines near Parral.

NEW ZEALAND.

Mining Journal: The returns of the gold export for the past year show a substantial increase in the figures compared with the previous year. The total quantity exported in the year '98 was 280,175 ounces, as compared with 251,645 ounces in '97, and the value was £1,080,691, against £980,204. The output last year was thus 28,530 ounces more than in '97, and the value of the metal showed an increase of £100,487. The following is a comparative statement of the value of the production of the various provincial districts for the two years:

	1897.	1898.
Auckland	£392 337	£527,786
Marlborough	3 195	3,103
Nelson	7,655	6,882
West Coast	235,439	319,784
Otago	342,187	223,231

SOUTH AFRICA.

A Washington, D. C., dispatch notes a consular report from Cape Town which says that, reckoning on the basis of the September reports of outputs, South Africa will produce in the current year $76,647,375 of gold, which would place South Africa's gold product ahead of all other countries.

TASMANIA.

A correspondent of the New Zealand *Mining Journal* says: The returns of the last crushing of the Tasmania mine was 1370 ounces from 960 tons of stone—an average of 1 ounce 6 dwt. per ton. The year's crushing produced 20,955 ounces, valued at £91,567, from 26,370 tons, being about 18½ dwt. per ton, showing the mine to be of high-grade ore. Since its formation this company has won 443,167 ounces of gold and divided £679,071 in dividends. Another company, the New Golden Gate, yielded 5644 ounces amalgam (approximately 1900 ounces of gold) from 2380 tons of quartz.

Industrial Notes.

—The Arizona T. & L. Co. has completed a sawmill in Flagstaff, Arizona.

—The Lincoln, Placer county, Cal., pottery has shipped six carloads of sewer pipe to Manila.

—Express matter was in February sent in five and one-half days from Syracuse, N. Y., to City of Mexico.

—The Indiana Natural Gas Co. has placed an order with Pittsburg manufacturers for 150 miles of 10-inch iron pipe.

—The Santa Fe road is reported to have secured control of the California & Nevada road to establish the Oakland, Cal., terminal.

—The Puget Sound Sawmill & Shingle Mill Co., Fairhaven, Wash., in '98 cut 117,402,000 shingles, operating 292 days of the year.

—Officers' quarters at the Mare Island, Cal., Navy Yard, to cost $107,500, will be built by Sinnott & McCann of San Francisco, Cal.

—From numerous Eastern points iron and steel product manufacturers and cotton mills report a general advance in wages of employes of from 5% to 10%.

—At Bonners Ferry, Idaho, a portion of the Kootenay Valley Railroad workmen are on a strike for higher pay. They demand $2.20 instead of $1.75 per day.

—The total exportation of California wines to Europe in '98 amounted to 557,671 gallons, valued at $193,583. The bulk of this went to Great Britain and Germany.

—The British Columbia Government has passed laws to prevent the employment of Chinese and Japanese in semi-public works and in underground coal mining.

—Consolidation of the electric and cable street railway lines of Denver, Colo., has been effected under the name of the Denver City Tramway Co., capital stock $5,000,000.

—The aggregate appropriations of the recent session of Congress were $675,885,489. The total appropriations for the last year were $893,231,615, making a total for the Congress of $1,569,117,104.

—At Nanaimo, B. C., the Alexander strike is reported still on. The men say they will remain out until the Dunsmuirs increase wages 50 cents per day, same as standard wage paid by the New Vancouver Coal Co.

—The Santa Cruz, Cal., powder works employ 200 men. Ten thousand dollars is paid monthly in wages. The present daily output is 700 kegs of blasting powder and 6000 pounds of smokeless powder. All of the latter goes East.

—The transport steamer Valencia sailed from San Francisco on the 5th inst. for Manila via Honolulu, laden with supplies for the troops in Hawaii and the Philippines. She carries $1,500,000 in coin for the payment of soldiers.

—Mine owners of the Cœur d'Alenes, Idaho, are forming a company to generate electric power at Thompson Falls, Mont., to operate mining machinery in the Cœur d'Alenes. The power plant is to be located on an island near Thompson Falls.

—The Oregon Short Line is looking into the feasibility of extending its line from the northern end of its Montana division across the Bitter Root range into the Salmon river country, and thence into the Buffalo Hump district near Grangeville.

—The construction crews of the Nevada, California & Oregon Railroad have reached a point twelve miles north of Amadee, Lassen county, Cal., and are extending the roadbed across the Madeline plains toward Alturas and southeastern Oregon.

—The biggest sticks of lumber ever cut in Portland, Or., were cut at the mill of Inman, Paulsen & Co. last week. They were of fir and were 3 feet square and a little more than 48 feet long. They contained 5200 feet of lumber and weighed about 20,000 pounds each.

—Kilpatrick Bros. & Collins, railroad contractors of Newcastle, Wyo., have contracts for cut-offs to be made on the Union Pacific between Laramie and Rawlins. It is estimated that the work will require the employment of 2000 men and many horses and mules.

—Negotiations for the delivery of 30,000 tons of Leadville, Colo., manganese ore to the Illinois Steel Works at Chicago have been closed. This contract, with those now in force, assures the production of 60,000 tons of this class of ore in Leadville during the next ten months.

—The Northwest Railway Co. have let a contract to Orman & Crook of Pueblo, Colo., for grading twenty-eight miles of roadbed from near Huntington, Or., in the direction of Seven Devils district in Idaho. There are 200 men now at work, but the force will be increased to 1000.

—Baker City, Oregon, will supply water for domestic purposes and for its mills by a ten-mile gravity system, the cost of which is estimated at $110,000, for which the city proposes to issue bonds. This is the first instance on record in which the mills for ore treatment are supplied from a municipal water system.

—At Fresno, Cal., S. N. Griffith proposes to construct and operate an electric railway and extend it into the colonies adjoining Fresno, and, besides his passenger service, to run freight cars, enabling vineyardists and wineries to ship their produce to Fresno. If the idea is consummated, the San Joaquin Electric Co. will furnish power.

—Summerland, Cal., papers say that the entire production of the Summerland oil field has been sold for several months ahead. That condition of affairs has been brought about largely by the decline of the Los Angeles field. Considerable development work is in progress now and some good wells are being struck at various points along the beach. Work is greatly retarded on the beach by the uncertainty of the title to the tide lands adjacent.

—Pittsburg reports an advance of 50 cents a ton in steel billets and Bessemer pig iron. Billets are quoted at $23 per ton and Bessemer at $13 50. Under the scale agreement of the Amalgamated Association the advance in steel billets will be followed by an advance of 8% in the wages of the skilled workmen. The advance will affect about 15,000 men.

—Pasadena, Cal., is now lighted by electricity, transmitted from the head of the Santa Ana river, seventy-eight miles distant, the wires delivering at Pasadena 3000 volts. As the city uses ordinarily on the incandescent light service but 1000 volts, the current runs into a bank of transformers, is reduced to 1000 volts and transferred to the local incandescent wires.

—It is noted as a striking evidence of the development of the country that the St. Louis World's Fair in 1903 calls for as much money in city, county, state and federal appropriations as the entire Louisiana purchase cost in 1803. Fifteen millions of dollars was a staggering sum in those days, but it will be spent now as a matter of course in an educational festival to commemorate the centennial.

—At Dawson, N. W. T., Gold Commissioner Senkler has made an important ruling as follows: "A person locating a claim, and, after prospecting it, finds it a blank or unprofitable, he can make an affidavit to that effect and regain his right to locate again on unoccupied ground in that district. This is a very important concession, as heretofore a person lost his right after recording. Parties after completing their representation work must renew the lease before the year expires from date of recording. This point should not be overlooked to save the loss of the claim. All concessions for hydraulic and dredging purposes are obtained from Ottawa, this office not having the power to make grants."

Personal.

D. W. Ross of Boise is Idaho's new State Engineer.

F. MITCHELL is the new New Pass Supt., Austin, Nev.

MGR. NESBIT of the Bullion-Beck Co. is in Salt Lake, Utah.

H. PENGELLY is now Supt. Douglass mine, Volcano district, Amador Co.

J. E. POINGDESTRE of San Jose, Cal., has gone to Chicago for four months.

G. E. BAILEY is managing the Chloride-Bailey mine in Trinity Co., Cal.

J. F. MCDONNELL has been re-elected secretary Virgina, Nev., Miners' Union.

H. L COY has been engaged to take charge the Golden Lily mine at Republic.

J. B. HAMMOND of Portland, Or., has been inspecting mines in southern Oregon.

R. K. COLCORD has been confirmed by the Senate as Supt. of the Carson, Nev., mint.

W. A. FARISH has been making examinations of mining property in Bingham, Utah.

J. E. JACKSON has resigned the presidency of the Salt Lake City, Utah, Mining Exchange.

J. M. VAN COTT of the Murray Iron Works Co. of Burlington, Iowa, visited Denver on the 28th ult.

JAS. V. COLEMAN of San Francisco, Cal., has been at Angels, Cal., inspecting his mining interests.

J. J. FREY, Gen. Mgr. Santa Fe system, has resigned. It is thought that Chas. Dyer will succeed him.

FORREST KALDENBERG has taken charge of the affairs of the Live Oak Copper Co. at Globe, Arizona.

L. MCGAFFEY, formerly of Angels, is millman at the Crandall mine, near Auburn, Placer Co., Cal.

BYRON E. SHEAR of Denver, Colo., contemplates a trip through Arizona, where he has mining interests.

ROBT. S. MOORE, of the Risdon Iron Works, San Francisco, sailed last Thursday for the Hawaiian Islands.

CHARLES BUTTERS was in Denver on Feb. 28th, enroute to New York. He expects to make a trip to Europe.

DAVID A. BAUM of the Baum Iron Co., Omaha, Neb., recently visited his branch house in Denver, Colo.

PERCY WILLIAMS, formerly of Silverton Colo., is now superintendent of the Red Bird mine at Clayton, Idaho.

W. W. CHISHOLM, Treas. Centennial-Eureka at Eureka, Utah, has returned after an absence of several weeks in Utah.

J. B. HASTINGS, Supt. War Eagle mine at Rossland, B. C., has been engaged to examine the Deer Park mine at Rossland.

A. W. MCCUNE of Salt Lake, Utah, is reported having sold his interest in the Payne mine at Rossland, B. C., for $900,000.

E. H. WEBSTER, secretary at Minas Prietas, Mexico, Grand Central M. Co., Supt. during E. Abadie's absence, will resign March 31st.

J. P. STIDGER of Brown's Valley, Cal., has been engaged by a syndicate to go to Dawson, Alaska, to take charge of mining interests near there.

GEO. MOORE, metallurgist for the Con. Kansas City Smelting & Refining Co., has been making an examination of the mines of Tuscarora, Nev.

W. T. HARPER, Pres. University of Chicago, will deliver the public address at the California University charter day celebration, March 23d, at Berkeley.

A. B. ADAMS has returned to San Francisco from Mexico and reports forming the Consolidated Mines of Copalquin in Durango. He wants bids on an electric machinery plant to be erected at the junction of the Limon and Copalquin rivers.

FROM San Francisco Richard Johnson writes the Nogales, Ariz., *Oasis* that he has sold the Cobato mine, in the Altar district, Sonora, Mexico, for "$100,000 in gold."

GEO. O. WALKER, formerly Supt. Sacramento mine, at Mercur, Utah, has accepted the superintendency of the properties of the Idaho Con. M. Co., in the Buffalo Hump district, Idaho.

P. E. DEVILLE, who claims to have been the original discoverer and locator of the Treadwell mine, Douglass island, Alaska, is back from the Klondike, where he is credited with having become a millionaire.

PROF. WILLIAM P. BLACK, Territorial Geologist of Arizona, is working on an elaborate report of that Territory's resources, which, it is said, will be tendered the Legislature without charge.

E. R. KRAUSE has been appointed ancillary receiver for Boston & Montana Con. C. & S. M. Co. at Silver Bow Co., Mont., in a suit brought by James Forrester and John McGinnis, stockholders, for a dissolution of the corporation. Thomas B. Hinds had been appointed receiver for the company last December.

ACCORDING to a Seattle paper, Henry Bratnober, who is now in London, has decided to open offices there and at Skagway for himself, as a mining promoter, and to leave the service of the London Exploration Co. In this he follows the example of his predecessor, Hamilton Smith, whom he succeeded as chief agent of the London Exploration Co. in this part of the world.

T. H. EVANS, who is announced in Boston as having "introduced the cyanide system of gold concentration into South Africa," is visiting New York from Mexico, where he has been gathering copper specimens. They run "from 3% to 8% in metal, and their richness so impressed Mr. Evans that he carefully preserved them and brought them to New York."

"JIM" WARDNER is again heard from. This time he says he has a silver-lead mine near St. Michaels, Alaska, twenty miles from tidewater, that "runs 75 to 125 ounces silver and 60% lead;" that he has raised money to build twenty miles of railroad to get the ore to the beach for ship transportation to the smelter, and has contracted to so ship 500,000 tons of this silver-lead ore. The customary shipwrecked sailors near Golovan bay discovered the aforesaid mine some years ago, and it is now a great thing.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING FEBRUARY 28, 1899.

620,267.—PISTON ROD GUIDE—F. M. Anable, Westville, Cal.
620,417.—VOTING MACHINE—J. E. Chapin, North Fork, Cal.
620,419.—NAME PLATE—Clark & Wattson, S. F.
620,285.—REVOLVING PLOW—M. C. Dethiefs, Willows, Cal.
620,290.—SUPERHEATING APPARATUS—P. F. Dundon, S. F.
620,292.—FLY TRAP—M. S. Featherstone, Goshen, Cal.
620,436.—PERFORATING MACHINE—J. J. Flett, Corvallis, Or.
620,438.—CABLE GRIP—G. S. Fouts, S. F.
620,119.—CAR VENTILATOR—Graham & Pierce, Sacramento, Cal.
620,546.—CULTIVATOR—G. G. Guenther, Orange, Cal.
620,244.—SNOW SHEDS—C. F. McGlashan, Truckee, Cal.
620,345.—FOLDING STOVE—J. Morawetz, Castella, Cal.
620,346.—EXERCISING DEVICE—A. C. Mueller, Oakland, Cal.
620,169.—TRANSMITTING POWER—H. Paulson, Sumner, Cal.
620,174.—CAR VENTILATOR—E. R. M. Pierce, Sacramento, Cal.
620,250.—CUP POLISHING APPARATUS—O. F. Pira, Oakland, Cal.
620,552.—WASHING MACHINE—J. H. Therien, S. F.
620,262.—CAN FAUCET—G. F. Tong, Sacramento, Cal.
620,381.—LINOTYPE MACHINE—Trounsell & Trego, S. F.
620,264.—MINING APPARATUS—S. W. Wible, Bakersfield, Cal.
30,274.—DESIGN, HORSE PAD—E. D. Flint, Oakland, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Recent Mining Incorporations.

South Sliger G. M. Co., San Francisco; capital stock $150,000, subscribed $50; A F. Baumgartner, J. L. Daniels, E. B. Cushman, W. H. Metson, C. W. Keeney.

Hanford Mica M. Co., Hanford, Cal.; capital stock $80,000; subscribed $60,000; P. McRae, K. H. Sim, R. Irwin, T. S. Esrey, N. P. Duncan, D. Finn, L. Nathan.

Green Jumper G. M. & D. Co., Sonora, Cal.; capital stock, $52,500; subscribed, $50,000; J. T. Ryan, E. J. Landers, F. Corbin, J. W. Purdy, W. S. Risley.

Amarillas G. M. Co., San Francisco; capital stock, $100,060; subscribed, $25; E. A. Abbott, M J. Kast, W. J. Wilson, W. E. Tucker, W. W. Kaye.

Obituary.

J. M. BRYAN, the patentee of the Bryan mill, died at Smith's Flat, El Dorado Co., Cal., last Monday, aged sixty years.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ADJUSTABLE GUIDE FOR ROCK DRILL PISTON RODS.—Francis M. Anable, Westville, Cal. No. 620,267. Dated Feb. 28, 1899. This invention relates to an improvement in rock drills. It consists essentially of supplemental removable segmental linings fitting in correspondingly-shaped sunken chambers, which are formed in the heads through which the piston rod passes, and means for adjustably securing these lining sections therein, so they may at any time be set up and adjusted, to compensate for the wear caused by the weight and friction of the parts, and to keep the piston rod in constant alignment.

HORSE SHOE PAD.—E. D. Flint, Oakland, Cal. No. 30,274. Dated Feb. 28, 1899. This invention comprises a novel design for an elastic pad which is adapted to be fitted to the foot of a horse and to have the iron portion of the shoe applied to the exterior so that the pad forms a cushion and protects the horse's foot from injury.

SNOW SHED CONSTRUCTION.—C. F. McGlashan, Truckee, Cal. No. 620,244. Dated Feb. 28, 1899. The object of this invention is to provide a means for preventing the excessive drifting of snow and consequent blockade of railway tracks in snowy and mountainous regions. It consists in the employment of wire screens, which, when applied to snow sheds and structures of like character, form a sufficient check to prevent the entrance of the snow, while at the same time they allow the light and air to enter and provide a free escape for the smoke and products of combustion, which so vitiate the atmosphere of these sheds when they are covered and surrounded by snow. The same arrangement of screens, when fixed to suitable framework, said framework being set up transversely to the drift of the snow, will afford a sufficient lodgment to prevent the drifts from forming upon the line of the track.

CUP POLISHING APPARATUS.—O. F. Pira, Oakland, Cal. No. 620,250. Dated Feb. 28, 1899. The object of this invention is specially to provide a means for the rapid cleaning and polishing of individual communion cups such as are now being employed in the communion service of churches, and generally for any rapid polishing of interior and exterior surfaces. It consists essentially of a horizontally journalled shaft having the opposite ends provided respectively with right and left screw-threads, tapering heads fitted upon the ends, one having a gradually increasing diameter from the outer to the inner end, and the other being hollow and correspondingly tapered. Both of these heads are provided with any fibrous cleansing substance and the shaft, when rotated, gives motion to the heads so that a cup to be polished may first have its exterior surface polished by introducing it into the hollow head, then it may be fitted over the opposite conical head to clean the interior, the work being done very rapidly by this means.

MINING APPARATUS.—S. W. Wible, Bakersfield, Cal. No. 620,264. Dated Feb. 28, 1899. The object of this invention is to combine in a single continuous apparatus devices for separating and saving gold from its intermixture with foreign substances, and in so combining the various devices as to economize labor and expedite the work by making all parts of it essentially continuous and automatic. The apparatus is more especially designed for use in river beds and low places where there is not sufficient natural fall to allow the work to be done. A sluice of any suitable construction having transverse riffles and pockets for mercury, brings the auriferous sand and material down to the point where an undercurrent is located, which takes out a portion of the fine material, leaving the coarser material to pass on to a point where it is transferred to what is known as a "siphon elevator." At this point such material as cannot be handled by the elevator is carried off by a grating over which it passes, leaving other material to fall through into the bottom of the sluice. The grating connects with delivery spouts which transfer to one side or other of the main sluice and thus dispose of the larger material. The jet of water is discharged in line with the open end of the elevator pipe and the material which falls through the grating is received upon a bottom in line between the water discharge nozzle and the elevator so that all material is carried in and thus elevated to any desired point. Supplemental jet pipes open into the elevator at different points so as to give an additional momentum. These jets are all supplied from a common distributer into which the water is brought under any suitable or obtainable head or pressure and is delivered therefrom to points where it is to be used with any relatively reduced pressure which can be controlled by gates. A momentum water wheel driven by one of the jets serves to operate the traveling portion of the machinery.

CAN FAUCET.—G. F. Tong, Sacramento, Cal., assignor to M. K. Barrett. No. 620,262. Dated Feb. 28, 1899. This invention is designed to provide a discharge faucet for closed cans, and in conjunction with it an ore supply device which allows air to enter the can as the liquid is withdrawn from it. The faucet is especially designed to be applied to the original five-gallon cans in which such products as coal oil, gasoline, etc., are placed on the market, and it is then only necessary to invert the can, set it upon a suitable support, leaving the faucet projecting to one side in readiness to draw therefrom. The arrangement of air passages is such as to prevent any supplemental drip after the cock has been closed, and it enables the user to withdraw the entire contents of the can without waste.

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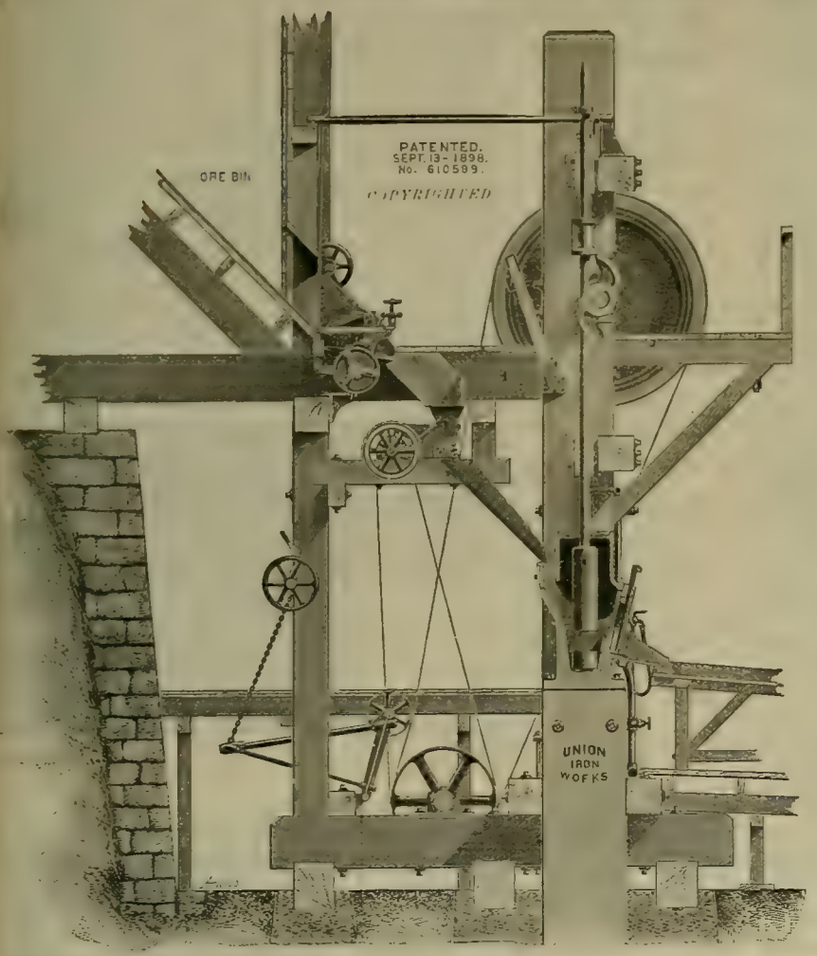

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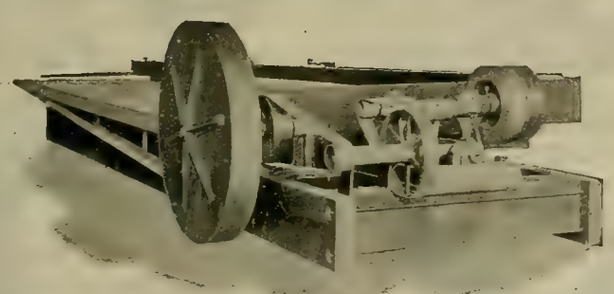

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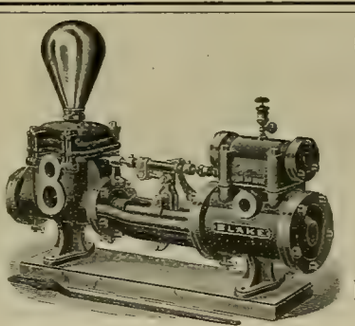

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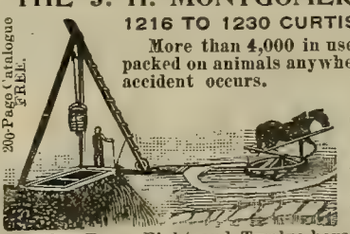

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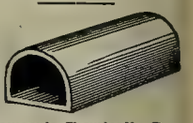

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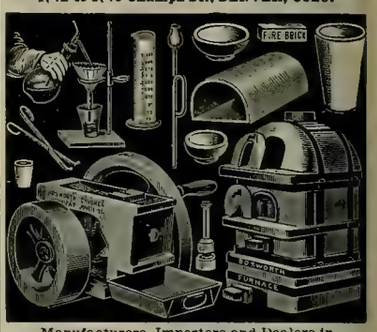

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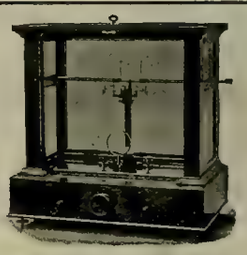

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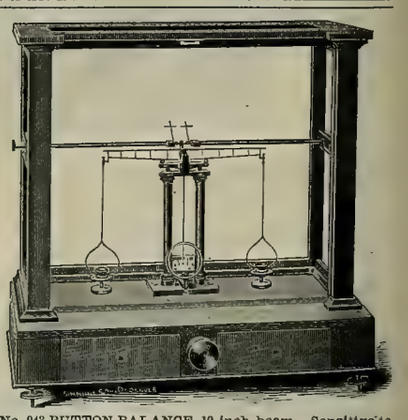

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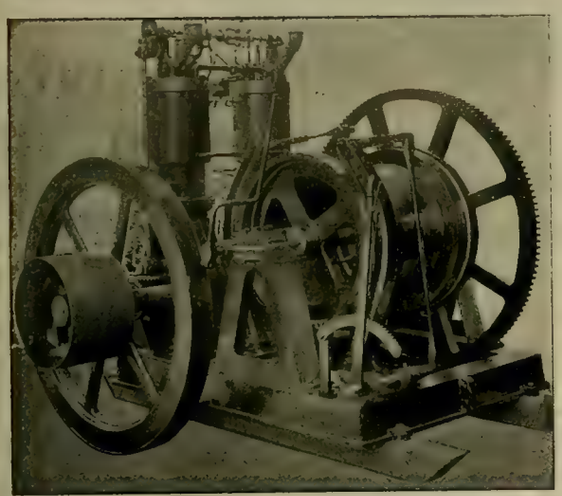

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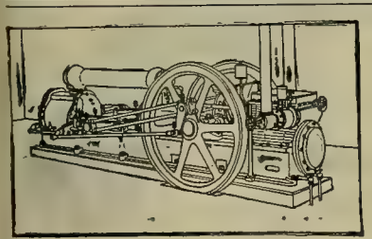

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NOTICE TO CONTRACTORS.

NOTICE TO CONTRACTORS.—Sealed proposals will be received on or before one (1) o'clock P. M., April 12th, 1899, for the construction and completion of certain additions to the existing water works owned and controlled by the City of Seattle, Washington. The said additions include a gravity water supply from Cedar river, reservoirs and portions of an auxiliary high service system in the city. The contract will be let in four (4) separate subdivisions, and will embrace the following general terms of construction:

In Subdivision One (1):

Head works on Cedar river, consisting of Diverting Weir, Intake Canal (400 feet long), Settling Basin, Gate House, Dwelling House and Stable.

Pressure Pipe from Head works to High Service Reservoir in City Park, said pipe being 42 inches in diameter and 28.1 miles in length; of which 6.1 miles are to be riveted steel and 22 miles to be wooden stave pipe banded with steel bands ¾ inch in diameter, wooden stave and steel pipe between High and Low Service Reservoirs, 30 inches in diameter, about one mile in length.

Wooden Stave Pipe 24 and 30 inches in diameter respectively, about 4900 lineal feet, as waste pipe from High Service Reservoir to Lake Union. Change of Cedar River channel, 65,000 cubic yards excavation.

Improvements at Swan Lake, consisting of clearing land, construction of dam at outlet, Intake and pipe connection with said Lake.

In Subdivision Two (2):

High Service Reservoir and Gate House in City Park (capacity of said reservoir being about 16 million gallons); Low Service Reservoir with Gate House and Pumping Plant in Nagle Addition (capacity of reservoir about 20 millions gallons; capacity of pumping plant 3 millions gallons in 24 hours).

In Subdivision Three (3):

Stand Pipe on Queen Anne Hill, 30 feet diameter by 60 feet high, incased in "Ransome Concrete."

Force main from Low Service Reservoir to Stand Pipe on Queen Anne Hill, also to Renton Hill, said mains consisting of 13,200 lineal feet of 12-inch and 2690 lineal feet of 16-inch Kalamein pipe.

In Subdivision Four (4):

Pipe line from the Low Service Reservair to the present distributing system, consisting of 3580 lineal feet 30-inch riveted steel and 1240 lineal feet 30 inch cast iron pipe, also 250 lineal feet 24 inch riveted steel pipe, for connecting said reservoir with Tenth Avenue Sewer.

Separate bids will be received and separate contracts will be let for each of said subdivisions. The work will be let to the lowest bidders therefor. The total cost of said work is limited to $1,250,000. The contract to be entered into will provide that payment shall be made for this work only by warrants upon the "Cedar River Water Supply Fund of Seattle," as created and established by Ordinance No. 3990 as amended by Ordinance No. 5258, and the contractor shall have no claim against the city except as therein provided. Said ordinance provides that such warrants shall have interest coupons attached, and shall bear interest at the rate of five (5) per cent per annum, payable semi-annually on the first days of January and July of each year; and the city of Seattle absolutely and irrevocably pledges, out of the revenues from its water works system now owned, or which may hereafter be owned operated or controlled by it, a sum not less than one hundred thousand ($100,000) per annum, to pay the principal and interest of said warrants as aforesaid, when the same shall become due.

In addition to the warrants which will be issued in payment for the construction of said additions, the contractor will also be required to purchase at par any and all warrants which shall be drawn on said fund by the city in such amounts as shall be required to pay for any real estate, rights, easements or privileges necessary for the prosecution of the work of construction and the perpetual control by said city of the additions to the water works herein specified, whether obtained by purchase, agreement or condemnation proceedings, and also such warrants as shall be drawn upon said fund by the city in payment of engineering and other expenses necessarily incurred in connection with said additions; provided, that the total amount of the warrants thus required to be purchased by the contractor shall in no case exceed the sum of sixty thousand ($60,000) dollars, and shall be distributed as follows, to wit:

Against subdivision No. 1, the sum of forty-five thousand ($45,000) dollars; against subdivision No. 2, twelve thousand ($12,000) dollars; against subdivision No. 3, two thousand ($2,000) dollars; against subdivision No. 4, one thousand ($1,000) dollars.

Each bid must be accompanied by a certified check, payable to the order of the City Comptroller, for a sum not less than five (5) per cent of the amount of the bid, and no bid will be considered unless accompanied by such check.

The successful bidder will be required to enter into a contract and furnish satisfactory bond for the amount required by the City Charter and the laws of the State of Washington, within ten days after being notified of the award of the contract to him; failing so to do, the said check and the amount thereof shall be forfeited to the city. No person is eligible as a bidder who has within two years prior to the letting of said contract made default in payment of any just claim for any work or labor performed, or any skill or material furnished pursuant to any such contract as herein advertised, or who within said two years failed to complete any such contracts.

Special attention is called to article xxiii. of the City Charter, as now in force, relating to "hours of labor."

All bids must be made in accordance and compliance with the plans and specifications now on file in the office of the Secretary of the Board of Public Works, and in compliance with Ordinance No. 3990 as amended by Ordinance No. 5258.

The City of Seattle reserves the right to reject any and all bids.

Proposals must be endorsed on envelope "Bid for Constructing Subdivision No. —— of Certain Additions to the Water Works of the City of Seattle."

By order of the Board of Public Works.
FRANK OLESON, Secretary.
Date of first publication March 11th, 1899.

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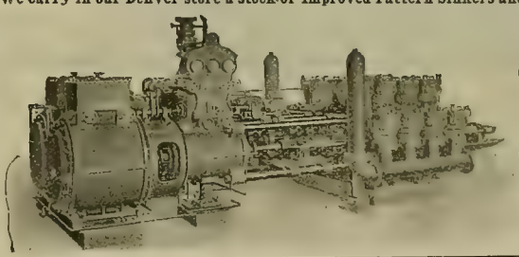

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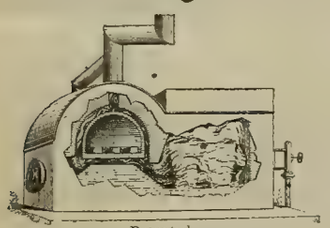

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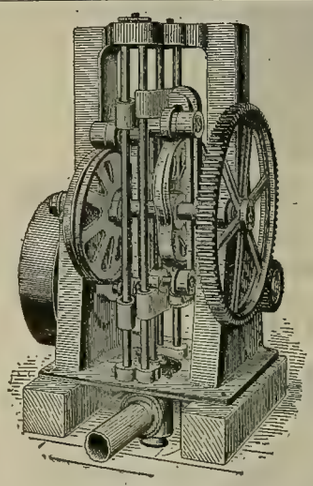

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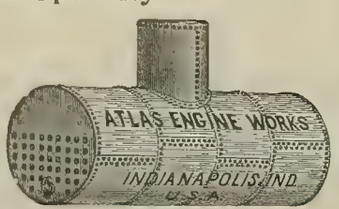

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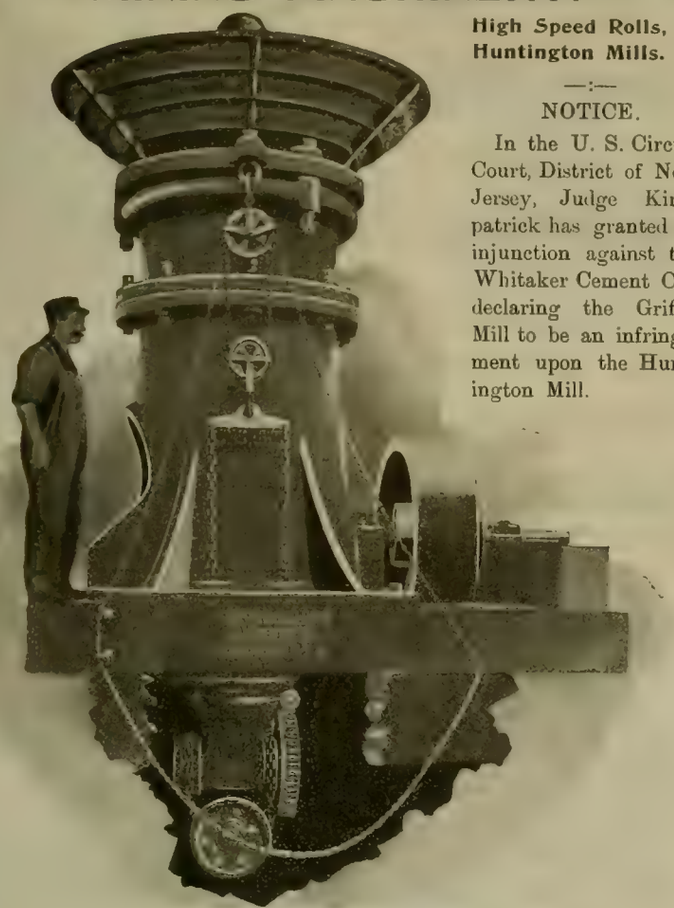

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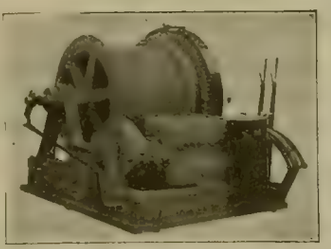

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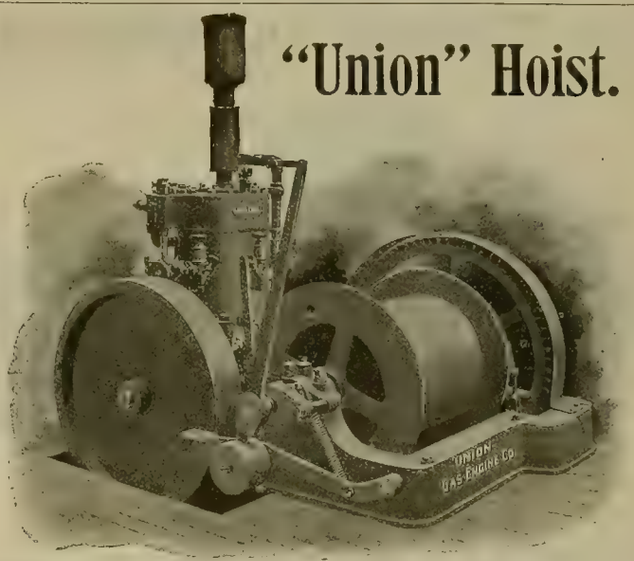

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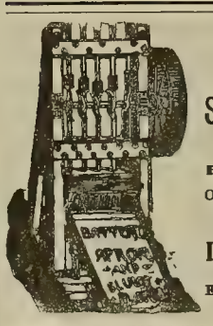

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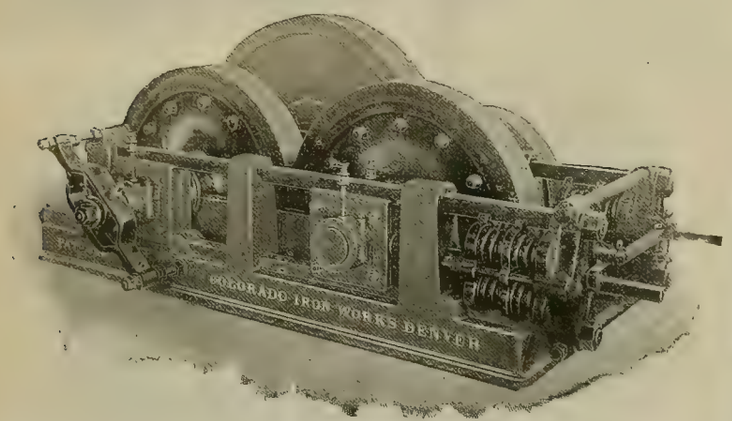

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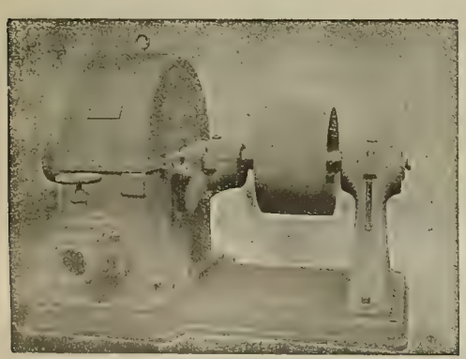

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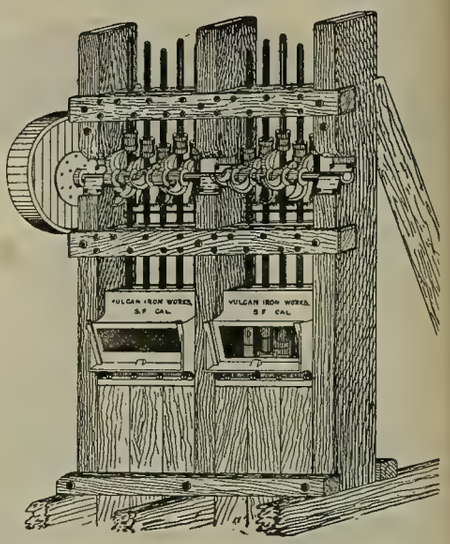

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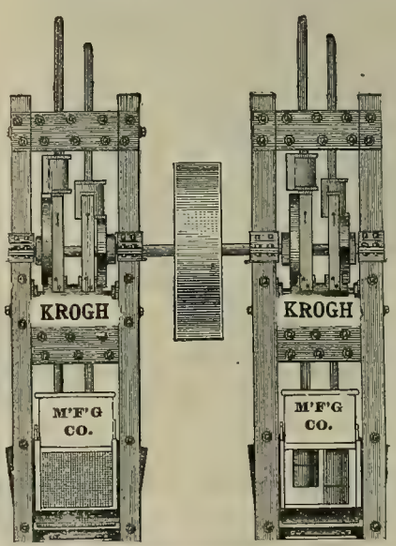

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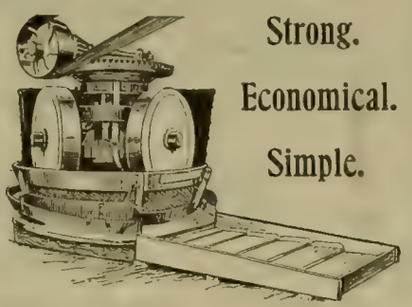

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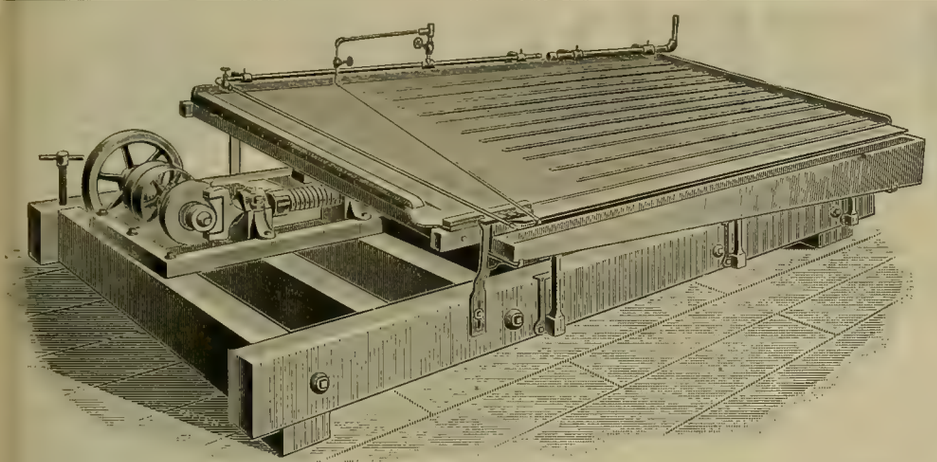

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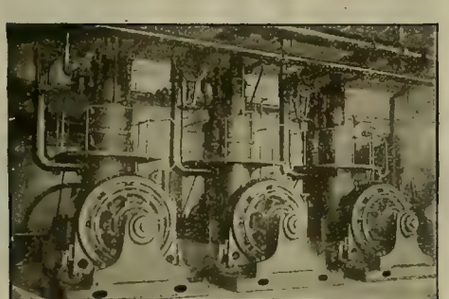

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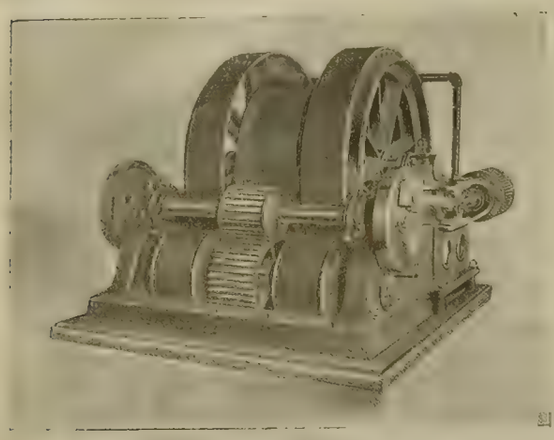

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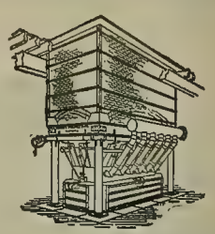

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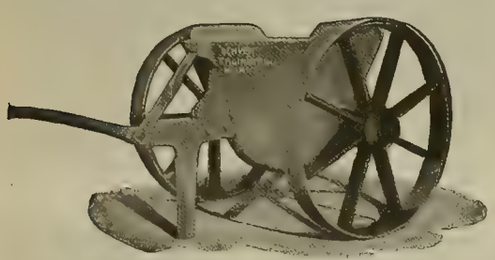

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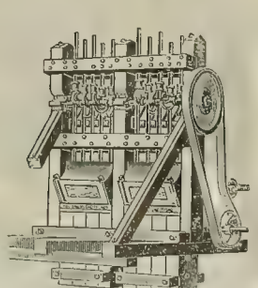

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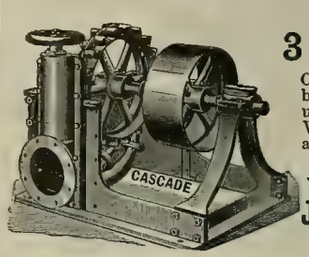

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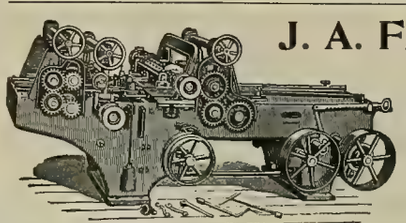

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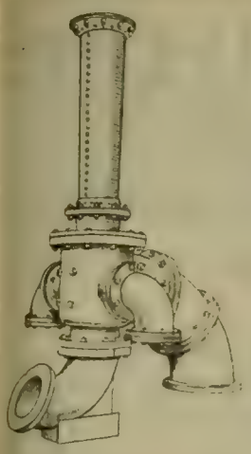

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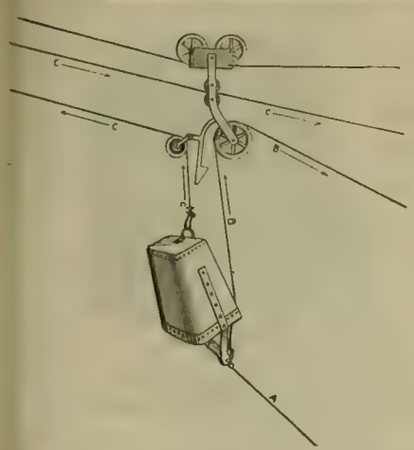

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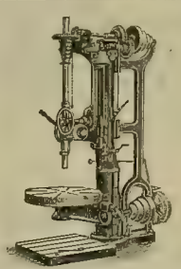

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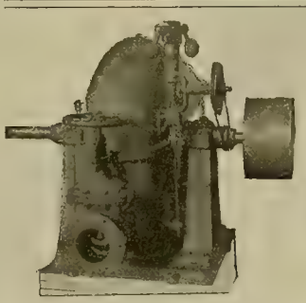

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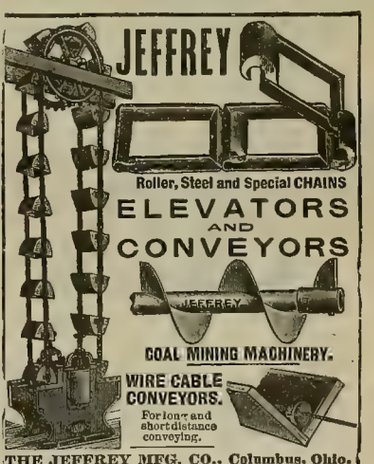

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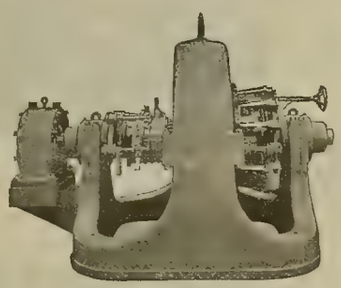

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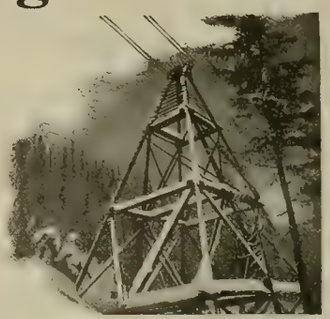

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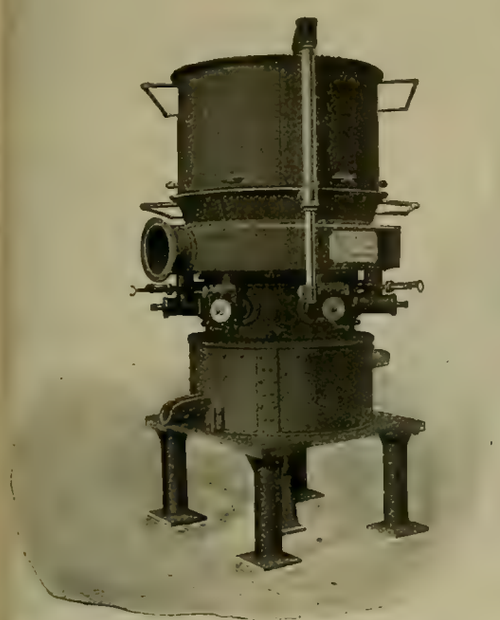

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(SEE PAGE 276.)

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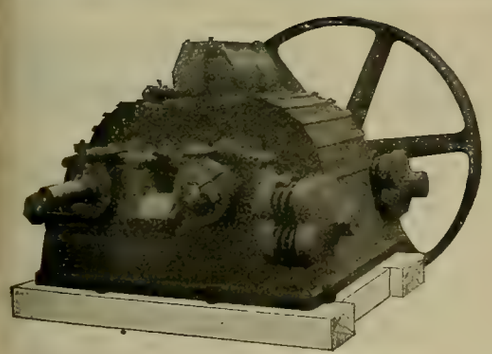

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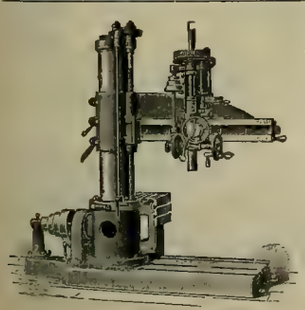

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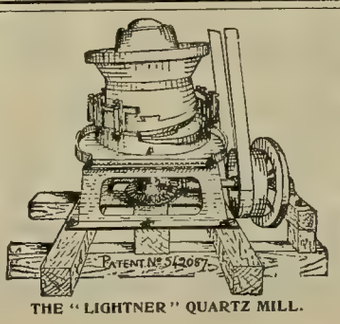

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Market Reports.

The Markets.

SAN FRANCISCO, March 9, 1899.

SILVER. — London, 27⅛d; New York, 59⅝; San Francisco, 59⅝; Mexican Dollars, 47⅛@48. New York exchange, sight, 15; telegraphic, 17½ cents premium.

LEAD.—New York reports "firm," $4.30@$4.35; brokers' price, $4.10.

Local, pipe, 7@7¼c; sheet, 7@8c; pig, 6¾c; bar, 7c.

COPPER.—New York reports Lake unchanged, $17.75; brokers' price, $18. Local, bar, 21¼c per lb.

England's imports of copper during January increased, as compared with '98, nearly 64% in quantity and 38% in value.

IRON.—American, soft, $22@24 per ton; Scotch, $27. Local bar, 2½c per lb. A Pittsburg dispatch says steel billets on the 8th sold at $24 a ton, the highest price since 1890. Several large sales were made at that price.

TIN.—Pig, 30c per lb.; Bar, 35c. New York reports firm, $24.

ANTIMONY.—16.

BABBITT METAL.—No. 3, 8c.

QUICKSILVER.—Local, $42.50; export, $39@39.50; carload lots, special rates.

Speaking of California quicksilver stocks, in Boston, where the stock is mostly owned and controlled, a paper says the New Indria, the newest of the quicksilver properties, out within the last two years at $5 per share, is at the present time producing 400 flasks of quicksilver per month, against a production of 600 flasks by the Napa, 300 flasks by the Ætna. The demand for quicksilver has cut down stocks on hand to between 5000 and 6000 flasks in this country, whereas a normal supply has been between 10,000 and 12,000 flasks, and a years ago a stock of between 25,000 and 30,000 flasks was not considered abnormal. The New Idria has a surplus of over $100,000 and is earning greatly in excess of the 80c per share it is now paying.

Ætna Quicksilver has been at 3¾ to 4 per share for many months, although paying 40c per share per annum dividend. It has now advanced to 4¼.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 2c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9½@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 7½c; 6s, 14 oz., 6½c; 6s, 12 oz., 5½c; 6s, 10 oz., 4½c; Granite (Mining) Candles—6s, 16 oz., 8¾c, 6s, 14 oz., 7¾c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11¼c; Mineral Seal, iron bbls., 21c; wooden bbls., 23¼c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia)	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 9, 1899.

Pending pumping results matters move slowly in the local stock market. In other stock exchanges it is different. Denver, Colorado Springs and Salt Lake City report considerable activity. In the East there is a tremendous rush, especially in copper stocks which everybody wants:

It is the old story repeated for the hundreth time. The mass of men move only in droves, and until one or more courageous leaders show them the way they hesitate and hang back. After they once start, however, they keep going until they get a fright or are tired out and then they stop and perhaps retreat as fast as they advanced. If all the buyers of stock in times like these in the East were investors who paid cash for their purchases and stowed them away to keep, it would not be safe to predict a reaction from the upward movement that is now going on. Buying for the sake of income will not give way to a selling because of a failure of income, until such a failure actually occurs. From all appearances stock and bonds which now pay dividends and interest may be counted upon to continue to pay them for months if not years to come. With those on the other hand who have bought merely to sell again at a higher price than they have paid and especially those who have bought with borrowed money, the case is different. To such there very speedily comes a time when they get impatient of waiting for the expected profits and begin to be apprehensive that they may suffer a loss. As soon as this state of mind prevails the same energetic leadership which set in motion the rush to buy is able to start an equally general rush to sell. Whether or not things have reached this critical stage is therefore a question which every man must decide for himself as best he can and abide the result.

9:30 A. M. SESSION.

100 Alta	14c	1150 Mexican	72c
500 Belcher	21c	1100 Occidental	24c
1100 Best & Belcher	50c	400 Ophir	$1 00
200 Bullion	05c	600 Potosi	27c
100 Caledonia	30c	600 Savage	27c
300 Challenge	24c	500 Sierra Nevada	$1 30
700 Con. Cal. & Va.	$1 70	1000 Union Con	54c
300 Gould & Curry	39c	200 Utah	17c
1300 H. & N.	33c	800 Yellow Jacket	23c
200 Justice	18c		

2:30 P. M. SESSION.

100 Ophir	$1 00	340 Yellow Jacket	24c
200 Mexican	70c	500 Belcher	18c
500 Gould & Curry	41c	700 Sierra Nevada	$1 30
350 C. Cal. & Va.	$1 75	900 Bullion	05c
600 Savage	28c	600 Union Con	53c
400 Chollar	36c	300 Best & Belcher	50c
400 Potosi	25c	200 Challenge	23c
400 Hale & Norc's	31c	400 Andes	17c
100 Crown Point	20c	100 Standard	2 75

Commercial Paragraphs.

THE Warren Webster Co. of Trenton, N. J., is now represented in Denver, Colo., by Howard H. Fielding.

THE Denver office of Fairbanks, Morse & Co. reports the recent sale of five gasoline hoists, two gasoline air compressors, four steam engines for stamp mills, distributed through Colorado, Arizona, Utah and Idaho.

THE Pelton Water Wheel Co. have recently installed two wheels in the Ophir mine on the Comstock under such extraordinary conditions as to head as to be worthy of note. One of these is a 36-inch wheel direct connected to a fan used for ventilating the shafts, stopes and drifts of the mines. The other, a 32-inch wheel, direct connected to a dynamo used for lighting the mines. Both of these wheels are located at the Sutro Tunnel level, some 1700 feet below the surface, and run under a vertical head of 2020 feet. This is believed to be the highest head under which any water wheel has ever been operated, except a similar wheel furnished an adjoining mine some years ago, which runs under 2100 feet head. Some fifteen or twenty Pelton wheels are now running in the various Comstock mines under heads varying from 1200 to 2000 feet—operating dynamos, blowers, hoists, etc.

Catalogues Received.

THE third edition of Catalogue No. 17, "Gold Dredging Machinery," published by the Risdon Iron Works, is received. It is fully up to former catalogues of mining machinery published by that establishment, and contains the latest in the line of gold dredging machinery. The engravings are equal to those produced on the pages of a first-class magazine, and, with the accompanying descriptive matter, are printed on heavy calendered paper. The technical descriptions of the dredge are from practical articles from the London *Engineer*, the MINING AND SCIENTIFIC PRESS and other journals. This is the latest of a series of catalogues published by the Risdon Iron Works, Howard and Beale Sts., San Francisco. No. 3 is an 82-page pamphlet on "Hoisting Machinery," and is sent, postpaid, to any address on receipt of price—30 cents. No. 4 treats of "Tangential Water Wheels," 36 pp., 15 cents. No. 5, "Evans' Gravel Elevators," 48 pp., 15 cents. No. 6, "Hydraulic Machinery," 62 pp., 15 cents. No. 7, "Air Compressing Machinery," 96 pp., 30 cents. No. 8, "Bryan Roller Quartz Mill," 48 pp., 15 cents. No. 9, the same, in Spanish, 15 cents. No. 11, "Risdon Concentrators, 16 pp., 15 cents. No. 13, "Structural Iron Work," 60 pp., 15 cents. No. 14, "Johnson Concentrators," 16 pp., 15 cents. No. 17, "Gold Dredging Machinery," 48 pp., 15 cents. Bound copies, in cloth, 600 pp., $5 each.

Recently Declared Mining Dividends.

Swansea, Utah, $5000; March 10.

Empire State-Idaho M. & D. Co., 1½%; payable March 15.

South Swansea mine, Utah, $7500; March 6.

Pennsylvania M. Co., Grass Valley, Cal., dividend No. 27, 5 cents per share, making $2500; March 5.

Morning Star M. Co., Iowa Hill, Cal., $3 per share; March 5.

Pioneer M. Co., Cal., 12½ cents per share; payable March 15.

Wolverine Copper Mine, Mich., $1.50 per share; payable April 1.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

Cable address Edico Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

ANTIMONY.

We buy Antimony Ore in any quantity and pay prompt CASH for same. Write us and let us know what you have.

Chapman Smelting Works Co.,
(INCORPORATED.)
422 Battery Street.....San Francisco, Cal.

UTAH
Mines—Dividend Paying and Investment Stock.

W. E. HUBBARD & CO., 15 W. 2d So. Street, SALT LAKE CITY.

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Supported by the State of Michigan. Practical work. Elective system. Special advantages for men of age and experience. For catalogues address
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Houghton, Michigan.

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Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.
W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.
29-30 Chronicle Building, S. F.

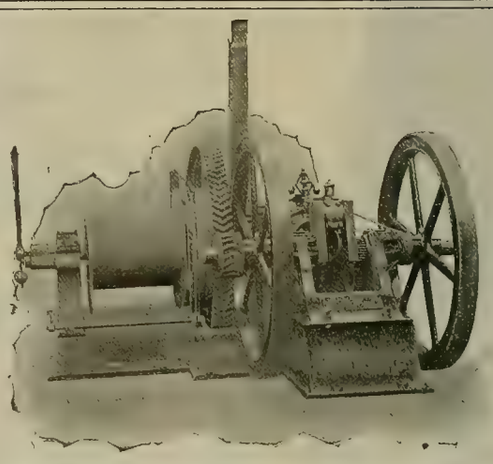
Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

CREIGHTON & CO.,
Republic and B. C. Mining Stocks.
Reliable quotations furnished on all standard British Columbia, Washington and Idaho Stocks.
ROOM A, ANNEX 606 RIVERSIDE AVENUE,
SPOKANE, WASH.



FRESNO, June 25, 1898

Hercules Gas Engine Works.
San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,
305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,
MANUFACTURERS OF DIRECT CURRENT MACHINERY
For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,
ALSO REPAIR AND JOB WORK OF ANY KIND.
Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.
509-511 Howard St., - San Francisco.

W. PELLEW HARVEY, F. C. S.
The Vancouver Assay Office and Ore Testing Works.
MINING ENGINEER, METALLURGIST AND ASSAYER.
Working Tests by Amalgamation and Cyanidation. Ores Purchased. Assays and Analyses.
Representative for:
Vivian & Sons, Swansea; The Elliott's Metal Co., Wales; The MacArthur-Forrest Process (Cyanide).
OFFICES: VANCOUVER AND VICTORIA, B. C.

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Mining Stocks
BOUGHT and SOLD.
For reliable information, write to
NICOLLS & HAWLEY, Vancouver, B. C.
Codes used: Clough's, Moreing Neal.

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Mining Stocks
Bought and sold for non-residents. SOLID DIVIDEND PAYERS as an investment. Prospective producers as a speculation. Write for information.
H. P. PALMER & CO.,
Ecxhange Nat. Bank Bldg., SPOKANE, WASH.

POSITION WANTED by experienced cyanide man as superintendent of a mill or as assayer and chemist. Technical graduate. Will take charge of a cyanide proposition for a small salary with a percentage of the profits. Address S. C. M., care of Mining and Scientific Press, San Francisco, Cal.

WANTED—Position by a Mining Engineer, Assayer and U. S. Mineral Surveyor.

Speaks Spanish fluently. Best of references. Address P. C., this office.

WANTED—SITUATION BY A PRACTICAL MILLMAN AND ASSAYER.

Would go anywhere. Best of reference. Address J. B., care of Mining and Scientific Press.

WANTED — POSITION BY A CHEMIST, ASSAYER and MINING ENGINEER.

Cyanide a specialty. Speaks Spanish. First-class references. Address Box 28, this office.

WANTED.

Capital to Handle Extensive Gold Mines.

JAMES ARTHUR, Cornucopia, Oregon.

Wanted to Bond a Gold Mine

IN CALIFORNIA OR ARIZONA, on which parties will do development work.

Address P., 347 Wilcox Building, Los Angeles, Cal.

Have Purchasers for Good Copper and Gold Mines

IN THIS STATE, ARIZONA AND MEXICO. Reliable reports required and options later, if approved of. RUSSELL & POOLEY,

349 Wilcox Building, Los Angeles, Cal.

CRIPPLE CREEK.

FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MacBETH, Equitable Building, Denver, Colorado.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.

CAPITAL, - $550,000.

The Original Cyanide Process.

SIMPLE. RELIABLE. ECONOMICAL.

(MacARTHUR-FORREST PROCESS)

Gold Medal, Columbian Exposition, 1893.

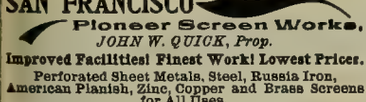
MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by

The MacArthur-Forrest Cyanide Process.

Samples assayed and fully reported upon. Particulars upon application.

Advisory Board in the United States: Geo. A. Anderson, General Manager; Hugh Butler, Attorney; W. S. Ward; J. Stanley Muir, Technical Manager.

OFFICE: McPHEE BUILDING, DENVER, COLORADO.



—EASTERN PRICES BEATEN.—

SAN FRANCISCO Pioneer Screen Works.

JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices.

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

—MINING SCREENS A SPECIALTY.—

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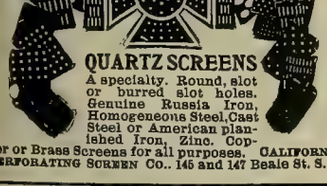

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc. Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St. S. F.

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DEWEY, STRONG & CO. 330 MARKET ST.

Assessment Notices.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of February, 1899, an assessment (No. 23) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of March, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 3rd day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of February, 1899, an assessment (No. 8, new series) of seven (7) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of March, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 5th day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. P. THURSTON, Secretary.

Office—324 Pine St., San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of March, 1899, an assessment (No. 17) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 28th day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the seventh (7th) day of March, 1899, an assessment (No. 66) of ten (10c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 33 Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the tenth (10th) day of April, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the second (2nd) day of May, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33 Nevada Block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 20) levied on the 10th day of January, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Mrs. Helen M. Stanley	4,201	25	$6 25
W. P. Stanley	6,053	25	6 25
Geo. B. Root, Trustee	6,817	100	25 00
Geo. B. Root, Trustee	6,818	100	25 00
Geo. B. Root, Trustee	6,819	100	25 00
Geo. B. Root, Trustee	7,157	200	50 00
Geo. B. Root, Trustee	7,178	50	12 50
Geo. B. Root, Trustee	7,289	100	25 00
Geo. B. Root, Trustee	7,290	100	25 00
Geo. B. Root, Trustee	7,291	25	6 25
Geo. B. Root, Trustee	7,292	100	25 00
Geo. B. Root, Trustee	7,334	25	6 25
F. Avery, Trustee	7,393	1,000	250 00
T. F. Bean	7,397	100	25 00
New York Issue.			
Herman Cohen	120	50	12 50
Mrs. Mary E. Wright Smith	1,000	50	12 50

And in accordance with law, and an order from the Board of Directors, made on the 10th day of January, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, No. 310 Pine street, Rooms 15 and 17, San Francisco, California, on TUESDAY, the 21st day of March, 1899, at the hour of 1 o clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, Rooms 15 and 17, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from D. M. Butterfield, in the Santa Cruz Placer Mine, near Quincy, Plumas Co., to deposit tailings in a worked-out pit; from the Hoag Fat Company, in the Doherty Mine, at Howland Flat, Sierra Co., to deposit tailings in the East Branch of Slate Creek; from Sam Ahtye, in the Spaniah Flat Mine, near La Porte, Plumas Co., to deposit tailings in worked-out pits; and from J. D. Wetmore and Martin Tufford, in the Dry Creek Mine, near Brownsville, Yuba Co., to deposit tailings in Dry Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on March 20, 1899, at 1:30 P. M.

QUICKSILVER!

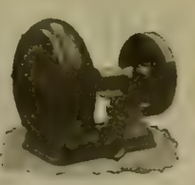
—FOR SALE BY—

The Eureka Company,

OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

DOBLE WATER WHEELS are without a Rival.



These Wheels have demonstrated that they will yield a higher efficiency than any other wheel on the market.

ELECTRIC POWER TRANSMISSION.

Doble Water Wheels are especially reliable for this class of work.

ABNER DOBLE COMPANY, S. W. COR. FREMONT & HOWARD STS. SAN FRANCISCO, CAL.

Weber Hoists.

6 to 100 H. P.

Cost to Run, 1c per hour per H. P.

All Latest Improvements. Get Catalogue.

WEBER GAS ENGINE CO., 430 S. W. Boulevard, Kansas City, Mo.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

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CHEMISTS ASSAYERS ENGINEERS.

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ORES CRUSHED AND SAMPLED. ✦ MILL RUNS.

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MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction.

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Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

Utah Mines.

The Utah mining camps are fast forging to the front. THE TINTIC DISTRICT, BINGHAM, PARK CITY, MERCUR, LA SAL AND GOLD MOUNTAIN are all located on the line of the

RIO GRANDE . . .

WESTERN RAILWAY.

Two trains daily from Denver via Denver & Rio Grande or Colorado Midland and RIO GRANDE WESTERN. For pamphlets, etc., write

F. A. WADLEIGH,

General Passenger Agent, SALT LAKE CITY.

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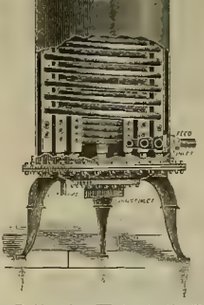
(A CORPORATION.)

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. ☞ Extra sizes and lengths made to order on short notice

611 and 613 Front St., San Francisco, Cal.

THE NATIONAL Feed Water Heater.



800,000 Horse Power Sold.

Delivering Water to the Boiler at 210 degrees F. Thirty Sizes from 5 to 4000 Horse Power. Made of the best Seamless Drawn Brass or Copper Tube, with Hard Brazed Joints. Unsurpassed for SIMPLICITY, EFFECTIVENESS and RELIABILITY. Send for Catalogue.

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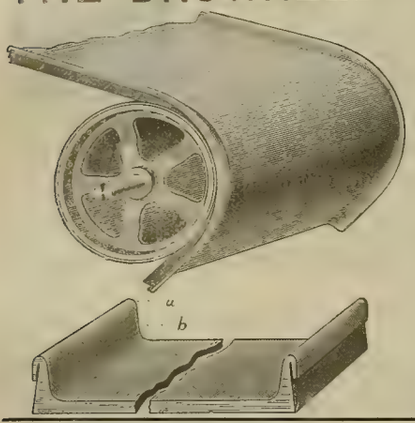
Skeleton Mining Report.

NEEDED BY EVERY MINING MAN.

FIFTY CENTS POSTPAID.

Mining and Scientific Press, 330 Market St., S. F.

THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.



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Yours truly, JOHN ROSS JR., Superintdenent.

MEXICAN MILL. EMPIRE, NEV., March 28, 1897.

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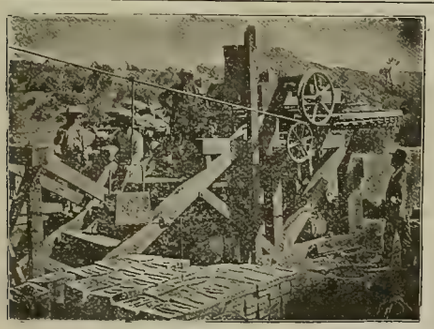

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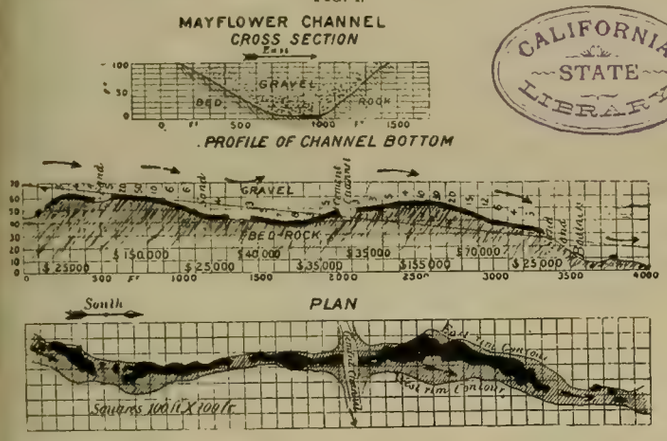
FIG. 1.



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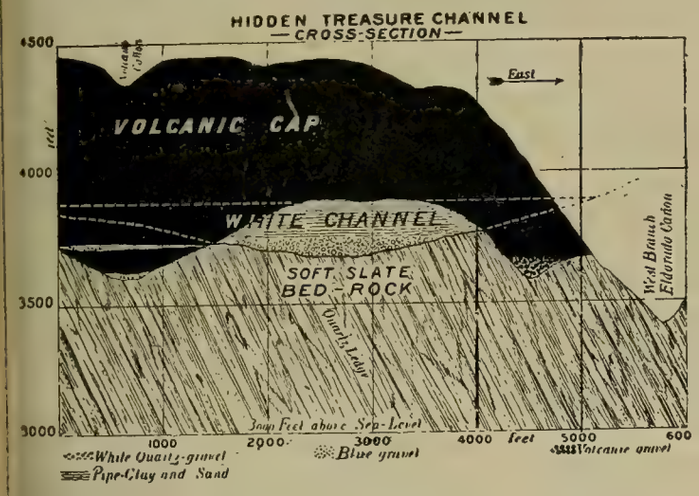

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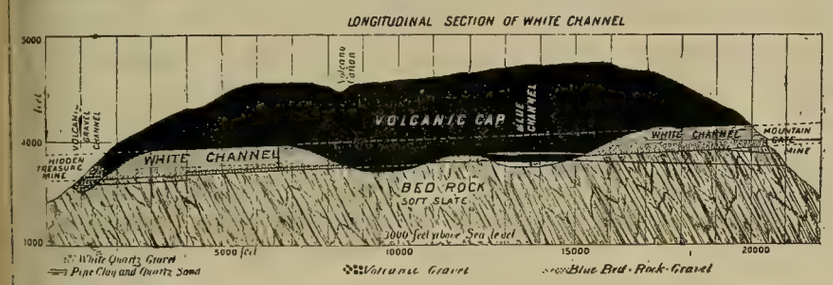

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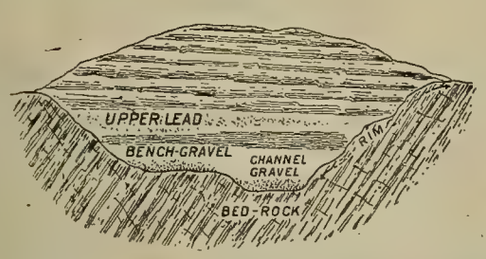

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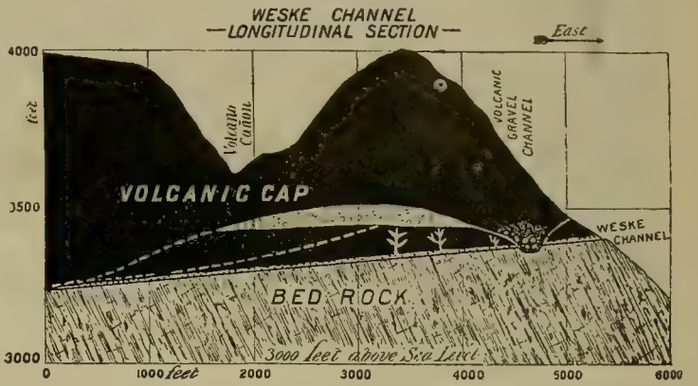
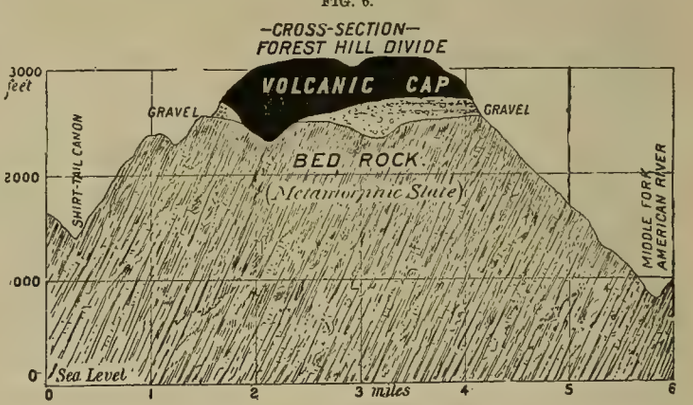


FIG. 6.



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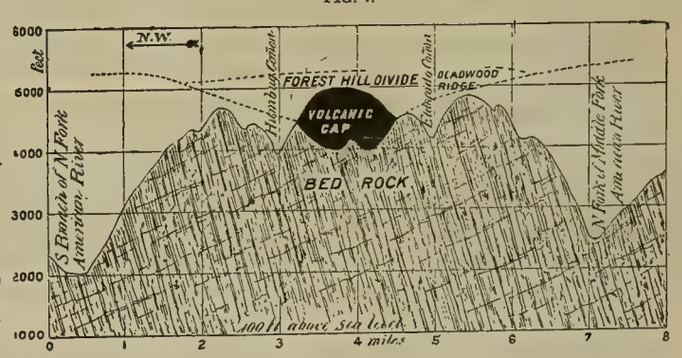

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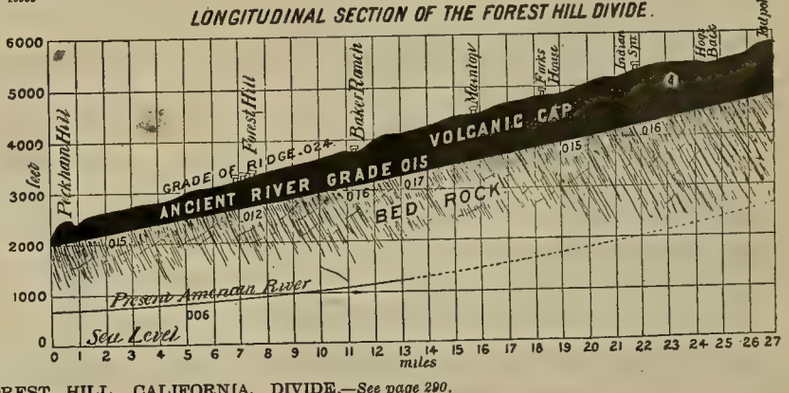

ANCIENT RIVER CHANNELS OF THE FOREST HILL, CALIFORNIA, DIVIDE.—See page 290.

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J. F. HALLORAN.....Publisher

San Francisco, March 18, 1899.

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REGARDING the present activity in copper development consequent upon the great demand and appreciation in price, the remark of the Boston banker may continue to be quoted as it can not be improved, viz., that while copper is less easily sold at 18 cents, it is more easily produced.

A NEW YORK CITY technical journal gives an interesting account of an electric light plant at Johnson, Vermont, a village of 600 people. The total outlay was $5600. According to the New York paper's assertions, the village, which owns the plant, furnishes 16-candle power incandescent lights for $1 per year, and from that revenue is able to furnish free sixty public 30 candle power lights and show an annual net profit of 8% on the investment, which, like similar statements, is interesting if true.

IN mining operations conservatism is most important, but it can easily be overdone. All who know anything of mining are aware that a rich and well developed mine is as good an investment as can be found, but all realize with equal force that an absolutely undeveloped property has a great deal of the element of a gamble in it, and yet a prospect which makes a good showing on the surface justifies an amount of capital sufficient to test its worth; but because the surface prospect is good, the operator is not justified in ordering a plant of machinery having a capacity for a shaft half a mile deep, nor is a mill necessary until the quantity and character of the ore has been determined. The development of a prospect may be carried on in a satisfactory and economical way, and by pursuing this course mining is robbed of much of its risk.

EXCHANGES during the week past have brought the news of several fatalities resulting from powder explosions, one in Colorado resulting in the death of four men. In this case a large quantity of nitro powder exploded in a tunnel. The powder was no doubt kept in the mine to prevent freezing, but the practice of keeping large amounts of powder in the underground workings of a mine, where it is accessible to everyone, is a very bad one. Where climatic conditions are such as to require the powder to be kept underground there should be a separate place for it, in an abandoned drift or in an excavation made especially for it, and then accessible to but one man. Men should never be permitted to prepare their fuse, caps and powder near large quantities of powder, and caps particularly should be kept in a separate place. In another instance a Siskiyou Co., Cal., miner undertook to thaw nitro powder by placing it under his cabin stove, with the usual result—the destruction of his cabin, though he, being at a distance, was uninjured.

A Notable Decision.

In the issue of Feb. 18th appeared editorial reference to a decision just rendered by the Supreme Court of the State of Colorado. A brief recital of the facts was given. From the interest manifested it is deemed advisable to give the decision in full, which accordingly appears on page 288. Perusal of the opinion will give a clear understanding of the facts and of the line of argument that resulted in a reversal of the lower court, and a definite determination of the rule regarding the legal status of the locator of a lode claim on placer ground before patent for the placer is applied for, and also the extent of such lode claim.

The judges' decision is deemed worthy of place because of the information it contains, the recurrence everywhere of conditions similar to those constituting the point at issue, and the unusual absence of Supreme Court decisions on so important a matter.

The knowledge of the facts so clearly set forth on page 288 is of practical value to every owner or locator of a lode or placer claim, as such knowledge may save tedious and expensive delay and litigation in any similar contingency, if each party to such incipient controversy thoroughly understands his rights under the Federal statutes in such cases meant to apply.

It is clearly shown that the locators of the two lode claims had a right to these two claims, for they were "known to exist" at the time the owners of the placer claims in the same location applied for patent to the area embracing both lode and placer claims. In this part of the decision the Colorado Supreme Court decides against the Mt. Rosa possessors of the placer claims, and in favor of the holder of the lode claims within the limits of the Mt. Rosa placer holdings. But in the second part of the decision is the most important ruling, the court determining (for the first time, so far as known in a court of last resort) how much surface ground the successful lode locator in such placer ground is entitled to because of such admitted lode location. The lower court had allowed him the usual amount —600x1500 feet (300 feet each side of the vein, a distance of 1500 linear feet). When appealed, the Mt. Rosa Co. claimed that even if the lode locator in their placer ground were allowed to hold ground therein he was entitled only to a small portion of the usual 600x1500 feet, such portion to be determined by the Supreme Court. On this point the Appellate Court held that the placer claim took precedence; that it had the "right of way," so to speak, and that the lode claimant in such cases as the one under discussion should be allowed only just what would be absolutely required for convenient working of the lode, in this case 25 feet on each side of the strike of the vein, or 50x1500 feet, instead of 600x1500. In making this rule Justice Goddard evidently noted the express implication in Section 2333 of the United States Statutes and the precedent established by Judge Riner in the United States Circuit Court, who, in a similar case, determined that 25 feet each side of the vein was the minimum amount that a lode locator could get along with, and the maximum amount that he should receive when the rights of the placer locator were taken into account.

TOO MUCH importance cannot be attached to the advantage obtaining from carrying the development of mines far ahead of stoping operations. A mine that has no ground blocked out beyond its actual stopes is at best a hand-to-mouth affair. How much more satisfactory it is to have two or three levels opened and raises through and a large quantity of ore actually blocked out for stoping at any time. In some mines where this desirable state of affairs has been reached, it is not uncommon to see additional stamps set up to more speedily get rid of these reserves. This may be good business judgment, too, if the development is still continued in a vigorous manner. This is legitimate mining, and it is to be regretted that the policy is not more generally appreciated.

A California Mining Decision.

An important decision has been rendered by Judge Nicol of the Superior Court of Tuolumne county, Cal., in the case of the Argonaut Mining Co. vs. the Kennedy Mining Co. of Jackson, Amador county, Cal. The Argonaut Co. alleges in its complaint that the Kennedy Mining Co. has trespassed upon the property of plaintiff and extracted therefrom large amounts of valuable gold-bearing quartz. After elaborate preparations by both parties to the suit, a statement of facts was agreed upon by the attorneys for the contestants, which was submitted to the court September 15th, '98, at San Andreas, Cal. The case was subsequently argued in San Francisco. The litigation involves the apex and end line questions, and affects the extralateral rights of contestants. The Kennedy Co., prior to May 10th, '72, made application for a patent to its quartz claim, which was adversed by the Pioneer Mining Co., now the Argonaut Mining Co. A U. S. Deputy Surveyor was directed to make a survey and establish an end line dividing the Kennedy and Argonaut mines. This became known as the compromise line, and a patent was issued to the Kennedy Co. with reference to this line. In the meantime the Pioneer Co. made application for a patent, which was also subsequently granted. Both patents were issued subsequent to May 10th, '72. The Pioneer, or Argonaut claim, is bounded on the south by an agricultural patent issued prior to the application of the Pioneer Co. for a patent, and its south boundary line is consequently defined by this agricultural patent and is a due east and west line. The strike of the quartz vein through the Argonaut claim is about 20° west of north, and its north end line is approximately at a right angle with the strike of the vein, hence the end lines of the Argonaut mine are not parallel, but the claim was taken up and entered for patent under the laws of 1866, which did not require the end lines to be parallel. The Kennedy Co. contended that the end lines of the Argonaut claim should be parallel and assumed that the triangular section of ground which would lie between the eastward projection of the north end line of the Argonaut claim, and a line similarly projected drawn parallel with its south end line passing through the lode at its intersection with the Kennedy south end line, would become the property of the Kennedy Mining Co., and it is largely within this triangular section that the alleged trespass has been made. The court has decided in favor of plaintiff, establishing the end line as claimed by the Argonaut Co., and awarding judgment against the Kennedy Co. for $64,000—the net amount extracted by that company within the Argonaut extralateral right.

SINCE this paper published the statement that there were in California large quantities of chlorination tailings containing values of $5 per ton and upwards a number of letters have been received making inquiry concerning them. The experience of those who have tried experiments on material of this class would form a valuable contribution to the treatment of gold ores and the MINING AND SCIENTIFIC PRESS would like to hear from any who have conducted such experiments, whether by rechloridizing, cyaniding, amalgamation or otherwise.

A CHANGE has been made in the hydraulic ejector at the C. & C. shaft, Comstock mine, Virginia City, Nev. In the new arrangement the injecting water jets are introduced in the bottom of the elevator, in place of the sides, as in the first ejector. This permits a direct upward lift, with consequent suction, and is designed to obviate the vibratory motion in the lower part of the discharge column. The new castings in which this change has been introduced have not yet been placed in position.

PRESENT high price of copper stimulates production and retards industries wherein copper is a large factor. As in the case of copper, so with zinc. New localities are being scoured by prospectors and old ones are coming to the front with discoveries of ore, the existence of which, it would seem, had not been suspected. Out of the thousands of new locations are likely to come a few good mines. With the coming of spring the efforts of prospectors will be increased.

Concentrates.

REDDING, Cal., is one of the few places where miners are locally reported to be in demand.

"THE largest tin mine in the world" is believed to be that on the island of Sulo Brani, in the bay of Singapore, producing monthly over 1000 tons of tin.

PROF. FALK of Vienna announces the destruction of the world will take place on Nov. 13th, '99. Very well. Most of us can get along just as well without it.

THE proposed purchase of gold properties on Cedros island, off the Lower California coast, by W. A. Clark of Montana, has, as usual, awakened dormant claims thereto.

WITH lead at $2 60 in '97, the Gem, Idaho, mine like others of its class closed down. Better prices and prospects now occasion the unwatering and reworking of that property with new machinery.

No U. S. internal revenue stamps are required on preliminary filing or final mining location notices. Where title is transferred, stamps are required, the same as any other conveyance of real estate.

AMONG other unique forms of gold "mining" will appear this season a force of miners working in diving suits in the Sacramento river, Cal., between Redding and Keswick, superintended by M. Warren.

THE Denver, Colo., Mining Stock Exchange is about to attempt getting back at least a portion of the business enjoyed by Colorado Springs, Colo., mining brokers, lost by the former organization several years ago.

ON a claim located in July, '98, no matter how much work was put on it in that year, there must be $100 work or improvements put on the claim some time in '99 to enable the locator to legally hold it after Dec. 31st, '99.

A PATENT for an improvement on a machine does not restrict the use of the machine in its usual form. In the claim for an improvement the claim must be limited to the addition. It is void if it comprises the whole machine.

DIAMOND mining in Brazil is now carried on by small associations or by single individuals, in a cursory sort of way. At one time it was the most important diamond field in the world, and the quality of the stones is unsurpassed.

LATEST monthly report from the Alaska-Mexican mine shows the milling of 13,905 tons ore, yielding $1.85 per ton. During the month 275 tons sulphurets were saved, which are expected to smelt $30 per ton. The month's expenses were $23,062.

THE region around Johannesburg, South Africa, has produced gold to the amount of $900,000,000; California has produced gold to the amount of $1,310,000,000. In the former region there are now 5325 stamps in operation, crushing about 750,000 tons ore per month.

ANSWERING Trinity Center, Cal., Bisbee, Ariz., and Brigham, Utah, there is no federal law stating how much per day shall be reckoned as the base for annual assessment work on unpatented mining claims. The ruling rate of wages paid determines that matter in every locality.

THE three bills recently passed by the Oregon Legislature affecting the mining industry puts placer and quartz claims upon the same basis as real estate, provides for lien against mining claims for labor and supplies and for the appropriation of water for mining and power purposes.

THE price of copper may be made prohibitory. In one New England factory formerly consuming, it is said, 300 tons of copper per month, aluminum has been introduced to take the place of copper, and in another Babbitt metal is said to have been substituted for copper since the price of the red metal passed 14c.

A $20 GOLD PIECE weighs 516 grains and contains 464.4 grains fine gold. There is $20 worth of "pure gold" in a $20 gold piece; the 51.6 grains of alloy therein is to give the coin hardness and durability. Whether in the shape of a coin or a "melted nugget," the $20 gold piece, as it comes from the U. S. mint, is worth exactly $20 in gold.

THE present high price of zinc should stimulate prospecting in the Santa Ana mountains, in the Trabuco canyon, Orange Co., Cal., and that vicinity, for ores of that class. A large amount of development work has been done to develop lead-silver ore, but the ore contains more zinc than lead, and, having a silicious gangue, should concentrate readily.

SO FAR as learned, the underwriters of the American Smelting & Refining Co., the new smelter combine, are H. H. Rogers of the Standard Oil Co., Lewisohn Bros. and Moore & Schley. Of the $65,000,000 capitalization, one-half will be in preferred and one-half in common stock. The full details, as furnished by the parties themselves, appear on page 297.

EVERYTHING in the way of material that goes into the construction of mining machinery shows a general advance in price. Iron and steel especially show sharp rise in prices. So far there has been no advance in prices of manufactured articles, though it is manifest in the face of increased cost in all that goes to make up the finished product, it must advance too.

LONG distance telephone messages from nearly every part of California have been joyfully ringing in the MINING AND SCIENTIFIC PRESS office since the morning of the 15th, telling of copious rains in the foothills and snow in the mountains, insuring a busy season for the California miners. The rain was badly needed and clears the local business atmosphere.

THE latest available Russian platinum statistics are for '97, when that country produced six tons, or 95% of the entire world's output. Detailed technical accounts of the industry have repeatedly appeared herein, the latest being an exhaustive article written by a European mining engineer for the MINING AND SCIENTIFIC PRESS, and which appeared in the issues of Sept. 10th and 17th, '98.

TO FIND the area of a required pipe, the volume and velocity of water being given, multiply the number of cubic feet of water by 144, and divide the product by the velocity of the water in feet. The area being found, it is easy to get the diameter of pipe necessary. The area of a steam piston multiplied by the steam pressure gives the total amount of pressure exerted. The area of the water piston multiplied by the pressure of water per square inch gives the resistance. A margin must be made between the power and resistance to move the piston at the required speed, usually reckoned at about 50%.

THE company that is credited with intention to exploit the gravel deposit near Columbia, Tuolumne Co., Cal., by driving a 5000-foot tunnel from the Stanislaus river, is mainly composed of San Francisco men. The original incorporated name was the Columbia Tunnel & Exploration Co. The new company that is about to undertake the development will issue 1,000,000 shares of stock.

COPPER sulphide ore has been found in Aliso canyon near Acton, fifty-five miles northeast of Los Angeles, Cal., on the S. P. Railway. Near the summit of the San Gabriel mountains, on Wilson's peak, back of Pasadena, a vein has been opened in which is found considerable copper sulphide. At several localities in the San Gabriel canyon, above Azusa, copper ores are found, some of which are rich in gold and silver.

WITHIN thirty days from announcement, an appeal may be made from the decision of any local register and receiver to the Commissioner of the General Land Office. It must be printed or written, and must be brief and to the point. It must be forwarded through the local land office. Upon questions relating to private land claims, or disposal of public lands, an appeal may be taken from the ruling of the Commissioner of the General Land Office to the Secretary of the Interior.

IN '63 camels were brought from Asia Minor to the State of Nevada and there used to carry salt from Churchill and Esmeralda counties to the Washoe silver mills. They were thus used for several years. After the completion of the C. P. R. R. they served to carry wood from the Carson river. In '75 the Nevada Legislature prohibited their further appearance on highways, and the remnant of the herd was taken to Arizona, where it carried military supplies till the completion of the first railroad through that Territory.

A GOOD leather belt will resist a continuous strain of 350 pounds per square inch of section. Long belts are more effective than short ones for transmitting power. A belt will transmit 30% more power with the same tension when the grain (smooth) side is turned toward the pulley than when the flesh side is turned in. Belts draw better on smooth pulleys than on rough ones, and is about 50% greater on a leather-covered pulley than on a polished iron one. Belts should not be permitted to become hard and dry. This may be prevented by the occasional use of tallow or neats foot oil.

THE town of Eveleth, on the Minnesota iron range, is to have a novel experience. It will be moved bodily next month to a new site some distance from its present location, which has been found to be directly over a big bed of iron ore. The mining company that platted the present townsite reserved the mineral rights, so the townspeople have no alternative; and as the mining company has agreed to grade streets, lay sidewalks and move all the buildings at its own expense, there is no opposition, and the unique experience seems to be viewed as rather diverting than vexatious. The mining company has taken the precaution this time of satisfying itself, by diamond drilling and other tests, that there are no considerable iron deposits under the new townsite, as it doesn't care to stand the expense of a second transplanting of the whole town.

A GOOD cement for cast iron may be made of two ounces of sal-ammoniac, one ounce sulphur and sixteen ounces of cast-iron filings, these to be well mixed and kept dry. When required for use take of this mixture one part and of clear iron filings twenty parts; mix thoroughly in a mortar and make into a stiff paste with a little water. A little fine grindstone grit improves it. For face joints equal parts of red and white lead mixed with linseed oil forms a good cement. For joints in steam pipes take litharge in fine powder, two parts, very fine sand and quicklime (which has been allowed to slack slowly in a damp place), each one part. Mix and keep in air-tight can. When required make into a paste with boiled linseed oil. A good cement to secure tools in their handles is made of black resin four parts, beeswax one part, finely powdered brickdust one part.

AN interesting comparison of the insulating action of various materials has been instituted by Prof. Carpenter. If the loss of heat of a non-inclosed pipe is taken at 1, the following rotation of figures is obtained for the effect of the insulating agents: Pale gray lead paint coat, 1.267; two layers of asbestos paper, 0.777; one layer of asbestos board, 0.594; four layers of asbestos board, 0.503; a wooden pipe, 0.330; magnesia applied as paste, 0.224; slag wool, felt, 0.209; asbestos mixed with felt, 0.208; slag wool, fibrous, 0.203; asbestos with sponge, 0.180; two layers of asbestos paper, 2.5 millimeters felt, 0.170. The escape of heat seems to be increased by lead paints. Remarkable is the slight increase in the imperviousness in using four layers of asbestos board, as compared with the results obtained by the use of only one layer. Such results are of practical interest to manufacturers or users of devices in which heat must be, so far as possible, bottled up.

AT a recent meeting of the Chemical and Metallurgical Society of South Africa, the secretary read the following letter from M. T. Dixson: "In the interests of the gold industry in general and the cyanide process in particular, I would make public the great advantage of using glass as a flux for cyanide slimes, either in ordinary plumbago crucibles or—by preference—in clay liner crucibles. I think we here may lay claim to having been the first to adopt, after numerous experiments, on a large scale the use of glass as a primary flux. The proportions are for 100 pounds roasted slime (not acid treated), 50 pounds ground white glass and 50 pounds ordinary borax. This mixture in a clay liner pot will give gold 860 fine if treated in a fairly quick furnace. Slimes yielded treated 5.9 ounces troy gold per pound avoirdupois slimes. Perhaps the chief feature, after the refining, is the economy in its use, which should recommend its adoption generally."

A GALLON of water, "United States Standard," weighs 8⅓ pounds and contains 231 cubic inches. A cubic foot of water weighs 62½ pounds and contains 7½ gallons. Each nominal horse power of boilers requires 1 cubic foot of water per hour. In calculating horse power of steam boilers, consider for tubular or flue boilers 15 square feet of heating surface equal to 1 H. P. Condensing engines require from 20 to 25 gallons of water to condense the steam evaporated from 1 gallon of water. To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434. Approximately, every foot of elevation is equal to a pressure of one-half pound per square inch. To find the height of a column of water in feet that will cause a given pressure in pounds per square inch, multiply the required pressure by 2.304. To find the velocity in feet per minute necessary to discharge a given volume of water in a given time, multiply the number of cubic feet of water by 144, and divide the product by the area of pipe in inches.

"YOUR paper is a necessity; I am lost without it," writes a mine superintendent from Santa Rosalia, Sonora, Mexico, just returned from the interior. "I would gladly send $10 a year for the MINING AND SCIENTIFIC PRESS were that the charge," says a Rossland, B. C., milliman. "It seems as if the MINING AND SCIENTIFIC PRESS always knew just what mining men wanted before anyone else has given it voice," writes a Colorado Springs mine officer. The Iquiqui, Chile, subscriber who was paid to 1903 is now exceeded by a Colorado subscriber, who is paid up to 1905. Commendations and flattering testimonials of merit are always appreciated, the constant effort being to deserve such kindly criticisms; yet, the paper always welcomes adverse criticism, and recognizes the value of friendly reference to any sin of omission or commission at any time. Everybody knows more than anybody, and any one of the thousands who everywhere in the mining world weekly see these pages, is cordially invited at any time to proffer criticism, suggestion or advice in the interest of all.

IN Cassel's method of chlorination by electrolysis chlorine is produced by the electrolysis of a solution of common salt, caustic lime being added to neutralize the hydrochloric acid produced by secondary reaction. The same apparatus serves for the generation of the chlorine, the chlorination or conversion of the gold into chloride and the precipitation of metallic gold. It consists of a large barrel, revolved on a hollow horizontal axis, which serves as the cathode for the collection of the gold as precipitated. The anodes are plates of retort carbon. The usual manhole is in the barrel for charging and discharging. The axle is covered with a filter of asbestos cloth; inside is an archimedean screw, working in packed boxes, to remove the gold as formed and carry it to the boxes at either end, exteriorly, to the barrels. The charge is about two tons of roasted ore, and sufficient solution of salt to make the pulp fluid, together with the necessary amount of quicklime. The barrel is given eight or ten revolutions per minute, and the current from the dynamo is turned on.

ELECTROLYTICAL copper refining in most large establishments is conducted in two ways—first, by means of a copper sulphate solution. Anodes are made from copper plates, carefully freed from antimony, arsenic and bismuth. The cathodes are formed by coating sheets of rolled copper with graphite, the depositing tanks are of wood, lined with thick sheetlead. When the current is switched on the solution decomposes and pure copper is deposited in thin films on the cathodes. Any gold, silver, platinum, bismuth, tin, antimony, arsenic, lead, slag, etc., which went into solution with the copper, and some small quantities of metallic copper, are precipitated at the bottom of the vats in the form of a thin, slimy mud. The second process utilizes chloride solutions. This method is sometimes applied to raw ores. The ore, after being calcined, is finely pulverized by dry crushing and charged with the leaching solution in large, revolving wooden vats, and rotated for several hours. The cupric chloride is then reduced to cuprous chloride, and run into tanks formed of wood and containing carbon anodes, which are separated from the cathodes by diaphragms, and electrolyzed. The spent liquor is filtered, and contains a considerable quantity of cupric chloride and hydrochloric acid, which is used again for dissolving copper from the ore.

A COLORADO miner furnishes a tabular "method for calculating cost per ton for stoping ore," taking as a basis the thickness of the pay streak at the point considered. He figures that, where the ore streak is 4 inches thick, the cost of stoping per ton is $17.33; where 6 inches thick, $11.55 per ton; 8 inches, $8.67; 10 inches, $6 93; 12 inches, $5.78; 14 inches, $4.95. It would seem a difficult matter to prepare a table which would show the approximate cost of stoping which would have general application, for the reason that the rocks enclosing the vein may be hard or soft, or may be massive or have a slaty or quicksand structure, and many other conditions, always differing, may obtain which have an important bearing on the subject. A vein which breaks freely from the walls can be more cheaply mined than one of the same size which is "frozen." A soft granulated vein can be more cheaply extracted than one of the same size that is hard when the country rock in each case is the same. In the former case in small veins the miner removes the vein and then shoots down the wall, while in the latter the vein is usually stripped and shot or gadded down where the country rock has been removed. In this matter, as in almost all others connected with mining, generalizations are not possible. What may apply almost universally in one locality will not answer in another.

ABOUT 60% of wood may be converted into liquid. While the strongest hydraulic pressure would not squeeze one-half of 1% of moisture from dry wood, by putting the same material into an iron retort and converting it into charcoal by means of heat, the gases and smoke to the extent of fully 65% of the weight of the wood may be condensed into liquid pyroligneous acid, from which are obtained wood alcohol, acetate of lime and wood tars. A cord of wood weighing 4000 pounds produces about 2650 pounds of pyroligneous acid and 700 pounds of charcoal. The pyroligneous acid from one cord of wood produces nine gallons of 82% crude wood alcohol, 200 pounds of acetate of lime and about twenty-five gallons of tar, besides thirty-five bushels of charcoal. After the pyroligneous acid is neutralized with lime the wood alcohol is distilled off, the lime holding the active acid in solution. After the separation of the wood spirit the remaining liquid is boiled down in open pans to a sugar, which is dried and becomes the acetate of lime of commerce. Acetate of lime is used for making acetic acid. Fully three-fifths of all the wood alcohol and acetate of lime produced in the world are made in the United States. Wood alcohol is a substitute for grain alcohol for manufacturing and mechanical purposes at one-third the cost. It is used principally as a solvent in the making of shellac varnish, in making celluloid, photographic paper, etc., makes dye tints, is antiseptic and used for liniments, etc.

A Decision of the Colorado Supreme Court.

Following is the full text of the recent decision of the Supreme Court of the State of Colorado in a case that has attracted considerable interest. In response to numerous requests the MINING AND SCIENTIFIC PRESS has procured the official decision, as follows:

No. 3738.—The Mt. Rosa Mining, Milling and Land Co., appellant, vs. J. S. Palmer, appellee; appeal from the District Court of El Paso county. Mr. Justice Goddard delivered the opinion of the court.

This is an action instituted by the appellee, plaintiff below, against appellant, the Mt. Rosa Mining, Milling and Land Co., defendant below, to quiet his title to two lode mining claims situated within the exterior boundaries of a certain tract of land conveyed to appellant by a government patent, as placer mining ground.

Upon the trial it was admitted that the lode claims were formally and regularly located as provided by law, except as to the discovery of mineral therein; that affidavit in lieu of labor, for the years subsequent to their location, were properly filed by the owners; that by proper conveyances the plaintiff became, and was, the owner of whatever title had been acquired by virtue of such locations.

It was further agreed that the placer owned by the defendant was located some time prior to the location of the lode claims; that the application for a patent was not made until after their location; that the defendant, through proper conveyances, was the owner of the placer.

The only questions of fact that remained in dispute were whether or not a vein or lode was discovered and known to exist in the Handy Andy and Newman claims, within the boundaries of the Mt. Rosa placer, at the time appellant applied for patent for such placer, on August 18, 1892. The court, though sitting in the exercise of its equity jurisdiction, called a jury, to which it submitted these questions. Their answers were in the affirmative, and were adopted by the court as a part of its findings; and thereupon, and from a consideration of all the evidence introduced, the court found that the facts established were substantially these:

That the grantors of plaintiff, on March 18 and April 5, 1892, entered upon the land included within the exterior boundaries of the Mt. Rosa placer, and located respectively the Handy Andy and the Newman lode mining claims, upon discoveries of mineral-bearing rock in place, within the boundaries of said claims, and subsequently performed all acts necessary to complete a valid location of said claims; that by duly executed and recorded deeds of conveyance plaintiff became vested with all right, title and interest in and to the same; that on November 7, 1892, the Mt. Rosa Mining, Milling and Land Co. made application in the proper United States land office for a patent for the Mt. Rosa placer mining claim, and on April 24, 1893, the patent therefor was issued; and it thereby became, and is still, seized of all the right, title and interest to the tract of land described therein.

The court also found, as conclusions of law, that the Handy Andy and Newman lode mining claims, respectively, had been duly discovered, located and recorded, within the exterior boundaries of the tract of land described in the Mt. Rosa placer patent before the time of said application; that the ground described in said lode mining claims was excepted out of the land described in, and conveyed by, the placer patent; that the plaintiff was, at the time of the commencement of this action, and still is, entitled to the possession of the ground described therein, and entered judgment in favor of plaintiff for the possession of the ground in dispute, enjoining defendant from asserting any interest adverse thereto, and for costs. To reverse this judgment the company brings the case here on appeal.

Error is claimed upon the refusal of the court to give certain instructions asked for by appellant, defining what constitutes a lode or vein of mineral under the statute. We think this subject was properly covered by the instructions given, and that therein the court gave the accepted definition; and also stated the necessary conditions that would constitute it a known lode under Section 2333, Rev. Stat. U. S. The evidence not being preserved in the below exceptions, we must presume it was sufficient to sustain the answers of the jury and findings of the court, that lodes were discovered and known to exist within said respective locations prior to the application for patent. The counsel for appellant contended that, notwithstanding this, appellee cannot maintain this action, for two reasons:

First—Because appellant, having made a valid location of the ground as a placer claim, it was entitled to the exclusive possession thereof, and the entry of plaintiff's grantors thereon was wrongful, and no possessory right to the lodes was acquired thereby.

Second—That if, notwithstanding such wrongful entry, valid locations of the lodes were made, the title thereby acquired is not sufficient to support an action to quiet title.

It is undoubtedly true that when a locator perfects a valid location to a lode or placer mining claim he is entitled to the exclusive possession and enjoyment of the lands located for all purposes granted by the Act of Congress. In the case of a lode location the land located is segregated from the public mineral domain of the government, and the grant confers upon the locator exclusive right of possession and enjoyment of the surface, and any lode, the top or apex of which is within its surface boundaries (Section 2322, Rev. Stat. U. S.); and so long as he complies with the requirements of the Act he can protect his possession of the surface of his claim, as well as such lodes, from invasion by any subsequent lode or placer locator. (Manuel vs. Wulff, 152 U. S., 505; Armstrong vs. Lower, 6 Colo., 393; McFeters vs. Pierson, 15 Colo., 201; Seymour vs. Fisher, 16 Colo., 188; Belk vs. Meagher, 104 U. S., 279; Gwillim vs. Donellan, 115 U. S., 45.)

On the other hand, those provisions of the statute that give the locator of a placer the right to locate and patent all other forms of mineral deposit included within the surface boundaries of his claim expressly except therefrom veins of quartz or other rock in place known to exist within its limits. (Sections 2329 and 2333, Rev. Stat. U. S.) Such lodes, therefore, are not the subject of a placer grant, and a placer location does not operate to confer the title or possession thereof upon the placer claimant, or withdraw them from subsequent location by others. In other words, the placer location gives a qualified possession of the ground located; that is to say, it confers upon the owner the exclusive right of possession of the surface area for all purposes incident to the use and operation of the same as a placer mining claim, and all unknown lodes and veins, but does not give right of possession to known lodes or veins within these limits. The right to the possession of such lodes or veins can be acquired only by locating them as lode claims. (Lindley on Mines, Vol. 1, Sec. 413; Aurora Lode vs. Bulger Hill & Nugget Gulch Placer, 23 L. D., 95; Reynolds vs. Iron S. M. Co., 116 U. S., 687.)

It has been universally held that a patent for a placer claim does not convey title nor right of possession to the patentee to any lodes known to exist therein at the time of application; that if he desires to obtain such title and possession he must comply with the provisions of Section 2333, and patent them as lode claims. In Reynolds vs. Iron S. M. Co., supra, Justice Miller, who delivered the opinion of the court, speaking upon this subject, said:

"We are of opinion that Congress meant that lodes and veins known to exist when a patent was asked for should be excluded from the grant as much as if they were described in clear terms. It was not intended to remit the question of their title to be raised by some one who had or might get a better title, but to assert that no title passed by the patent in such case from the United States. It remains in the United States at the time of the issuing of the patent, and in such case it does not pass to the patentee. He takes his surface land and his placer mine, and such lodes or veins of mineral matter within it as were unknown, but to such as were known to exist he gets by that patent no right whatever."

Since a patent conveys to the locator no other or different rights than those acquired under the location, it inevitably follows from the doctrine thus announced that he has no possession, and acquires no right to any lodes known to exist within his claim by virtue of his placer appropriation. In Aurora Lode vs. Bulger Hill & Nugget Gulch Placer, supra, Secretary Smith, in discussing the rights acquired by the placer locator, said:

"Such a location, in and of itself, does not establish any right in the claimant under it to the superficial area within its boundaries except as a placer claim or mine. Of its own force it cannot operate to give title to or property rights in any veins or lodes within its boundaries. True, a placer mining claim becomes property *as such* by discovery and location the same as a vein or lode claim, but it cannot and does not in itself in any sense give title to or property rights in veins or lodes; nor can it, in my judgment, operate to preclude a subsequent lawful discovery and location of veins or lodes within its boundaries."

And Mr. Lindley, in his admirable work on mines, after an elaborate and thorough discussion of the question, deduces the following conclusions:

"1. A perfected placer location does not confer the right to the possession of veins, or lodes, which may be found to exist within the placer limits at any time prior to filing an application for a placer patent.

"2. Such lodes may be appropriated (*a*) by the placer claimant, or (*b*) by others, provided the appropriation is effected by peaceable methods and in good faith."

While we recognize to its full extent the rule that precludes the initiation of a right through a trespass upon the lawful possession of another, we think, under the established facts in this case, appellant is not in a position to invoke its protection. The lodes in question were known to exist prior to the application for patent; and appellant, not having taken the necessary steps to obtain possession of them, they were open to location by others at the time they were located by the grantors of appellee. In making locations no right of appellant was invaded, and their validity, therefore, is in no way affected by the fact that they were made within the surface boundaries of a prior placer location.

In support of the second proposition it is urged by counsel for appellant that the mere possessory title to mining claims is not sufficient to support the action provided for in Section 255 of the Code. This section enacts that:

"An action may be brought by any person in possession, by himself or his tenant, of real property, against any person who claims an estate therein adverse to him, for the purpose of determining such adverse claim, estate or interest."

The estate acquired by the locator of a mining claim is an interest in real property; and although the paramount title remains in the Government, the Congress have universally recognized such interest as a freehold, and in all controversies arising between the locator and other persons as to any right or claim thereto he is treated as the owner in fee. (Mercer M. Co. vs. Fremont, 7 Cal., 317; Hughes vs. Devlin, 23 Cal., 502; Merritt vs. Judd, 14 Cal., 60; Roseville Alta M. Co. vs. Ia. Gulch M. Co., 15 Colo., 29; Forbes vs. Gracey, 94 U. S., 762)

As was said in Hughes vs. Devlin, supra:

"Although the ultimate title in fee in our public mineral lands is vested in the United States, yet as between individuals all transactions and all rights, interests and estates in the mines are treated as being an estate in fee, and as a distinct and vested right of property in the claimant or claimants thereof, founded upon their possession or appropriation of the land containing the mine. They are treated, as between themselves and all persons but the United States, as the owners of the land and the mines therein."

Such being the character of the locator's title, it is obvious that the provisions of the Code are as applicable to mining claims as to any other real property; and his right to avail himself of the remedy therein provided is too clear to admit of dispute. (Dahl vs. Rannheim, 132 U. S., 260; Perego vs. Dodge, 163 U. S., 160; Noyes vs. Mantle, 127 U. S., 348; Gillis vs. Downey, 29 Cir. Ct. App., 286)

Another and more serious question is presented, and that is as to the amount of surface ground appellee is entitled to, if any, under and by virtue of his lode locations. The court below awarded him the full amount claimed, to wit, 300 by 1500 feet, in each of the claims. It is insisted by counsel for appellant that he is entitled to only the mineral lodes, and not to any of the surface of the placer ground.

This precise question has never, to our knowledge, been discussed or determined by a court of final resort. It has, however, been passed upon by the land department; but its rulings are not in favor. In the case of the Shonbar Lode, 1 L. D., 551, Id. 3 L. D., 388, Mr. Secretary Teller ruled that the lode claimant, having failed to adverse the placer application for patent, he was restricted to his lode and 25 feet of surface on each side thereof. Subsequently, and after the decision in the case of Noyes vs. Mantle, 127 U. S., 348, Assistant Secretary Chandler held, in the case of the Pike's Peak Lode, 10 L. D., 200, that the limitation of the width of the lode claim in Section 2333 was only applicable where the placer claimant sought to patent the lode, but had no application to a lode claim perfected by another; that in the latter case the lode claim in its full extent should be excepted from the placer patent. It does not appear from the statement of this case whether the lode claim was located prior to the placer or not; but we infer from the fact that the Secretary quoted from, and relied upon, the decision in the case of Noyes vs. Mantle, supra, as supporting this conclusion, that the lode claim was the prior location; while in the case of Aurora Lode vs. Bulger Hill & Nugget Gulch Placer, supra, Secretary Smith held that the lode location did not carry with it any more surface ground than was necessary for the use and enjoyment of the lode. But this conclusion seems to have been influenced largely, if not altogether controlled, by the peculiar conditions of that particular claim, and the fact that the placer claimant had obtained judgment in an adverse proceeding theretofore instituted against an application by the lode claimant for a patent.

The question was also involved in the case of Campbell vs. Iron S. M. Co. in the Circuit Court of the United States for this test, Judge Riner presiding. He entertained the fact, and instructed the jury to the effect, that a lode claimant, in case of a recovery, was entitled to no more than the vein or lode and 50 feet of ground, extending 1500 feet in length. We think this instruction correctly defines the amount of surface ground to which a lode located within the boundaries of a placer is entitled under the provisions of Section 2333. As was said in Reynolds vs. Iron S. M. Co., supra:

"(This section) made provision for three distinct classes of cases: 1. When the applicant for a placer patent is at the time in possession of a vein or lode included within the boundaries of his placer claim he shall state that fact, and on payment of the sum required for a vein claim and 25 feet on each side of

it, at $5 per acre, and $2.50 for the remainder of the placer claim, his patent shall cover both.

"2. It enacted that where no such vein or lode is known to exist at the time the patent is applied for, the patent for a placer claim shall carry all valuable mineral and other deposits which may be found within the boundaries thereof.

"3. But any case where the applicant for the placer is not in possession of such lode or vein within the boundaries of his claim, but such vein is *known to exist*, and it is not referred to or mentioned in the claim or patent, then the *application shall be construed as a conclusive declaration that the claimant of the placer mine has no right to the possession of the vein or lode claim.*"

We think it is manifest that the vein or lode referred to in the first and third provisions is the same thing, and that whatever a placer claimant would acquire by availing himself of the privilege accorded him by the first provision of the section is reserved by virtue of the third provision; in other words, that the same extent of surface ground that is incident to such lode or vein, if located and patented by the placer claimant, is reserved from the placer patent in case of his failure to claim and patent the same. If he elects to patent the lode he is required to take 25 feet on each side of the center of the vein and pay therefor at the rate of $5 per acre. This is a privilege accorded him which he may avail himself of or not, as he sees fit. If he elects to waive this privilege he may do so in one of two ways: either by expressly excepting the lode from his placer location and application for patent, or remain silent in regard to it. If silent, then by implication he declares that he makes no claim to such lode, and by such silence is bound to the same extent, and in the same manner, but no further than he would have been by an express declaration. By electing to make no claim to a known lode, or express declaration in regard to it, he must be understood as claiming, for placer purposes, the greatest possible area within the boundaries of his placer claim, and should be held to have relinquished only that which he might have taken, which is the lode, with the amount of surface ground provided. Why should there be any difference between rights of claimants of known lodes within the boundaries of a placer? We know of none. The object of excepting known lodes from placer locations was to prevent titles to such lodes being obtained under the guise of a placer, at the same time in order to protect claimants to each character of mineral locations to the greatest extent, and preserve to each that which was most valuable for particular purposes in connection with each class of claims. The lode, for convenient working, could not be limited to less than 25 feet on each side of the center of the vein; and the placer, which would be valueless without such surface rights, is permitted to take title to the remaining area accordingly. Those who controvert this view base their contention upon the provisions of Section 2320, which, it is said, governs the length and width of all lode claims, whether made within the boundaries of a placer claim or not. An Act on a particular subject must be construed as a whole. Section 2320 refers to the location of lodes not conflicting with any other class of mineral locations, while by Section 2333 special conditions with reference to conflicts between the two classes of mineral claims are specially provided for; and to that extent, construing the Act as a whole as a limitation or qualification of the provisions of Section 2320, it relates, as stated, to the width of lode claims generally, and regulates the width of lode claims when made upon lodes within the boundaries of a placer, whether such lodes are located by the owner of the placer or by strangers to that title. By this construction full force and effect are given to both of these sections, and the purpose of the statute is carried out. The Government receives for its mineral lands the price fixed for lodes and placers respectively, and the superior right to the surface area of the placer claimant, acquired by his prior location or patent, is protected. It is the conclusion of a majority of the court that the limitation of the width of the lode claim in Section 2333 is not only applicable to the placer claimant, but applies as well to others who locate a lode within the boundaries of his previously located placer.

Chief Justice Campbell declines to express an opinion upon this question because, in his judgment, the stipulation entered into by counsel eliminates it from the case.

It follows that the court below erred in adjudging to appellee surface ground in excess of 25 feet on each side of the lodes in question. For this reason judgment is reversed and the case remanded, with instructions to enter judgment in accordance with the facts we have expressed.

Reversed.

The Genesis of Petroleum and Asphaltum in California.

NUMBER VII.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

Red Shales in the Island of Trinidad.—The formation of the island of Trinidad consists of clay, loose sands, shales, limestones, calcareous sandstones, indurated clays, porcelanites of brilliant red colors, with pitch deposits and lignite here and there.

The only substances containing sufficient carbon and hydrogen for the formation of asphalt and likely to be inclosed in the strata are vegetable remains. They are particularly abundant at La Brea, where most of the asphaltic beds have been originally carbonaceous and lignitic shales. Mineral springs abound throughout the island. In a series of loose sands, clay and shale lies Pitch lake, seemingly occupying a depression in the strata. To the southward of the lake the shore is made up of bold cliffs, the strata of which consist of indurated clays. They also present thick veins of porcelain jasper. Strata of loosely coherent sandstone also abound, some of which are impregnated with bitumen. Rounded pebbles of pitch and porcelain jasper form a beach at the foot of the cliffs. A species of coke is occasionally observed along the shore with a porous structure and the prismatic form of the artificial product, but, of course, much denser on account of the large proportion of earth. Near the lake is a red yellowish substance, semi-baked, evidencing a considerable degree of heat which attended its formation. Part of the impurities in the Trinidad asphalt consist of comminuted red clays or shales with some sand.

PITCH LAKE AT TRINIDAD, W. I.—From an old print.

It is evidently not adventitious at the surface, but must have been thoroughly incorporated and brought up from the depths with the bitumen, judging from the constant amount, dissemination and character in all parts of the deposit. Water containing all the mineral ingredients of strong thermal water is found in the Trinidad asphalt. The presence of borates, iodides and so many forms of sulphur compounds and other characteristics show that the water must be of the same origin as that of many thermal springs. This water in all unaltered pitch shows that the formation of the pitch and water must have been simultaneous and cannot be considered adventitious.

It would be impossible for water in any adventitious way to become intimately mixed with the bitumen so as to form practically an emulsion. Near the center of the lake is a body of pitch softer, blacker and newer than that of the remainder of the lake. Gas constantly issues from the cracks in the bitumen. Those phenomena show that asphalt is being distilled at the present time. The porcelanite and red shales must have been formed by heat created in the starata themselves as these shales are burned uniformly, in no place showing a greater degree of heat than in another. They are probably formed in the same manner as similar rocks in California. The depression in which Pitch lake lies was probably made by the subsidence of the surface of the earth caused by the heat contracting the underlying shale. There was no focus to this heat, no central point. If there was, in the material next to the central point the evidences of heat would be great, gradually decreasing as you went from the focus; this is not shown. To illustrate, bricks of very different qualities are to be found in the same kiln, for as the fire is applied below in arches, the lower bricks in their immediate vicinity will be burnt to great hardness or perhaps vitrified, those in the middle will be well burned and those on the top will be too little burned. Even then the bricks the farthest from the fire would not have been burned to this extent if it were not for the numerous flues left between the bricks in the construction of the kiln. The intense heat of a furnace is confined by a foot wall of fire bricks. Three feet of lava will confine the heat of melted rock underneath. From the uniform burning of these shales the heat must have originated in the shales themselves. A good, clean red heat is required for the burning of brick: it is fair to suppose that this temperature is required to produce red shales.

Porcelanites and vesicular clinkers are scattered throughout these red shales; they are not centralized. No fumeroles connect these porcelanites with a central fire. Moisture was concerned, as is evidenced by their even burning. Moisture was the vehicle of heat, or the burning would not have been so uniform in its effect if disseminated by conduction or radiation. The parts of the shale burned to porcelain resemble earthenware and stoneware; to burn earthenware and stoneware a clean, white heat is required.

Arborescent forms of huge scale of these hydrothermal shales extend their ramifications throughout the earth in the vicinity of bituminous deposits. This form also goes to show that their burning was accomplished by chemical action, with the presence of moisture, and not from radiation or conduction from a focalized fire. Nearly all readily solvent substances and all volatile substances have been removed from these red shales, or where solvent substances now exist in them they are different from those that were in them at the time of their formation. The noticeable bright red colors of these shales could not have been produced by the oxidation of the iron in the shales by water alone; heat must have been present to produce them. This heat would be sufficient to distill any carbonaceous substance contained in them.

In the metamorphic rocks of the San Rafael range of mountains of Santa Barbara county it can be plainly seen that these porcelanized shales were converted to serpentine. All gradations from shale to serpentine can be found: shales reddened by heat, porcelaneous masses still retaining the structure of shales and porcelain partly converted to serpentine. There are no visible signs of metamorphic action now in operation where the serpentine is exposed to view, but in the Tertiary shales and sandstones to the west, especially in the hills lying north and south of the Los Alamos valley, this metamorphic action is going on at the present time.

These red shales lie above and precede greater metamorphism, such as is exhibited by serpentine and quartzite and probably metamorphic granite. This can be seen where erosion has been great enough to expose the contact between metamorphic rock and red and unaltered shales. When burnt, the cracks and seams in the shale are large, showing the extent to which they have contracted. Near the surface the red shales are vesicular and look as if they had faulted. These red shales are very much distorted and contorted; many of the contortions have a radius of but a few feet. No carbonaceous matter exists in these red shales. No bituminous

substances exist in these red shales unless they have entered subsequently to their burning. There is also an absence of sulphur. Carbonaceous and bituminous substances and sulphur are disseminated throughout the strata adjoining the red shales.

(To be Continued.)

Mysteries of the Ancient Rivers of the Forest Hill Divide, Placer Co., Cal.

Written for the MINING AND SCIENTIFIC PRESS.

The recent announcement of the discovery by Felix Chappellet Jr., on the Forest Hill divide, near Centerville, Cal., of what is presumed to be a continuation of the rich channel worked in former years in the Dix mine, adds another interesting chapter to the history of the divide. The discovery was made in the workings of the Eureka Con. Co., after years of diligent search, under constant heavy expense, and evinces what determined effort intelligently directed may accomplish in solving the mysteries of that system of ancient river channels which in prehistoric times cut their sinuous courses through the valley that has since become a mountain—the Forest Hill divide. Years ago two mines were worked in the vicinity of this recent find. They were known, one as the Dix mine, the other as the Greek claim. Both were rich, but several thousand feet of unexplored ground lay between, and it was for the purpose of developing this section that the Eureka Con. Co. was formed. A large tract of land was bought and operations began to find the channel in the body of the mountain under hundreds of feet of andesite breccia and volcanic mud. The tunnel was driven straight in, through bedrock, a distance of 3000 feet, having discovered nothing. Then an inclined raise was put in, at 2100 feet from the mouth of the tunnel, until it broke through the bedrock and entered lava. This was on the rim of a channel. The rim was followed a short distance and a winze sunk 6 feet to bedrock, which was pitching east. Then from the main tunnel a vertical raise was put up 2500 feet from the mouth of the tunnel, 338 feet, which struck lava. This was evidently too high, so a drift from the raise was started 300 feet above the main tunnel, which, after progressing 317 feet backward in the direction of the mouth of the main tunnel, struck the rim of the channel. The drift was continued 100 feet and at that point a winze was sunk into the channel, which was found to contain large, smooth, well-worn boulders and wash, but the water came in so rapidly as to make it all but impossible. Mr. Chappellet then went back to raise No. 1 and at 194 feet above the tunnel level started a drift back which is now in 100 feet. Should this drift be found to be beneath the channel a series of raises will determine its location, and, if too high, another drift will be run lower down.

There is not a more interesting feature in mining geology than a study of those ancient river channels. The above description of the discovery of a channel is a single instance; the discovery of the Mayflower channel, near Forest Hill, by Felix Chappellet Sr., is another of similar character. This latter was made some years ago, when the channel system of the Forest Hill divide was not so well known as now; but even to-day some of the best and most experienced mining engineers on the divide are sometimes at a loss, coming unexpectedly upon channels whose existence was unknown, and again failing to find a certain channel where it was calculated it should be found.

If the channels were all bedrock channels—that is, all of a contemporaneous time—the vexatious problem would be much simplified, but such is not the case. There are four periods of channel formation, including the recent—those of the first period, usually broad, with heavy wash, including numerous large boulders, and cutting into the underlying crystalline rocks. The main channel of the Mayflower mine is a type of channel of the first period. (See Fig. 1, on page 285.)

When these broad channels, which in places were 1000 feet wide, were still living rivers, volcanic disturbances occurred, which lasted doubtless many centuries, but which, geologically, are of one age—the Pliocene. These disturbances extended hundreds of miles along the Sierra Nevada mountains. They were characterized by the vast amount of material ejected from the volcanic rents. In various parts of the range these materials differed. In the region under discussion it consisted chiefly of andesitic fragments, ashes, and, doubtless, also vast quantities of mud. This volcanic ejectamenta covered thousands of square miles of territory, and, flowing slowly westward, filled the river channels in places, no doubt, to the tops of the neighboring hills, and possibly burying them from sight. Immediately the streams began the task of cutting new channels for themselves across this sloping and probably undulating plain of lava. While these channels appear to have been confined within certain broad limits, they did not follow the courses of the first streams. It would seem that the streams were now more numerous, narrower, and carrying large amounts of detritus derived from the freshly deposited volcanic material, cutting their ways rapidly into the soft lava rocks, until they had reached either the channel of the original stream beneath or cut into the bedrock itself, thus becoming gold bearing. Thus were formed channels of the second period. (See Fig. 2, page 285.) The channel of the first period is seen in the center, with a channel of the second period on either side. Fig. 3 illustrates a longitudinal section along a channel of the first period, channels of the second period having cut their way across it.

The channels of the second period had apparently no sooner cut their way into the older channels or underlying bedrock than they in turn were filled by further volcanic outbursts, which poured again from the crest of the Sierra Nevada; but the work of erosion was continued without cessation, and the channels of the third period were soon under way, their sinuous courses being determined by the inequalities of the surface. The channels of the third period only repeated the history of those of the second period. The fact that the channels of the second period, and again those of the third period, were able to cut through the great thickness of lava and even scour their ways down into the underlying bedrock, indicates what a vast time must have been necessary to accomplish this. Erosion was doubtless more rapid than at the present day, for the modern streams, though still hundreds of feet above the base level of erosion, do not flow as swiftly as then, nor do they carry the vast amount of sharp-cutting sand and rock fragments. Then, too, the bedrock is universally harder than the lavas, with few exceptions.

Channels of the second period cutting those of the first period, as in the center of Fig. 3, would at a lower point on its course deposit in its bed a body of gravel derived from the erosion of the channel of the first period, as may be seen in Fig. 4, where a channel of the second period is marked "upper lead." This deposit may occur in places directly above a channel of the first period, and in some instances follows such older channel for long distances. Where this condition obtains, it is quite evident that the rims of the channel of the first period had some influence in determining the course of the upper lead. Fig. 4, page 285, represents a channel of the first and also of the second period, and Fig. 5 illustrates channels of the first period, the Weske channel; the second period, the white channel in the center, and the third period, that on the right side, cutting into the Weske channel. Fig. 6 may represent a channel of the first period cut by a channel of either the second or third periods. Many channels of the third period contain only lava boulders and little or no gold.

The channels of the fourth period are the river courses of to-day. Fig. 7 illustrates the relation of the ancient system to the recent erosion. The forks of the American river have cut their canyons through 2500 to over 3000 feet of lava cap and hard bedrock since volcanic disturbances ceased in the Sierra Nevada.

The grades of the various channels are not at all uniform, some being much heavier than others, and, too, the grade of any particular channel varies from place to place, as may be seen in any modern stream. Fig. 8 illustrates the grades, as given by Ross E. Browne in his valuable contribution, "Ancient Rivers of the Forest Hill Divide," in the 10th annual report of the State Mineralogist of California.

In the mind of the writer there remains no doubt that throughout the ancient river period and lasting possibly till the present time there has been a slow upward movement of the entire Sierra region, extending from the crest of the range to the great inteior valley of California, and that this uplift was somewhat greater in Placer and adjoining counties than farther south in Calaveras, Amador or Tuolumne counties. There is much difference of opinion on this subject among those who have given the ancient river channels study, but there appear to be valid reasons for thinking that such uplift did occur.

Should the channel recently discovered by Mr. Chappellet prove to be the Dix-Greek channel, it will be a good thing for the mining industry in that section, as it would be the means of opening another large new mine which would give employment for years to several hundred men.

A glance at the map of the Forest Hill divide, made by Messrs. Browne and Hoffman, suggests that it might not have been unwise to have drifted directly up the old channel, where it might have been reached in the old Dix ground. This would have positively assured the identity of the channel. Should the newly-found channel eventually prove to be some other than the Dix channel, which may lie farther in the hill, then the Eureka Con. Co. have two channels to develop and work instead of one, as was the case in the Mayflower mine.

A Compliment from Colorado.

Among the periodicals devoted to the mining and milling industry, and publications of this class, the MINING AND SCIENTIFIC PRESS of San Francisco is absolutely without a peer. There is not even ground for comparison between the PRESS and others of its class. In fact, it is a class by itself.—Telluride, Colo., Journal, Mar. 4.

Experiences of a Working Miner.

NUMBER VII.

Written for the MINING AND SCIENTIFIC PRESS.

For several years the S—— brothers held a group of claims, doing enough work to hold them. No one ever accused them of having a good thing and a few people were actually surprised when they were offered and accepted $100,000 for their property—particularly at the offer. Soon after that the lonesome prospector's camp became a busy community. Buildings were rapidly constructed, including a fine residence for the superintendent, and a chapel. Scores of men were grading for a large mill, and a few weeks later a handsome structure had been completed, and then the hillsides re-echoed the thundering roar of 120 stamps. Two compact, neat-looking locomotives hauled long trains of rock from the mine to the mill. There was no better equipped nor more prosperous appearing camp in the country, but after a week or two of this prosperity cleanup day approached and it was suspicioned that the rock contained no gold, and the cleanup verified the suspicion. The works were closed, the mine caved, the locomotives rusted, and one day the mill burned. G—— is a desolate camp now. Its prosperity was short lived. This little bit of misplaced confidence cost one man over $300,000.

One bright day in the fall I tramped into L—— and found quite a camp. I had been there before when it consisted of a lonely prospector's cabin. Back on the hill were half a dozen claims, on each of which was a little development. Since my former visit Eastern capital had been interested and now the camp was a scene of busy activity. I found a number of men grading a road up C—— creek for the purpose of hauling in a second-hand 40-stamp mill, which was as good as new. To me it seemed that it might have been more sensible to haul a few hundred tons of ore to the mill—but this was a sure thing, so they all said, and the mill was hauled in and set up in first-class manner. A tramway, half a mile long, was built to connect with the mines; a bedrock drain was cut and numerous buildings erected; a ditch several miles in length was also part of the plan. I worked there a short time—nobody worked very long. It was an old, old story. The rock in the L—— mine was too low grade and too limited in quantity; the ore from the S—— claim was too base and would not amalgamate, and that from other mines didn't contain any gold. It cost nearly $100,000 to find these things out which might have been learned for $10,000 and some people would have been satisfied with even less than that.

A friend of mine told me not long ago of a little experience which came his way. A company purchased a mine and built a mill equipped with stamps and pans. It was known that the ore was difficult to treat, but after running the mill several weeks the mill was shut down, the gold cleaned up—what little there was of it—and the whole plant abandoned. After a time miners and others passing that way would look curiously at the old mill and sometimes they would step inside and look around. Some of them stepped as far as the assay office and cleanup rooms. Here were lying numerous useful little trifles, such as test tubes, beakers, graduates, scorifiers, annealing cups and a hundred other small articles such as may be found in and about mills. They were dust covered and doing no good, so one at a time these little things disappeared as the boys used to visit the mill from time to time, usually Sundays, when they had nothing else to do. No one was there to disturb them and no one seemed to care. This was fifteen years ago. Three or four years ago this property was bought by another company, the mill torn down and removed to a new site. When the false bottoms were pulled up out of the pans between $7000 and $8000 was discovered in hard amalgam underneath. My friend in relating this concluded by saying, "Imagine my feelings when I heard of this—and think of the chances I had."

A placer mine is a fine thing to own, even on the desert, when water can be pumped to it and it can be worked all year around, but if you own such a mine and have any idea of pumping water to it, be quite sure that your pumps are suited to their requirement, and having built the pumping plant, you are sure of getting all the water you need. At P—— is quite an area of gold-bearing ground, and the C—— river is but five miles away. There is a splendid fall and conditions are favorable topographically. The company that took up this proposition did so with a flourish and the newspapers contained columns of matter describing the great undertaking. I have seen the outfit. One should see it to appreciate it. The pipe line is five miles long and 10 inches in diameter. At the head of the line is a tank which will hold perhaps 3000 gallons—with this a big hydraulic mining operation was to be carried on. Possibly if otherwise equipped it might operate on a small scale, but the pumps will scarcely send enough water to the head of the line to keep the tank wet. It cost nearly half a million dollars to try this experiment, and I doubt if there is that much gold in all the placers of the district.

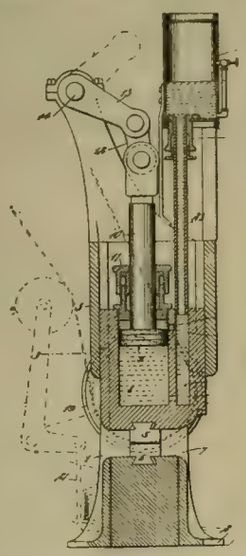
MINER.

Latest Mining and Metallurgical Patents.

Patents Issued March 7, 1899.

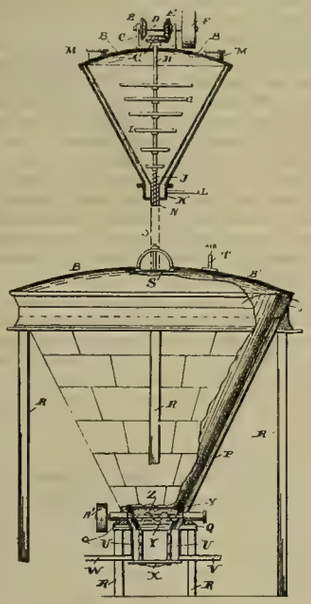
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

POWER HAMMER.—No. 620,749; A. Dinkel, Auburn, N. Y.



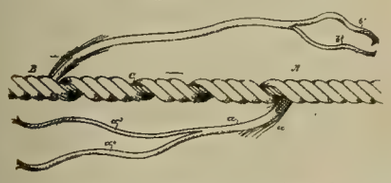
A sliding hammer head having a piston chamber for containing a liquid, a piston movable in the chamber and having its stem projecting through the upper end of the chamber; means connected with the piston stem for operating the piston, an auxiliary chamber communicating with the piston chamber at the upper and lower sides of the piston, and a chamber containing a liquid and a yielding cushion above the liquid thereof and offering a resistance to the liquid and consequently offering a resistance to the piston.

APPARATUS FOR TREATING ORES BY LIXIVIATION.—No. 620,660; Jos. Luce, Salt Lake City, Utah.



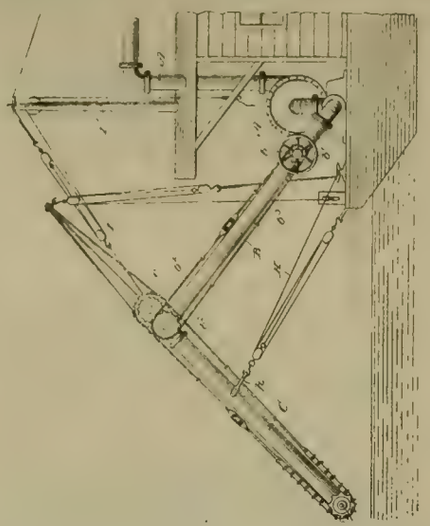
In a tank for the treatment of ores, a lining of asbestos applied directly to and covering the walls of the tank, combined with suitable supports placed inside of the asbestos, steam pipes supported in the tank and vertical layers of cloth arranged inside of the pipes; boards *E'* extending vertically in the tank inside of the asbestos and provided with suitable recesses and steam pipes placed in the tank, and supported in the recesses formed in the edges of the boards.

SPLICE FOR OLD WIRE CABLES.—No. 620,739; P. T. Christensen, San Francisco, Cal., assignor to the Washburn & Moen Mfg. Co.



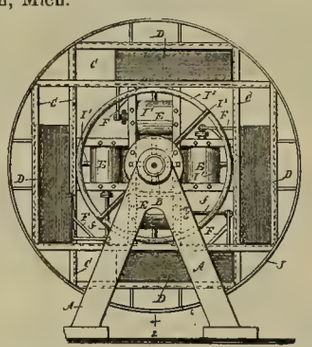
A rope or cable having ends united by a splice, consisting of opposing sections abutting together, each having projecting strands of different lengths and composed of a plurality of wires, untwisted and divided into groups, each section of rope or cable alternately laid upon each other from opposite directions and occupying the grooves or channels previously occupied by original undivided strands, and having their ends tucked under strands and secured.

DREDGING MACHINE.—No. 620,635; J. J. Bateman, Sunbury, Pa.



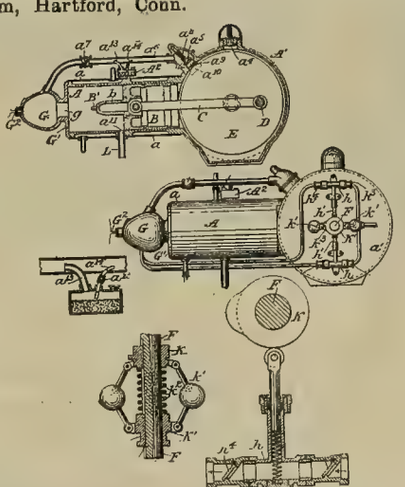
The combination with suction pipes connected to a centrifugal pump, means for adjusting or changing the position of pipes comprising three sets of tackles; the adjusting ropes thereof extending to the float, couplings which admit of varying the position of the pipe sections, a flexible agitator and screen positioned over the mouth or inlet opening of the suction pipe, connections extending therefrom to a gear mounted on the suction pipe, gears meshing with each other and gearing embodying flexible connections extending to a wheel which when operated will move the flexible agitator.

AIR COMPRESSOR.—No. 620,822; H. E. Anderson, Cheybogan, Mich.



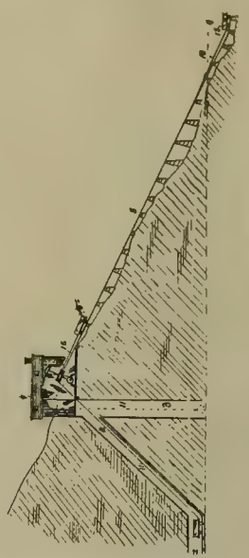
A frame having a central hollow shaft with two central partitions, guideways extending in direction of chords of a circle about shaft, weights in guideways having a limited reciprocation, an air compressor cylinder and a piston therein attached to each weight, discharge connections from the cylinders to one end of the shaft, cylinders having water chambers surrounding and cooling the cylinders, and water connections from chambers to the other end of the shaft.

EXPLOSIVE ENGINE.—No. 620,602; Hiram P. Maxim, Hartford, Conn.



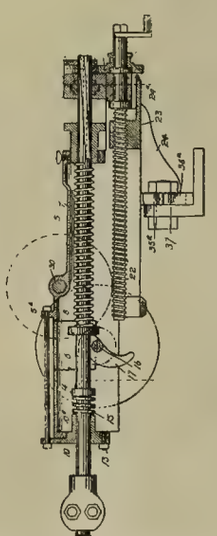
The combination with a cylinder, piston and explosion chamber independent of the cylinder and communicating therewith, the cylinder having an exhaust port arranged to be opened during the forward movement of the piston and the explosion chamber having a gas inlet, means for regulating the expansion of the gas from the explosion chamber to the cylinder; a check valve between cylinder and chamber and opening toward the chamber, of an air chamber in which air is compressed; a conductor communicating with chamber and with the explosion chamber; a valve controlling the air conductor, means to open the valve in air conductor as the piston approaches the forward limit of its stroke and means to admit the gas thereafter, the burned gases being expelled by the compressed air and the new charge being admitted to the explosion chamber in the rear of the body of air.

GRAVITY HOIST.—No. 620,801; A. C. Pratt, Carson, Nev.



The combination of the outer tramway with car moving thereon, a cable connected to car and to a motor reel, a shaft driven by reel and having a gear in position to engage gears on a countershaft, a clutch by which such engagement may be effected, and a drum on the countershaft having a cable connection to a hoist within the mine. The countershaft with two loose bevel pinions thereon in engagement with bevel pinion on the main shaft, a shiftable clutch on the countershaft by which engagement may be had with one or the other bevel pinion, and a drum on the countershaft having a cable and hoist connected thereto.

ROCK DRILL.—No. 620,847; M. C. Jackson, Denver, Colo., assignor to the Jackson Drill & Manufacturing Co.



Combination with the drill casing of a reciprocating drill shaft and power spring surrounding the shaft, of a crank shaft journaled in the casing, a gear fast on the crank shaft, another shaft journaled in the casing, a cam fast on the last-named shaft and adapted to engage a collar on the reciprocating shaft, a pinion fast on the cam shaft and meshing with the gear of the crank shaft, a pair of flywheels mounted on the extremities of the cam shaft, a feed-screw journaled in the casing, a guide track upon which the casing is mounted, the guide track being provided with a nut which the screw engages, means for feeding the casing to keep pace with the movement of the drill into the rock, (comprising a gear splined on the drill shaft, another gear splined on the feed screw and meshing with the gear on the drill shaft, the guide track being provided with a projection arranged to move the gear on the feed screw sufficiently to disengage it from the gear of the drill shaft by the time the screw has reached its forward limit of movement).

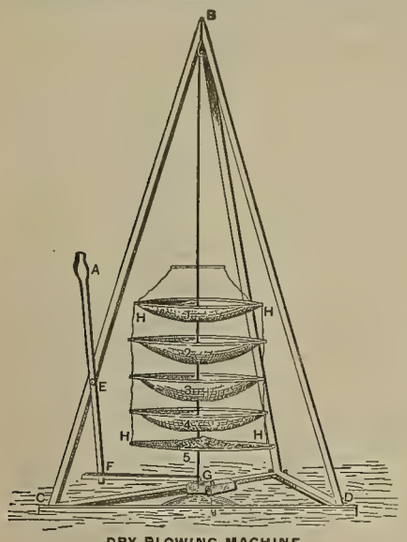
The Alluvial Deposits of Western Australia.*

NUMBER III.

By T. A. RICKARD, State Geologist, Denver, Colorado.

Another and more elaborate contrivance is exhibited in Fig. 4. It consists of a series of four trays, hung on a triangular frame *B*, *C*, *D*. The

FIG. 4.



DRY BLOWING MACHINE

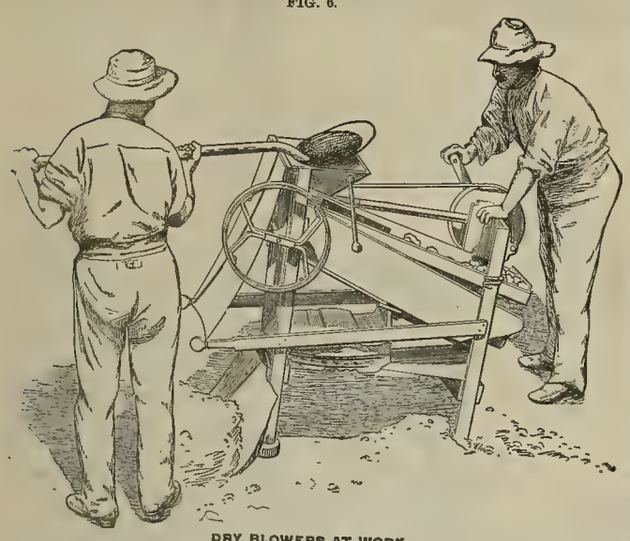
PLAN OF TRAY

trays are 22 inches in diameter. They are comparatively flat and have screen bottoms, through the center of which an iron rod passes to the eccentric *G*, which receives the required movement through the lever *A*, *E*, *F*, of which *A* is the handle. The trays are 5 inches apart and are held in place by wires *H*, *H*. The material to be treated is placed in the uppermost tray, which is a hopper pierced with inch holes. No. 2 has ⅝ holes, No. 3 has a 10-mesh screen and No. 4 has an 18-mesh screen. The lowest—No. 5—is flat and serves as a receptacle for the final product, which is dry-blown by hand, as heretofore described.

In these two contrivances no attempt is made to supplement the wind by an artificial air current. The next step is to use a bellows. Fig. 5 shows such an arrangement. It consists of a hopper *A* and a series of screens *B*, *E*, *F*, *G* and *H*. By turning the handle *M* the disk *K* is revolved; and this, by means of a belt, transmits its movement to the pulley, which shakes the screen *B*, *B*, through the eccentric rod *C*, and at the same time operates the bellows *D* through the disk *K*. Fig. 6 illustrates the machine when in operation.

When the material is placed in the hopper *A*, and the machine is set in motion, the large lumps run off

FIG. 6.



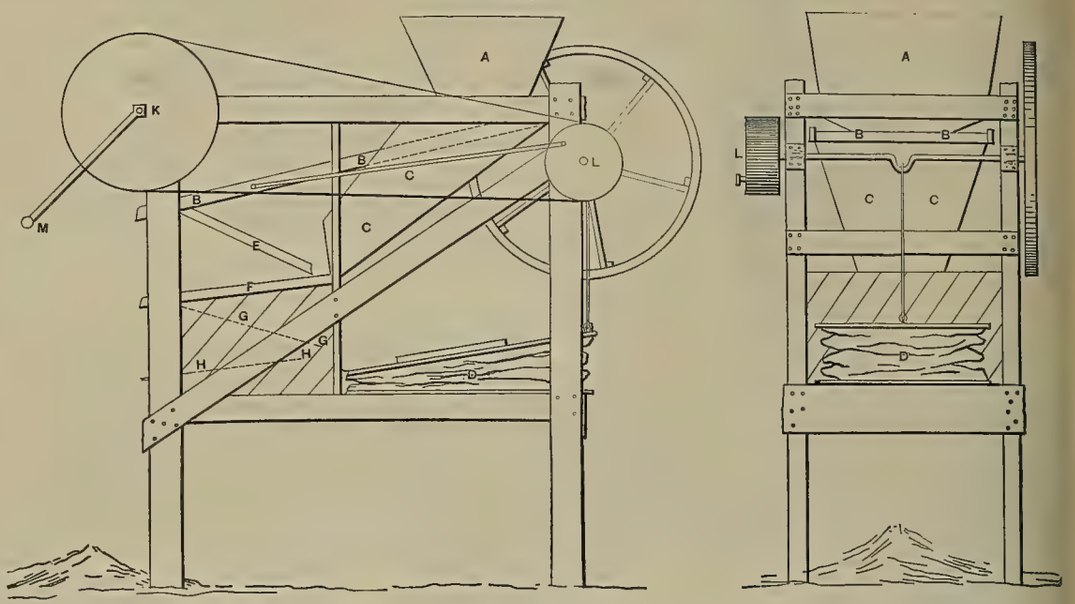
DRY BLOWERS AT WORK

over the grizzy or sizing screen *B*, *B*, the upper part of which is made of parallel wires $\frac{3}{16}$ inch apart and the lower portion of 8 mesh. The finer stuff falls down into the shoots *C*, *C*, and *E*, *E*, respectively, and reaches *F*, which is another (12 mesh) screen, supplied also with riffles. As it descends through the screens at *G* and *H*, both 18-mesh, the blast from the bellows keeps the material in agitation and aids the requisite separation between the particles of gold and the dust. The final product is panned by hand.

One of the most popular dry-blowing machines is that made by Steve Lorden at Freemantle. It is illustrated in Fig. 7. The essential parts are:

A. Feed hopper, sheet-iron bottom, punched with inch holes, hinged at A_2 and provided with riffles A_3, which arrest the heavier particles of gold, while the

FIG. 5.

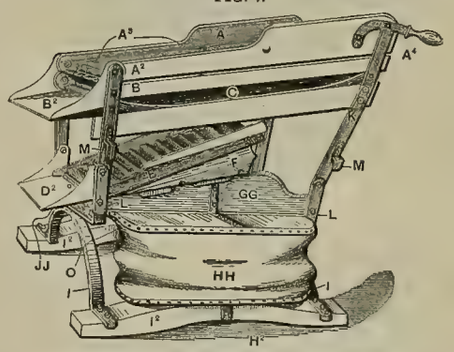


DRY BLOWING MACHINE
Scale 1″=1 Foot

coarse lumps of dirt pass out of the machine over the shoot B_2 and the fine stuff falls through into

B. Second hopper, which has riffles and smaller

FIG. 7.



LORDEN'S DRY-BLOWING MACHINE.

perforations, repeating the process. To examine this hopper the upper one *A* is sprung out of position at A_4.

C, *C*. Return shoots which lead the reduced material for further sizing upon the sloping screen *E*, which also has a series of riffles, and is placed directly over the air chamber *F*.

D_2 is a discharge shoot for the screen *E*. *G*, *G*, are air channels from the bellows *H*, *H*.

H, *H*. Double blast bellows, one on each side, which ride on carriers H_2, so arranged as to give the requisite play and to relieve the bellows from undue strain when in operation.

I, *I*. Rockers, bolted firmly to two foundation blocks, I_2, which form the stand, the only part of the machine that is not in motion. The curve of the rockers allows all dirt to fall away from the pivot pins *J*, *J*, by which the apparatus swings.

K, *K*. Standards, hinged at *L*, so that the machine folds up.

M, *M*. Brackets for the insertion of two poles, by means of which a couple of men can carry the machine conveniently.

The operator holds one handle at A_4 in each hand and rocks the machine, this serving simultaneously to put the bellows, hopper and screens all into movement. The machine weighs 124 pounds and has a capacity of from ten to fourteen loads (a load is roughly one ton) per day. The price at Freemantle is £16, or about $80.

The deposits exploited by the aid of these machines are of a generally patchy character and lie at the upper ends of the depressions formed where the surface slopes away from ridges traversed by the veins of gold-bearing quartz.

The prospector has an eye for the contour of the ground, and looks for the point where the rock surface disappears under the fragmentary overburden which he calls "made ground," as distinguished from the underlying "bedrock."

In his search he is usually guided by seeing the outcrop of quartz, marking a possible source of detrital gold and by the actual finding of specimens on the surface.

The distribution of the gold in these deposits reminds one of its position on a vanning shovel. It may be traced up to the outcrop which yielded it, or it may be scattered in the sand for half a mile; but the rich and only workable part of the deposit will ordinarily be found at a distance of 30 or 40 feet from the reef.

Underneath these patches of superficial gold-bearing detritus there are found partially consolidated accumulations, which are more extensive, and, quite apart from their greater economic value, are also of superior interest, because of their better defined geological features.

The Cement Deposits.—In the ordinary course of professional work I examined the two most important of these deposits at Kintore and Kanowna, respectively. Since then a third formation of a similar character has been opened up, also at Kanowna. This I happened to see when in the stages of early development, and before it had been extensively exploited.

The deposit of cement at Kintore was one of the earliest worked. It is situated twenty-three miles northwest of Coolgardie, on the road to Menzies. The West Australian Proprietary Cement Co. mined the ground with a success which was short-lived, because of the restricted quantity of material rich enough to pay the high costs of treatment. In four months 7335 ounces of gold was obtained by treating 4115 tons in a stamp mill, supplemented by cyanide vats.

Enough work has been done to disclose the character of the deposit. Under a thin covering of sand and dust there occurs a bed of kaolin, ranging from a couple of inches to a foot in thickness, and this overlies from 15 inches to 2 feet of "sand rock," which in turn gives place to the gold-bearing cement, which has an average thickness of 2½ feet. The last lies directly upon an irregular surface of decomposed granite.

The several layers composing the deposit are separated by seams of pipe clay, which, like the kaolin, are simply the product of the decomposition of the constituents of the granite, particularly the feldspar. The sand rock may be described as a coarse, incompletely consolidated sandstone or grit, consisting mainly of iron-stained particles of quartz, loosely cemented. The cement has a bluish-gray tinge, owing to the play of light on the quartz fragments. This, too, is not quite compacted, since fractures through the material do not break across the pebbles, which are harder than the clay binding them together. In this respect the cement differs, for example, from the South African "banket," to which it has been compared. From a distance the cement looks like a coarse sandstone and exhibits a rough-joint structure. The materials of which it has been made up have undergone incipient sizing, so that different layers of varying coarseness are distinguishable.

*Condensed from paper read before the Am. Inst. M. E.

The bedrock is granite, so softened by decomposition as to be mistaken by the miners for a part of the alluvial deposit. It is kaolinized to a depth which the neighboring mine shafts prove to reach a maximum of 130 feet. The surface on which the cement lies is marked by pot holes having a maximum depth of 2 feet and a diameter reaching to 3 feet. These holes are filled with cement, which is usually poor save at the rims, where some of the richest mill stuff has been obtained.

All the members of the deposit, from surface to bedrock, contain some gold, the kaolin being the poorest. The cement itself attains a maximum thickness of 5 feet. The richest parts occur in lateral embranchments from the main body of the deposit. The kaolin has become hardened and dried. It breaks like shale, and its true character is obscured by the down-filtering of red sand through cracks reaching to the soil overhead.

The deposit extends through a number of mining claims, and has been traced for a length of three-quarters of a mile. At the east end it begins as a narrow neck about 15 feet wide, and then enlarges steadily to 100 feet. Occasional bulges increase this width to a maximum of 250 feet. At the edge it gives place, as it thins out, to 2 or 3 feet of iron-stone gravel, carrying 3 or 4 dwts. of gold per ton.

The bedrock rises westward at the rate of 15 feet per 1000. This fact suggested that the origin of the gold-bearing cement was to be found in the reefs which were being profitably mined by the Sugar Loaf Co. The workings were 136 feet deep at the time of my visit in September, 1897. The veins traverse granite which has been kaolinized to 130 feet from the surface. They consist of white quartz and are narrow (4 to 12 inches), but they carry short shoots of very high-grade (three to ten ounces of gold per ton) ore. The gold occurs native, in flakes penetrating the cleavage planes of the quartz like a golden mosaic, and also in coarser particles, which, under closer examination, prove to be octahedral crystals with curiously rounded edges. A comparison of these veins and their enclosing rock with the material composing the cement deposit unquestionably indicates the derivation of the latter from the former. The cement carries gold which is exactly similar to that seen in the reefs; the quartz fragments in the alluvial are identical with the stone broken in the Sugar Loaf mine. In the cement occur particles of quartz showing gold. The loose gold in the cement has been but slightly worn, and the quartz pieces are rather subangular than rounded, so that they can hardly be termed "pebbles," and the deposit itself is better defined as an agglomerate than as a conglomerate. The binding material, the overlying layer of kaolin and the sand rock capping the gold-bearing stratum of cement all exhibit very clearly their derivation from a decomposed granite, similar to that which encloses the reefs and forms the bedrock of the alluvium itself.

The topography confirms this supposed relationship. The highest point along the major axis of the cement deposit is a very low ridge separating the workings of the Sugar Loaf from the alluvial ground.

Automatic Division of Irrigation Water.

Throughout the arid regions there are many irrigation systems where a certain stream of water, often varying in volume, is divided in varying proportion among the people entitled thereto. It is customary for the overseer to determine, in miner's inches, the amount at the head of the system and to measure out to each consumer along the line the number of inches to which he may be entitled. It is unnecessary to discuss at this point the various methods of measurement. Suffice it to say that where the water is flowing in open conduits or gravity pipes the irrigator near the head of the line is likely to fare better than the one at the lower terminus; for if the overseer be careless, or the users on the upper portion of the line piggish, the last man may be left dry as Sahara. It may be that the stream is the natural surface flow of some creek, in which case the evaporation along its tributaries during the heat of the day results in a decrease in the amount reaching the headgate of the system—frequently a loss of one-half. If the gates of consumers along the upper portion of the line be set so as to take continuously their maximum quota it is plain that the division is not equitable.

For the past five years there has been in operation at West Highlands, San Bernardino Co., Cal., a system which obviates these difficulties and permits the overseer to make his rounds on a peace footing. The consumers in the vicinity of West Highlands receive their water from the Bear Valley canal in a cemented ditch one mile in length. There are no consumers' gates along this line, all the water being delivered through the six lateral ditches, each a mile long, which lead away from it by a series of adjustable automatic weirs.

At the head of each of the first five laterals is a basin, as shown in the first engraving, from a photograph specially made for this article. It is virtually an enlargement of the main ditch and is about 12 feet square. Each of these weirs has two or more openings equipped with iron gates provided with doors which slide in lateral grooves. One opens into the main ditch and one into the lateral. In the weir shown the central gate opens into a flume supplying water to the ground immediately adjacent. All the openings in each weir are on a level with each other and when open the water flowing through them is of equal depth in all.

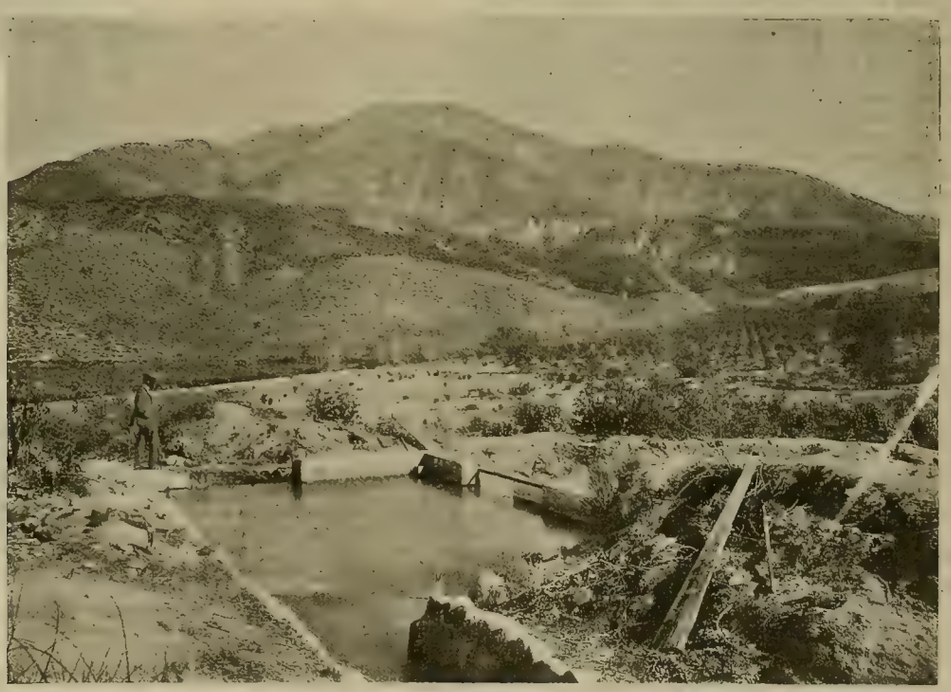
Division of water by this system is simple. The overseer starting down the line with say 300 inches, to be equally divided between the six laterals, goes to the first weir and sets the gate opening into the main ditch at its maximum width, which, in this instance, is 40 inches. The gate opening into the lateral he sets at 8 inches. Thus the main gate will take five-sixths and the side gate one-sixth of the water—250 and 50 inches, respectively.

At the second weir he sets the gates at 40 and 10 inches, respectively, and so on down the line. At the fifth weir, the last point of division, he has 100 inches to be divided between the last two laterals, and consequently sets the gates equally open. A hasp on the door is provided, at its loose end, with a peg which fits in any one of a row of holes drilled, at intervals of ½ inch, in the top bars of the front gate. A slot in the hasp fits over a staple above the one to which it is fastened. When the sliding door is set at the desired place, the hasp adjusted and secured by a padlock, meddling becomes difficult. The amount of water flowing may be determined by the open-weir table. An outlet under the main gate affords opportunity for sluicing out sand or sediment which may accumulate in the basin.

The schedule is so arranged that water is delivered to but one consumer in each lateral at a given time. Any increase, and likewise any decrease, in the amount coming into the system at any and all hours of the day automatically divides itself among all consumers.

The divide shown in the lower engraving, at the junction of two of the company's ditches, has a capacity of 2000 inches.

ADJUSTABLE AUTOMATIC WEIR AT WEST HIGHLANDS, SAN BERNARDINO COUNTY, CAL.



LARGE WEIR WITH DOUBLE GATES USED IN THE HIGHLAND IRRIGATION DISTRICT.

Commercial Importance of a Pacific Cable.

The submarine telegraphs of the world, and especially the practicability of a submarine telegraph across the Pacific, are discussed at considerable length in the January number of the "Summary of Commerce and Finance," just issued by the Treasury Bureau of Statistics. The statement shows that the submarine telegraphs of the world number 1500. Their aggregate length is 170 000 miles; their total cost is estimated at $250,000,000, and the number of messages annually transmitted over them 6,000,000. All the grand divisions of the earth are now connected by their wires, and from country to country and island to island the thoughts and words of mankind are instantaneously transmitted. Beneath all oceans, save the Pacific, the universal language which this system has created flows uninterruptedly, and man talks as face to face with his fellow man at the antipodes. Darkest Africa now converses with enlightened Europe or America, and the great events of the morning are known in the evening throughout the inhabited world. Adding to the submarine lines the land telegraph systems by which they are connected and through which they bring interior points of the various continents into instan-

taneous communication, the total length of the telegraph lines of the world is 835,000 miles, the length of their single wires or conductors 3,500,000 miles, and the total number of messages annually sent over them 365,000,000, or an average of 1,000,000 each day. Of the 170,000 miles of submarine telegraphs, about 150,000 belong to thirty-five companies operating the commercial cables, which number about 320; the remainder are mostly short lines controlled by governments, and connecting forts, batteries, signal stations, lighthouses, etc., the aggregate of government lines being about 1150 and their total length about 20,000 miles. In addition to this, the governments of the world hold about 80,000 miles of cable in stock for war purposes, ready to be laid at a moment's notice.

In the short half-century since the practicability of submarine telegraphy was demonstrated, the electric wires have invaded every ocean except the Pacific. Nearly a score of wires have been laid across the Atlantic, of which no less than thirteen now successfully operate between the United States and Europe, while three others span the comparatively short distance between South America and the African and south European coast lines. Throughout the Indian ocean lines connect the far East with Europe and America by way of the Red sea, the Mediterranean, the western coast of Europe, and the great transatlantic lines. The Mediterranean is crossed and recrossed in its entire length and breadth by numerous cable lines, and the "Mediterranean of America," the Gulf of Mexico and the Caribbean sea, is traversed in all directions by lines which bring its islands and colonies into speaking relations with each other and with South America, Central America, the United States, and thence Europe, Africa, Asia—the whole world. Along the eastern coast of Asia cable lines loop from port to port and from island to island, receiving messages overland from eastern Europe by way of the Russia-Siberian land lines and forwarding them to Japan, China, Australia, New Zealand, the Straits Settlements, Hongkong and the Philippines, and sending others in return. South America is skirted with cable lines along its entire border, save the extreme south, where they are brought into intercommunication by land lines. Along the entire coast of Africa cables loop from place to place and colony to colony, stretching along the entire circumference and penetrating the interior by land lines at various points.

Every body of water lying between the inhabited portions of the earth, with the single exception of the Pacific ocean, has been crossed and recrossed by submarine telegraph lines. Even that vast expanse of water has been invaded along its margin, submarine wires stretching along its western border from Siberia to Australia, while its eastern borders are skirted with lines which stretch along the western coasts of the two Americas. Several adventurous pioneers in Pacific telegraphy have ventured to considerable distances and depths in that great ocean, one cable line running from Australia to New Zealand, a distance of over 1000 miles, and another extending from Australia to the French colony of New Caledonia, 800 miles seaward.

The chief obstacle in the past to the construction of a grand transpacific cable was found in the fact that midocean resting places could not be satisfactorily obtained or arranged for, no single government controlling a sufficient number of suitable landing places to make this seem practicable, in view of the belief that the distances from which messages can be sent and cables controlled were limited. With landing places at Hawaii, Wake island, Guam and the Philippines, however, no section of a cable stretching from the United States to Asia and touching at these points would have a length equal to that now in daily operation between France and the United States. The length of the French cable from Brest, France, to Cape Cod, Mass., is 3250 miles, while the greatest distance from land on the proposed Pacific route would be that from San Francisco to Hawaii, 2089 miles, that from Hawaii to Wake island being 2040 miles, from Wake island to Guam 1270 miles, from Guam to Manila 1520 miles, and from Manila to the Asiatic coast 630 miles. While the depth of the Pacific is somewhat greater than that at which any cable has been laid, the difference between its depth and the greatest reached by cables in the Atlantic would be very slight, the cable recently laid from Haiti to the Windward islands being in 18,000 feet of water, while the greatest depth between San Francisco and Hawaii is 18,300 feet, and the greatest depth between Hawaii and Manila is estimated at 19,600 feet, though this estimate is yet to be verified by detailed soundings. Otto Krummel, who was the first to discuss the bathymatric data and calculate the area and volume of the various oceanic basins, puts the mean depth of the Pacific at 2160 fathoms, against 2040 for the Atlantic, in which cables have already been so successfully laid, and later researches and actual soundings, while they have developed extreme depths at certain points in the Pacific, have not, in the opinion of experts, been such as to warrant the belief that the depths along the proposed line would be considerably greater than those in which cables have been already successfully laid and operated.

The developments in construction, laying and operating of submarine cables and in their availability for general public use have kept pace with their extension throughout the civilized world. From a mere guttapercha-coated wire, the submarine conductor of electricity has developed in a half century into a great cable, having a central copper core surrounded by numerous layers of non-conducting material and protected by steel wire wound spirally about it, and in turn further protected by waterproof and insect-proof wrappings. From a steamer-towed, open barge, the facilities for laying have developed to a fleet of nearly fifty steam vessels, with every facility for laying, picking up, splicing and repairing the cable lines. From a speed rate of four words per minute, which was made on the first transatlantic cables, the speed of transmission has been accelerated to fifty words per minute, and even more than that with the automatic transmitters now coming into use with cable lines, while by the duplexing of the cables their carrying capacity is doubled. From a cost to the sender of $100 a message, which was originally charged on the first transatlantic cables, the rate from New York to London and the great cities on the continent of Europe has fallen to 25 cents per word. From several hours required for the transmission of a message and receipt of a response, the time has been so reduced that messages from the Executive Mansion to the battlefield at Santiago were sent and a response received within twelve minutes, while a message sent from the House of Representatives in Washington to the House of Parliament in London in the chess match of '98 was transmitted and the reply received in thirteen and a half seconds.

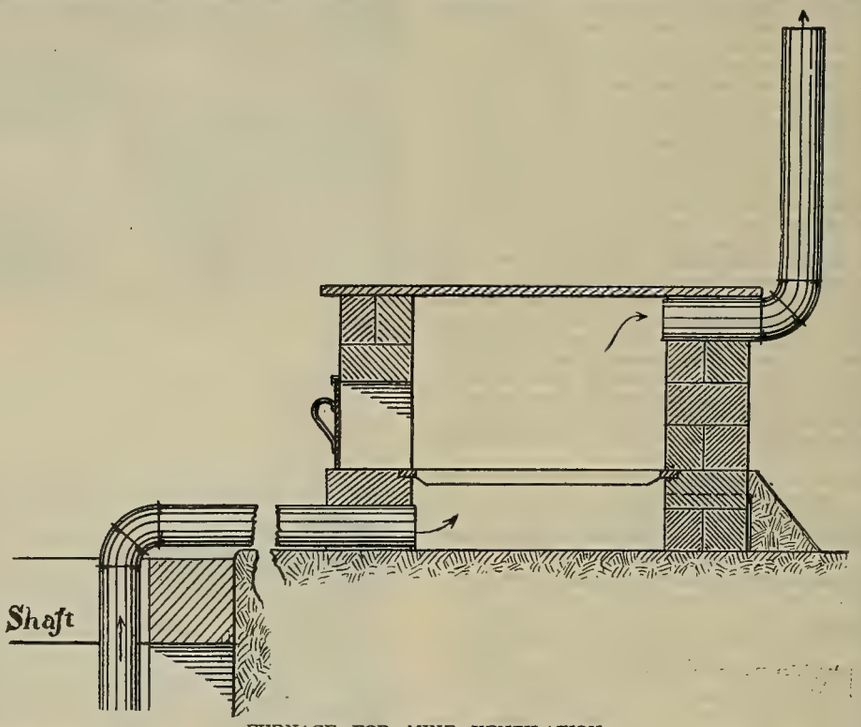
The effect of this ready and inexpensive method of transmitting thoughts and words from continent to continent throughout the civilized world is shown in the rapid development of international commerce since it began. The first successful cable lines between the United States and Europe were first put into operation in '66. In that year our commerce with Europe amounted to $652,232 269; in '76, $728,959,053; in '86, $896 911,504; in '96, $1,091,682,874; and in '98, $1,279,739,936; while our commerce with the whole world, which in '66 amounted to $783 671,588, had by '98 reached the enormous sum of $1,847,531 984.

With this evidence of the advantage of prompt communication between commercial centers desiring an interchange of their products, it may not be improper to call attention to the fact that the United States now obtains but a small proportion of the commerce of Asia, which it is at present only able to reach through the long and devious submarine and land telegraph lines across the Atlantic, the continent of Europe, the Mediterranean, the Red sea or the Persian gulf, the Indian ocean, land lines across India, cable lines again by way of the Straits Settlements, and thence along the Asiatic coast and among the islands of Oceanica. The commerce of the countries of Asia and Oceanica, lying commercially adjacent to the Philippine islands, amounts to more than $2,000,000,000 annually, their imports alone averaging $100 000,000 per month, or $1,200,000,000 per annum. Of this enormous market the United States at present obtains less than 6%, despite the fact that the imports into the countries in question are largely composed of the classes of articles produced in the United States and offered for sale by her manufacturers and merchants. With a direct cable communication across the Pacific, direct water communication through a Nicaraguan canal, and an increase in the number and capacity of American steamships, it seems not improper to suppose that a material addition might be made to the share obtained by the United States in the trade of that part of the world.

Cheap Ventilation in Small Mines.

Written for the MINING AND SCIENTIFIC PRESS.

Many small mines experience a great deal of trouble with powder smoke and foul air, particularly in warm weather. Ventilation may be vastly and cheaply improved in a variety of ways, one of which is the fire draft. This is accomplished by the construction of a furnace at the surface connected by pipe with the mine workings. The furnace may be built of brick or stone. When no more suitable material is at hand, rock from the dump may be used. Particular care must be exercised to make the furnace air-tight. The bricks or stone should be carefully laid with a liberal supply of mortar—sand and clay will answer, or any mud may be used. When finished, the outside should be treated to a coating of mud, to stop up all cracks. In constructing the furnace, a place should be selected far enough from the mouth of shaft or tunnel to be out of the way. If it is a tunnel to be ventilated, the furnace may be built on the hillside above it, and, if a shaft, any place near the shaft will do. When construction begins, first prepare a space for the pipe leading into the mine, and, putting the pipe in place, build around it. On the opposite side of the furnace, and level with the bottom, arrange an opening which may be closed or opened, when desired, for the purpose of removing ashes. This door must be kept sealed when there is a fire in the furnace. When the wall has reached a height of 10 inches, grate bars—iron bars of any sort—should be put in place. On one side, where it will be convenient, provide a door for the introduction of wood. The bottom of this door should be even with the grate bars. Continuing, provision should be made for the smokestack near the top of the firebox. For the top of the furnace one or more large, flat stones may be employed, one being better than two, and a heavy iron plate better than either. When completed, with pipes in place, the furnace is ready for work. After firing up, the smoke will quickly detect leaks, which should be plastered over with mud. It is very important to keep the doors shut tightly and to render the furnace as nearly air-tight as possible. The pipes should be not less than 5 inches in diameter, and the inside measurement of the furnace should be not less than 20x20 inches on the grate bars, with a height of 18 inches above them. In wet mines galvanized iron pipes are best, though in dry workings tin may be used for a long time. An enlargement of the pipe at the end nearest the face of the tunnel or bottom of shaft is an advantage. The pipe, in 10 foot sections, should be carried as near the face as possible with safety. The pipe may be protected from blasts by the use of plank or lagging. This simple and cheap device will greatly improve ventilation in quite extensive workings. The better the construction of the furnace and the larger its size, the more perfect is its operation. The smokestack should be carried up several feet above the furnace to secure good results. The accompanying cut illustrates a vertical section of the furnace, showing doors, grate and pipe.



FURNACE FOR MINE VENTILATION.

Mining Summary.

ALASKA.

A strike in the Sea Level mine, near Ketchecan, southeastern Alaska, is reported. A vein of $40 ore has been uncovered.

United States Consul McCook writes from Dawson City: "Investors should be careful of mining properties offered for sale, particularly in some sections of Alaska. Of the many who came here last spring and summer, hundreds drifted down the Yukon and located at Forty Mile, Eagle City and Star City. I am informed that there are many schemers there who get up miners' meetings, elect their own recorder, jump claims already recorded, get their men to give them receipts as record papers and issue prospectuses of water rights, all apparently in conformity with United States mining regulations. They have organized companies, their scheme being to sell their so-called water rights to the public. No one should buy anything until perfectly satisfied. There will be any number of valueless claims offered by promoters."

A Juneau dispatch says that the property of the Pande Basin Gold Placer Co. is leased to F. P. Voorhees for five years. The rental is stated to be $2,650,000, and $20,000 is alleged to have been paid down. In Pande basin is the lake out of which was drained last January 61 feet of water through a tunnel to expose gold bearing sand on the beach. The report sounds well, but lacks confirmation.

A correspondent of the Victoria *Times* says a large number of claims on Pine, Spruce and other creeks are thrown open, and the price is very low. Benches on Pine creek are offered at from $100 to $250, but no sale for them. There have been no sales at all, everyone awaiting the Gold Commissioner, who had not arrived up to Feb 26th. The rush had not commenced, although a few men were coming in every day. He saw a few specimens of quartz. No assays had been taken. It is a fine country. The thermometer ranges from zero to 20° below. The coldest day was on Monday, Feb. 28th—52° below.

ARIZONA.

At the Yarnell mine, near Prescott, a 10-stamp mill will be built.

At the Lowell and Arizona mines at Bisbee Supt. Fenner has raised through an old shaft to the surface. The shaft is double compartment. A new 25 H. P. hoist is to be put in at once. This property joins the Copper Queen, the output of which is 120,000 pounds of copper daily. The formation is limestone, intersected with porphyry dykes.

Nearly $100 was recently taken from dry gulch diggings near Prescott, supposed to have come from a blind lead. There are numerous gulches near Prescott which have been rich in gold where no veins have been found—one in particular, four miles south of Prescott, from which it is said $70,000 was taken, and no veins are known to cross it.

The hoisting plant on the Blind Goddess, at White Hills, has been removed to the Norma, in the same district.

Cinnabar occurs, with hematite in rhyolite, thirteen miles southwest of Prescott. Only superficial work has been done on the claims.

It is locally rumored an English company has purchased the Ray mines, on Mineral creek, and will build a railroad thirty-five miles to the Southern Pacific road at Picacho.

H. W. Blaisdell has taken hold of the King of Arizona mine and will make an effort to secure water there. Failing in this, he will place a pump on the Colorado river and pump to the mine, forty miles.

Republican: The Mammoth M. Co., in Pinal county, will put in an electric plant to run its 50 stamp mill and the 30-stamp mill of the Mohawk mine. The Mammoth mill will be enlarged by the addition of fifty stamps. The transmission line will be fifteen miles long.

—A strike has been made at the Oriole mine, at Old San Domingo, eight miles from Wickenburg; F. C. White is Supt. The company has sunk a shaft to a depth of 200 feet. There are now 800 tons of ore on the dump. The new strike was made in the west drift, disclosing a vein 2 feet wide, assaying more than $30 a ton.

Globe *Silver Belt*: C. E. Gunn has taken a lease on the New York and Chicago mines, belonging to the Old Dominion Copper M. & S. Co., situated near Bloody Tanks. The ore will be smelted by the Old Dominion Co.

Prescott *Courier*: The Hidden Treasure mine, six miles from Bumblebee, has shipped five tons of ore to the Prescott sampler, worth $100 per ton.

CALIFORNIA.

Amador.

Sinking is to be resumed on the Spagnoli mine at Pioneer.

Dispatch: It is reported that a large body of low-grade ore has been opened on the 1700 level of the Oneida mine, two miles north of Jackson. Drifts are in some distance north and south on the vein from the crosscut where the discovery was made.——It is reported that ore has been found in the shaft at the Amador Queen No. 2 mine, the ledge extending across the width of the shaft. The rock is said to show free gold and sulphurets.

Calaveras.

Rich rock is being mined in the Colliersville district, six miles east of Murphys. Some of this rock looks like "black granite" and would scarcely be thought to contain gold, but is liberally sprinkled.

The Sheep Ranch mine at Sheep Ranch is to resume operations.

The Gwin mine has declared another dividend of 25 cents per share and there is $12,000 still remaining in the treasury. The shaft is to be sunk an additional 200 feet, making a total depth of 1600 feet. Large ore reserves are blocked out between the 1000 and 1400-foot levels. This is one of the old, long-abandoned mines of California which after years of success remained idle for many years.

Prospect: The Big Horn, now known as the Taylor mine, two miles north of Murphys, is being worked by Mr. Tucker, as representative of a Fresno company.——At the Central Hill mine near Murphys piping is in progress, but the available part of the channel is nearly exhausted. When the tunnel was run through bedrock from Douglas Flat it was supposed the Central Hill Co. would have a large amount of valuable channel, but it was found that a later channel whose existence was unknown had cut out a large portion of the Central Hill channel, and the drain tunnel was too high to drain the new channel which crosses the Central Hill at nearly a right angle.

Del Norte.

J. A. Johnson of Crescent City has shipped three tons copper ore to the Selby Smelting Works, San Francisco.

Del Norte *Record*: The beach miners at the mouth of Gilbert creek near the Oregon State line had their dam carried away by the freshet and a heavy sea that prevailed. M. Burnett says it will take several weeks to repair the damage.

El Dorado.

Placerville *Democrat*: A rich body of ore has been discovered at the Omo mine, eight miles east of Fairplay, which assays $19 per ton. It is free milling and fully 85% of the assay will be saved. Twenty men are employed at the mine, and five stamps have recently been added to the mill, making ten stamps. The main tunnel is in 1000 feet, with 350 feet of backs.

Inyo.

Bishop *Register*: Harrison, Goldsmark & Co. have their tramway ready to start up——Emerick & Dover will have a mill at Stone Corral in two weeks, the machinery being now at Johannesburg.——Parties who bought out Lambert, Grey & Tate at Anvil Springs will have a mill on the ground in less than a month.——A. Williams has bonded his property at Tuber for $20,000.

Lake.

A rich strike of cinnabar is reported from the Crystal Quicksilver M. Co.'s mine.

The Crystal Quicksilver M. Co. say that ore assaying $400 is being taken out.

Lassen.

A rich strike is reported from the Idaho mine on Hayden Hill. The hill is a network of veins and some of the mines in past years have produced very rich ore, notably the Juniper.

Madera.

Mining experts have been making an examination of the old copper mines at Buchanan, and also on the north side of the Chowchilla, in Mariposa county. These mines are in mica schist and show large bodies of low-grade sulphide ore.

Mariposa.

(Special Correspondence).—Experts Jennings and Mein spent most of last week examining the Mariposa grant in company with Supt. Ludwig and several old-time employes of the property. Their visit has added some extra strength to the annual spring rumor that "something is going to be done on the grant now."

A mill will probably be placed on Capt. Ward's Spencer mine at Whitiocks. Development work is uncovering a satisfactory ore body.

Galey & Co. are cresscutting to the Mother Lode at the 200 level of the Murphy mine. Their 6-stamp mill at the Porter is nearing completion and sinking is in progress on the Keystone shaft.

The Montana M. Co. has surrendered its lease on the Louisiana, which is temporarily closed. Later in the spring a new shaft and much other work will be started and deeper exploration carried on.

The Merced Co. is taking some rich specimen ore from the 600 and 700 levels of the Mary just now. A crosscut from the lower workings through the entire formation has developed a hanging-wall vein of considerable size and good appearance, but as yet undetermined value. Were he not hampered by the great expenditures incurred by the former management, Supt. Mills would be able to make a notable dividend payer out of the Mary. The mill is crushing from 100 to 125 tons per day and reputed to be saving about $10 per ton. Engineer McDonnell is making surveys for the company along the Merced river in search of a water power.

H. H. Clark is running the steam arrastra on the Alice Clark, a mile north from Coulterville. Some good ore is coming out and a sale is pending to Chicago capitalists.

Good ore is reported from the Champion at Pino Blanco.

F. A. Brown has sold his Lost Friend mine at Horse Shoe Bend to Hutchinson Bros. of Oakland.

Bear Valley, March 14th, '99.

Gazette: A. H. Ward is having 100 tons of ore crushed from the Spencer mine, six and one-half miles north of Mariposa.

Nevada.

The Superior Court has granted the application of the W. Y. O. D. G. & S. M. Co. for disincorporation.

The arrastra on the Sazerac drift mine, at Rough and Ready, has been started up.

The Eastern Star mine in Willow Valley district has been bonded by Voyce & Jones, who are now opening up the property. A ledge of quartz 2 to 4 feet in width was struck there years ago and ore taken out.

Nevada City *Transcript*: W. H. Weldon of Grass Valley will put a hoisting and pumping plant on a quartz claim extension of the Massachusetts Hill mine, near Grass Valley.

Nevada City *Transcript*: Sinking of the shaft in Phenix mine near Nevada City is progressing. Some rich ore is coming out.

Placer.

A 3-foot copper ledge is being worked near Lincoln. Twenty men are employed.

E. Chase and W. Scadden were killed last week in the Three Star mine at Ophir by a blast charged by the day shift which failed to go off at the proper time.

The Drummond mine near Forest Hill, which has been working under bond for some time past, has been shut down and the air compressors removed.

Lessees are working the Dardanelles drift mine near Forest Hill, crushing the gravel in a stamp mill at the mine.

Placer *Herald*: The Mayflower drift mine, near Forest Hill, is employing fifty-five men. All the work is being done on the Orono lead, and paying well. The mill and compressor are run by steam. The company is figuring on putting in an electric plant. In the near future a tunnel will be started to open the Andy Steel claim, which was rich on the same lead above. Work is going on at the Bartley mine, Dutch Flat. Its channel is 1000 feet wide. The company has no impounding dam. Wm. Stuart is in good paying ore at the Caledonia on the Middle Fork.

Riverside.

Antimony has gone up in price recently. There is a deposit of high-grade antimony ore about four miles southwest of South Riverside in the brush-covered hills, upon which little work has been done. The rocks of that section are largely eruptive and intelligent prospecting may discover a good mine.

Numerous claims have recently been taken up in the Eagle mountain district, forty miles northeast of Walters station, in the Colorado desert.

The Good Hope mine, three and one-half miles southwest of Perris, is working about a dozen men. The tailings are being treated by the cyanide process.——The Santa Rosa mine tailings, six miles west of Perris, are also being treated with cyanide, it is said, with good results.

There are a number of small rich veins lying in the granite hills west of Perris, about the Santa Rosa and near Gavillan which were worked years ago by Mexicans, the ore being ground in arrastras. None of these mines have deep workings. At the first sign of a pinch they have been abandoned, no effort being made to learn whether the veins would open out in depth again; but as they do so longitudinally, it is not unreasonable to suppose that they will do so in depth. The ore is high grade, and most of the veins dip at low angles.

The shaft at the Riverside mines is to be sunk 150 feet additional, making 450 feet.

Winchester *Recorder*: Work has been resumed on the Utica mine, twelve miles west of Winchester, and the development of this property will go on steadily. The owner, C. H. Briggs, will build a cyanide plant of thirty tons capacity.

Shasta.

Trinity *Journal*: The Iron Mountain Co. at Keswick has put in a steam shovel and contemplates putting in a shovel with each of its roasters.

Sierra.

Mountain *Messenger*: M. Pinney says the Mountain mine and mill has closed down for a short time in order that some needed improvements may be made to the mill.——M Copeland has reduced his force at the Triple Pocket mine, in Slug canyon, owing to the fact that more ore was being produced than the mill could crush. The mill is kept running night and day with Geo. Black in charge.

Siskiyou.

Siskiyou *News*: The unworked portions of the old Hibernia mine on Eddy's gulch, Salmon country, is being developed by R. L. Fagundes.——Nearly all the placer mines along the Salmon have water enough to work with.——The hydraulic claim of Brown, Hammer & Co. has started up.——The tunnel at the Commodore mine on Barkhouse creek is in 500 feet and it is expected to cut the ledge at a depth of 300 feet.

Yreka *Journal*: There is 10 feet of snow on the Salmon mountains, with storms every day on the high peaks, which will supply the miners of Quartz valley, Mugginsville, Oro Fino and vicinity with plenty of water during the coming summer.——The miners at the Greenhorn Blue Gravel mine have reached paying gravel in the caved-in drift, and are taking out considerable gold. A force of forty men is employed.——Some fine prospects of gold have been found in the mountains between Gazelle and Scott valley. Pieces of quartz taken out show free gold, and claims have been taken on the East Fork and on Willow creek.——Kingery & Co., working a ledge at lower end of Scott valley, are getting prospects from their quartz ledge.

Tuolumne.

(Special Correspondence).—The Rising Sun mine, at Arrastraville, is cleared of water and timbered where found necessary. They are now sinking a winze in lower level, 135 feet from main incline shaft. In the winze a vein 20 inches wide is found, showing galena and arsenical sulphurets. The quartz also shows free gold. The country rock is intersected by seams of quartz that prospect well. G. L. Tomkins is Supt.

Arrastraville, March 15th, '99.

The Crystalline mine near Table Mountain and 1½ miles northwest of Jamestown has been purchased by a Scotch syndicate. The price is reported to have been $250,000. The mine is developed by numerous drifts, crosscuts and shafts. F. Bainville will have charge of the property.

All of the surplus stock of the Boston & Tuolumne G. M. Co. has been taken by a Boston syndicate. The officers are: President, L. Auerbach; secretary, A. N. Winslow; treasurer, W. Jones. Its mines are at Big Oak Flat, adjoining the Longfellow. Three shifts of men are at work.

The new mill of the Bown Mining Co. near Tuttletown is about completed and will be ready to run the coming week.

Lack of water is still the cause of numerous mines lying idle in this county.

Telluride ores occur in some of the quartz veins of Big Oak Flat in granite formation. The quartz is crystallized in part and usually of milk-white color. Iron, lead and zinc sulphides also occur with the tellurium.

The new north tunnel of the Turner Flat gravel mine struck bedrock at 25 feet and no gravel. A third shaft and possibly a series of shafts will be necessary to determine the exact location of the channel. The work done through shaft No 1 was all on the rim, though considerable gold was obtained.

Sonora *Independent*: There are at Big Oak Flat in active operation the Longfellow, Gold Syndicate, Limited, the Mack Consolidated, Pauper's Dream, Little Giant and Tuolumne.——A new mill for the Trio mine near Jamestown and one for the Hazel Dell group near Soulsbyville will soon be built by the Mother Lode Development Co.——The mill at the Star mine, two miles from Columbia, has been closed down on account of the scarcity of water. Men are still at work in the mine.

Union-Democrat: The Newcomer mine, fourteen miles north of Columbia, has three veins, which are opened by several tunnels, shafts and drifts. There are about 200 tons of ore on the dump.

Tulare.

The gravel hills on the White river are said to be gold bearing.

Porterville *Enterprise*: The mines of White river are being diligently developed. Nearly all interested state that the prospects of their respective mines are most encouraging.

COLORADO.

The Denver mint receipts for January were $1,691,106 98, a gain of $260,876.58 over January of 1898. The February receipts this year were $1,745,463.53, a gain of $293,103 23 over February of 1898. The total receipts for the two months were $3,436,570.51, a gain of $557,979.21 for two months, or over half a million dollars.

BOULDER COUNTY.

Ward *Miner*: The Big Five wants bids for driving the Niwot tunnel 2000 feet—a mining tunnel of greater distance than any heretofore in the State.

Denver *Times*: The Sedalia copper mine, two miles from Salida, was sold on March 9th to Boston and New York parties for $60,000; B. T. Brooks has been retained as Gen. Mgr. at this point. The company will build a smelter.

Denver *Mining Record*: A strike has been made in a 100-foot shaft in the Gillard mine. It shows considerable free gold.

Boulder *News*: A strike of ore is reported on the Longfellow mine at Jimtown, owned by I. Berlin, and now worked by leasers. There is a 14-inch vein of ore which ran 2200 ounces of silver and one of gold to the ton——The St. George mine on Lee hill, Sunshine, is down over 100 feet, and in ore that is beyond the necessity of assays. The last tested went into the thousands.

EL PASO COUNTY.

Owners of a large tract of the sandstone belt near Trout creek recently visited their property. A test of several tons of the sandstone will be made at the Florence cyanide works. Tests have already been made at the Spence and Frisco mills.

A rich strike is reported to have been made at a depth of 30 feet in a town lot in the Hayden Placer addition to Cripple Creek. The vein is 5 feet wide, carrying gold, silver, copper and lead.

Victor *Record*: The applications of the Roxana G. M. Co. to patent a portion of the land from which the Isabella G. M. Co. is producing ore at Cripple Creek, have been denied in United States Land Office. The decision states that the "locations are invalid in both form and subject."

FREMONT COUNTY.

(Special Correspondence).—The Cripple Creek Beam M. Co. now have control of one of the cyanide mills at Florence and are making changes therein to adapt it to their method of reduction, and it is stated it will be made equal to 100 tons capacity per day.

Florence, March 10th, '99.

GILPIN COUNTY.

Mining Record: The old Stewart mine, five miles west of Black Hawk, on Stewart hill, will soon be operated. This property has been closed down since '74. The original owners were Boston capitalists, who are again in charge. Prof. E. C. Lindemann will put men at work.

Republican: One of the most promising of the new properties in Gilpin county is the Notaway. This property was taken three years ago by a Chicago company. The shaft is now down 400 feet.

Central City *Register-Call*: For the month ending Feb. 28th there were shipped 203 cars of ore, aggregating 3654 tons, which represented the shipments of smelting ore and concentrates to the Denver and other smelters during that month.——The Great North Downs M. Co. is sinking the shaft on the Moyle claim, on Swede hill, with air drills. J. V. Thompson of Black Hawk is Supt.——The Fisk mine employs sixty men, and the daily shipments now average sixty tons milling and smelting ore.

GUNNISON COUNTY.

Marble *Times*: The Copper Queen M. Co. has let a contract to extend the main tunnel, near Gothic, 200 feet, which will give it a total length of 500 feet.

HINSDALE COUNTY.

Record: A discovery of telluride ore has been made in the Clara L., in a porphyry dike 50 feet in width. It is said to be a continuous streak of petzite ore, varying from 2 to 6 inches in width.

LAKE COUNTY.

(Special Correspondence).—A force of 125 men is now employed on the Moyer Placers and Sierra Nevada groups of the Iron-Silver M. Co. at Leadville. The production runs from 400 to 600 tons per month of iron sulphide

ore, carrying values in gold, silver and lead, the smelters paying for the iron also.

Leadville, March 11th, '99.

A bad cave occurred in the Bon Air shaft, at Leadville, on the 9th inst., imprisoning two men. Within a few hours after the beginning of the cave, 520 bales of hay and straw were lowered into the shaft in the effort to stop further caving. Two-hour shifts were set at work to make connection with the Starr shaft to liberate the imprisoned men. Communication with the imprisoned miners was established by means of the water column pipe which was shattered at the proper point by letting dynamite down from the surface and firing it by electricity. Light and provisions were sent to the men. A shaft is being sunk parallel with the caved shaft. It is thought the men will be reached within a day or two.

Leadville *Miner*: Lessees of the Fanny Rawlins on Breece hill have opened a large amount of ore carrying gold and silver and 8% copper.

MESA COUNTY.

Grand Junction *Sentinel*: A $40,000 mining sale in the Unaweep country to Denver parties is reported. The properties are the Nancy Hanks, one of the early discoveries of that section last year, and which has been producing regularly since, the Jack Pot, Anna and Last Chance.

MINERAL COUNTY.

Several hundred pounds of powder exploded at the Commodore mine last week, killing four miners.

San Juan *Prospector*: The Nelson tunnel at Creede is in 1500 feet on the crosscut and 6000 feet on the vein.

RIO GRANDE COUNTY.

San Juan *Prospector*: The Golconda tunnel at Summitville is in nearly 100 feet. It has been found necessary to timber portions of the tunnel already passed. It has a grade of 4 inches in 100 feet.

IDAHO.

Eighteen miles northeast of Cuprum are the Carbonate Hill mines, in what is known as the Mountain View district. The veins are of good size and carry gold, with iron sulphides.

The Harvest M. Co. has been incorporated by E. T. Woolley, B. H. Goddard, B. P. Critchlow, R. A. Garner and J. D. Stratford of Ogden, Utah; D. J. Davis, J. P. Freeze, A. H. Woolley and L. S. Simmons of Salt Lake, Utah; H. S. Woolley of Paris, Idaho, and K. P. Plowman of Boise, Idaho. The property includes the Washington group of claims, in Gambrinus mining district, in Boise county.

The Gem mine will resume work within a short time. It has been closed since the summer of '97. The first work will be to pump out the mine, which will require some time, and a new hoist will be added. The Mammoth M. Co. is using the Gem mill. The Mammoth owns a millsite and water right just below Wallace, and the company contemplates building one there.

Grangeville *Free Press*: It is supposed that the extension of the Buffalo Hump has been discovered at Mallick district, on Salmon river. The ledge is 100 feet wide and shows up free gold. There are six claims located on the lead, which runs up from about four miles from the river and to within four miles of the Big Buffalo Hump group. The Grand Prize shows up best. It is here the free gold has been found.

Idaho *Statesman*: The following computation is made of the output of Cœur d'Alene mines for '98 by C. D. Porter: Bunker Hill & Sullivan, 26,400 tons; Helena-Frisco, 22,500; Morning M. Co., 16,280; Tiger-Poorman, 15,350; Standard, 13,460; Empire State of Idaho (Last Chance), 9650; Mammoth, 7000; Milwaukee, leasers (Gem), 850; Hecla, 300; Yankee (Blake Bros., Osburn), 100; Colwyn, 60; miscellaneous shipments, 500. Total, 112,500 tons.

De Lamar *Nugget*: A strike has been made on the fifth level in the mine at Flint, where the ledge has widened from a few inches to 2 feet of ruby ore, assays showing 500 to 600 ounces silver.

Toronto *Globe*: C. Sweeny of Spokane has already placed orders for $150,000 worth of machinery for the Big Buffalo mines.

MICHIGAN.

Rat Portage *Miner*: The report published of the gold vein discovered in 62-16, near Tower, met with ridicule and doubt; later developments prove that the strike is richer than the parties interested thought. Several pieces of rock from the vein recently assayed show an average of $26 to the ton.

MINNESOTA.

It is reported that copper has been found near the mouth of Knife river on the north shore of Lake Superior thirteen miles from Duluth.

MONTANA.

Neihart is to have a 100-ton concentrator.

The Granite mine, near Phillipsburg, is to be rehabilitated and the Bimetallic mill started.

Spokane *Chronicle*: A company has been organized in Spokane to work placer ground in McFarland gulch, near Missoula. The company owns two and one half miles of the bottom of McFarland gulch, which runs into Quartz creek, a tributary of the Missoula river. The gold found in the gulch is coarse, no precaution to save fine gold being necessary.

Clancy *Miner*: W. D. Ross, who has discovered a mine near the head of Lump gulch, will build a stamp mill the coming spring.

Helena *Independent*: The Belmont mine at Marysville, the first producer in that camp, is being successfully worked, the ores being treated by the cyanide process.

Spokesman-Review: The Leslie Copper M. Co. is preparing to work a group of ten claims on the Montana side of the Bitter Root divide. The claims have been held for years, during which time there has been several thousand dollars spent in development work. The company proposes to run a long tunnel which will cut veins in depth. The mouth of the tunnel will be less than a mile from the Northern Pacific track, which permits the laying of a spur direct to the tunnel site.

Butte *Intermountain*: The Butte copper mines are not increasing their output, notwithstanding the high price of copper.

NEVADA.

A rich strike is reported from the Magnolia mine at De Lamar.

The Grand Prize mine at Tuscarora is to be reopened.

The sulphur mine near Humboldt is in possession of a St. Louis firm, who intend to work the mine.

Virginia *Chronicle*: During the year '98 two mining companies in White Pine county filed reports of their net bullion product. One reported a cash balance of $4829 above the cost of production, the other 47 cents.

Winnemucca *Silver State*: The Pueblo mine on the State line between Nevada and Oregon, 115 miles from Winnemucca, is running steadily, about eighteen tons of ore being crushed daily. The rock is free milling quartz.

Virginia *Chronicle*: The directors of the Occidental M. Co. at a recent meeting decided to ask the Chollar and Potosi mining companies to resume work in the Zadig drift, which will connect the Brunswick lode with the Sutro tunnel. It is calculated that it will cost $10,000, to be divided up among the three companies, the Occidental people waiving any claim for the money already spent in running this drift. The distance is 2100 feet, of which the Occidental has already covered 1000.

Walker Lake *Bulletin*: L. E. Hanchett has purchased the Davis property in Fish Lake valley and will erect an electric power plant for mining and milling at the Silver Peak mines.

Mohave *Miner*: Forty tons of machinery await transportation to El Dorado canyon for a cyaniding plant to work tailings from the El Dorado canyon mill. The plant will handle fifty tons per day. E. G. Eckis and A. E. Vandercook will haul the Dodge pulverizer from the C. O. D. mine to the canyon. Mr. Vandercook has charge of the chemical department.

NEW MEXICO.

Several years ago Kingston was an active mining camp with a large silver output. The rich ore bodies near the surface were exhausted, the low-grade material being thrown on the dumps. Recently a revival of the industry has set in. A company purchased a number of mines and has completed a concentrating plant, which is at work on the low-grade ores. C. M. Harmon, the Mgr., is considering the advisability of putting in jigs to effect a concentration of coarser material, which also involves the addition of other concentrating machinery—trommels, etc.

The Albemarle Co. of Cochiti, promoted by J. A. Coram, is to enlarge the mill, which has a present capacity of 250 tons per day.

Silver City *Enterprise*: A. E. Dawson, Gen. Mgr. for the Santa Rita Copper & Iron Co., will start pumping from the Romero shaft next week; the machinery is upon the ground. T. Knucky will superintend the work. It is rumored that a syndicate will purchase the group of Santa Rita copper mines. The shaft is 500 feet in depth.

Bland *Herald*: The Cochiti M. Co. will put in an electric plant to generate power for the Albemarle mine.

OREGON.

Another rich strike is reported from the Bonanza mine, thirty miles west of Baker City.

Spokane *Miner*: The most valuable rock in the Bonanza, Baker City district, contains considerable tellurium. The mill process entailing too much loss, it is being shipped to the smelter.

Idaho *Statesman*: The Badger G. M. & M. Co., near Susanville, November last, bonded the Badger, McQuade, Hughes, King of the Hills, Steamboat, Great Eastern and Fraction claims. Since then the company has built a 10-stamp mill and shipped over 400 tons of ore, with average smelter returns of $150 per ton. They have also purchased the Sloane quartz claims, Bull of the Woods, Mocking Bird, Poor Man, Alta and Blue Jay. There is an 8 stamp mill in operation on this group. Four adjacent claims have been added to these.

Jacksonville *Times*: A number of claims have been located on a body of quartz near Merlin, Josephine county. The ore is said to assay from $10 to $80 per ton, and the belt is reported to be several miles long.

Baker City *Democrat*: The news of the crosscutting of a 4-foot vein of ore in the Ibex mine is received and samples of the ore showing gold are exhibited in the city. This property was recently sold to Eastern capitalists for $65,000. — At Elkhorn mountain the Standard Oil Co. have secured control of the Denny group and the Robbins-Elkhorn mine and a consolidation effected. A 7000-foot tunnel will be driven by Burleigh drills by the use of electrical power generated at the head of Pine creek.

It is thought the dredger will be at work near Huntington early in April.

Boise *Statesman*: Seven hundred feet of rails have been ordered for the Magnolia mine in Grant county, a property under bond to Seattle people.——The Pomeroy Dredging Co. is now working thirty-five men near Huntington and will employ fifteen or twenty more when running in full capacity, paying $3 per day; board $4 50 per week. Their boat is 134 feet long and 34 feet wide. They have four carloads of machinery. The company has bought ground all along Burnt river as far as Huntington.——The Connor Creek M. & M. Co. are about to reopen their mine. Timbers are being hauled in for retimbering. This mine is one of the oldest gold producers in Baker county. The 35-stamp mill will be started and will employ in mine and mill about fifty men.——The Huntington M. Co., whose placer mine is one mile below the quartz mine, will increase their force.——C. E. Gault, president of the Virtue consolidated mines, has paid $60,000 to W. Smith, Baker City, Or., for the Collateral mine, a claim near the Virtue, six miles east of Baker City. The Collateral was bonded for $75,000 due in July next, but the offer of cash payment accounts for the saving of $15,000. The company has been reorganized for $1,250,000 and the consolidated properties will be worked. The first step will be the pumping out of the old Virtue.

SOUTH DAKOTA.

The Deadwood-Terra mine and mill are again in full blast after an idleness of months since the fire in July.——A number of mines in Blacktail are ready to ship as soon as the roads permit.——Attention is being directed to the region of eruptive rocks above Central City.——The new mill at Gayville, built by the Baltimore & Deadwood M. Co., is now completed.

Five carloads of ore were shipped recently by McDonald Bros. to the D. & D smelter at Deadwood. The ore is high grade, running in the neighborhood of $35 per ton. This ore is taken from the old Cyanide ground, on which the McDonald Bros. have a lease.——May & Faust are increasing their force of miners at Garden City. The Garden City cyanide plant is closed down for the present, but will start up when the weather is settled.

UTAH.

The mines of the Niagara M. Co., at Bingham, are producing forty tons of ore daily.

Mgr. J. Long of the Mammoth and Breckenridge mines of Gold mountain, left Salt Lake recently to make preparations for erecting a mill near the mines.

Salt Lake *Tribune*: Work on the new smelting plant of the newly consolidated Bingham mines will be commenced at the earliest practicable moment. It will be the largest pyritic smelter in the world. J. W. Neill will have the management of the company's property.——A ton of auro-cyanide was received at Salt Lake last week from the cyanide plants, worth $50,000. Some of it ran up to $80 per pound.——The upraise which was begun at 200 feet in the Tesora, at Silver City, has reached the surface. The breaking down of ore commenced at once, and the marketing of it will begin soon.——Five carloads of elaterite will be shipped at once from the Raven Co.'s mines, near Price.——The Bingham tunnel is in 1250 feet in hard ground.——The retimbering of the shaft on the Blue Bird Extension at Diamond, Tintic district, has been completed, and sinking will commence at once from a depth of 120 feet.

Park *Record*: The Clarissa Gold & Copper Co., at Park City, will sink a 300-foot shaft as soon as supplies can be gotten on the ground. ——A good prospect has been struck in the Whitehead mine, northeast of the Ontario, by miners doing assessment work.

At the Queen of Sheba, at Ibapah, in the Deep Creek country, the mill recently burned by fire is being rebuilt.

Salt Lake *Tribune*: The Mercur mine has sent to Salt Lake 1310 pounds of gold dust from its cyanide plant, the value of which is estimated at nearly $25,000. This is the second consignment that has come from the enlarged plant. In a short time the management will take up the matter of starting the old pioneer plant upon the mill tailings.——The mines at Castle Gate employ 400 men in mine, tipple, coke ovens, etc. Some 1200 or 1300 tons of coal is extracted daily, of which about 1000 tons is shipped as commercial coal, while 250 sacks of crushed coal, including "slack," is run into the 104 ovens to produce over 100 tons of coke per day. This coke industry gives employment to about forty men the year round. All machinery used in operating the hoists, electric locomotive, etc., around the mine is generated in a power-house where one large engine sends out near 400 H. P. by means of four generators. The company intends putting in a modern engine and dynamo at once, which will more than double the present capacity of the plant, the two engines to run side by side. Steam is now generated in four boilers, to which three are to be added.——There are twenty-two men employed by the company at the elaterite mines in Indian canyon, and more are being added as fast as there is room to work. Teams are on the way to haul out the first shipment.

Tribune: Manganese has now made its appearance in the breast of the drifts of the Alliance mine at Park City and sensational changes are promised at any shift.

Tintic *Miner*: The Victoria M. Co., with a capital stock of 250,000 25-cent shares, has been formed to develop the Sullivan, Six-Shooter, Victoria and Victoria No. 2 claims, lying north of and in the strike of the ore bodies of the Grand Central. The principal place of business will be Provo; L. Holbrook, Pres.; J. R. Twelves, Sec. and Treas.

Salt Lake *Tribune*: The Daisy of West Dip has sent to the gold sampler a little over 200 pounds of gold dust, known to have been better than $60 a pound. The Daisy was the first on the West Dip to begin marketing auro-cyanides, although the building of its mill was antedated by the Cigale.

WASHINGTON.

Pres. Jim Hill of the Great Northern wants Spokane to build a smelter.

The North San Poil, south of Republic, in which the recent strike was made, is a 300-foot fraction between the San Poil and Ben Hur. A shaft is being sunk.

J. E. Rockfeller's mining interests at Everett and Monte Cristo have been reorganized. It is expected that a general resumption of work will begin at Monte Cristo and the smelter at Everett. The properties are now in the possession of Rockefeller, Hoyt, Gates, Carey and associates. The debts and obligations of the mine Pride of Monte Cristo amounted to $143,345; Monte Cristo, $98,947, and United Concentration Co., $169,344, a total of $421,637. Stockholders of the old companies are to pay an assessment of about $101.50 on each 1000 shares of the old stock and retain their interest in the new company.

Spokesman-Review: The owners of the Sunset claim, within a mile of Northport on the reservation, at a depth of 20 feet have a good showing of galena and copper. Sinking on the other side of the ledge and about 100 feet from the former shaft has commenced, in which there is a streak of ore 10 inches wide.

Everett *News*: Two new mines in Snohomish county will ship ore the coming summer. It is possible the Monte Cristo mines will resume their output, and the Penn Co. may be able to smelt some of its ore. The new mines are the Sunset and the Forty-five—the former in the Silver Creek and the latter in the Sultan district. The Sunset is a copper proposition.

Spokesman-Review: A galena strike has been made on the Bullion group near Flat creek, Colville reservation, in a 45-foot shaft. ——The McKinley, at Greenville, Colville reservation, carries a peculiar black ore which is reported to average $18 in gold and copper. The vein has just been crosscut in the lower tunnel.——The shaft on the Churchill is down 135 feet. A road has been completed to the mine.——The Mountain Lion mine, Republic, which is developed to a depth of 350 feet, claims to have ore averaging $35 per ton. A compressor plant is being put in.——E Spedden is taking out fine copper ore from the Single Standard, one and a half miles east of Chewelah. The ledge is 2½ feet wide on the surface.

Spokane *Miner*: Coal has been discovered in Whatcom county.

WYOMING.

Cheyenne *Tribune*: A copper strike is reported having been made on the level prairie on the east side of the Platte river, fifteen miles north of Grand Encampment. Several small test pits were sunk along the vein for a distance of over 2000 feet and copper ore found in each place.

The prairies of Wyoming are strewn with fragments of copper-stained quartz over hundreds of square miles.

FOREIGN.

AUSTRALIA.

According to the *North Queensland Herald* a sensational find of opals is reported from Winton, Queensland. Two Germans left their claim to two men named Shillington and Greenwood, who had only removed a few inches of earth when they struck a big opal band. This, when opened up, resulted in the unearthing of one of the largest blocks of opal ever discovered, and it is valued at between £7000 and £10,000.

BRITISH COLUMBIA.

According to local reports, the gold strike on Granite creek, near Alberni, on the west coast of Vancouver island, assays $6000 to the ton.

The Dorothy Morton, at Fanny bay, and the Athabasca, near Nelson, this week shipped four gold bricks valued at $17,000.

About seventy men are employed in the Queen Bess in the Slocan.

It is reported at Nakusp that the Silver Queen group, at Cariboo Creek, has been sold to an American syndicate for $200,000.

On the Jennie mine, near Fort Steele, a strike of 2 feet of clean copper ore was made last week. All ore shipments go to the Canadian Pacific smelter at Trail.

It is reported the British America Corporation will shortly commence work on the Watson group, near Elko, in East Kootenay.

Four carloads of ore from the St. Eugene mine, near Moyle, were shipped last week to the Trail smelter.

Libby *Mountain News*: February's shipments of ore from Slocan mines have brought the total shipments since January up to 6500 tons.——The Slocan Ore Purchasing Co. has been organized to build sampling works at Nelson.——Greenwood is the center of a district twenty miles square, in which are located a dozen camps, all showing considerable activity.——The Mines Development Co., which lately secured the Swansea, in the Windermere district, northeast of Golden, will spend $25,000 in development work.

Spokane *Chronicle*: Nearly 650 feet of work has been done on the Golden Crown, in Wellington camp, Boundary. Machinery is installed and a large amount of copper ore is on the dump——J. Dixon has bonded from F. Staubert the Silver Queen, on Great Northern mountain, in Lardeau, for $25,000.——E. C. Finch of Rossland has bonded for $80,000 the Mabel and Oro claims, in Central Camp, in Boundary, also, the Cornucopia, which adjoins them, for $10,000. The claims run high in copper.——Work has begun on the Main claim, in Summit camp, in the Boundary.——A contract has been let to sink a shaft 150 feet from the principal crosscut in the Iron Colt, at Rossland. The tunnel is now in about 1300 feet. The present workings are in ore all the way. When the contract is completed a depth of 520 feet will have been attained.

Spokane *Chronicle*: The Le Roi resumed shipments March 9th and by Saturday evening had sent 825 tons down to the Northport smelter. The machinery has all been repaired. It is expected that the ore output will average above 300 tons a day. The Le Roi will increase its working force as fast as the men can be used to advantage.

Ymir *Miner*: The Deer Trail, owned by F. Hazelwood of Northport, Wash., is working fourteen men and down 35 feet on the ledge and sinking. They have a 5-foot ledge with 2 feet of arsenical iron and copper pyrites carrying gold.—— The Singleheart, one mile northeast of the Relief, is owned by T. Kane. They are working one shift, running a drift on the vein.——The Relief continues to ship 120 tons per week, making it the heaviest shipper in the Kootenays outside of the Slocan or Rossland mines, the ore averaging $75 per

ton. It is learned that it is the company's intention to erect a concentrator in the near future. The mine is thirteen miles north of Erie, on the north fork of Salmon river.

Spokane *Chronicle*: The Waffet mine near Erie, B. C., is developed by a drift of 175 feet on the ledge. There are two crosscuts, one north 60 feet, 75 feet from the mouth of the tunnel, where a vein intersects, and one southerly to cut a parallel ledge and by winze sunk on the ledge 60 feet from the mouth of the tunnel, which is 50 feet deep. The ore carries values of $14 in gold and 6% in copper. In a crosscut from the bottom of the winze a body of ore has been found, the width of which has not been determined.——Arrangements are being made for the erection of a 400-ton smelter at Greenwood ——The company was organized and is headed by J. P. Graves.

CANADA.

The Regina mill, near Rat Portage, ran 242 hours in January and crushed 615 tons of ore. The yield of gold was 255 ounces, of which 225 came off the plates and 30 from the cyanide treatment. The shaft is now down 450 feet, and is to be continued On the 450-foot level a crosscut of the vein was made exposing 5 feet of quartz, some of which shows visible gold.

ONTARIO.

(Special Correspondence).—The Deloro mispickle is now being successfully treated at small expense. By free milling process 60% of the gold is saved; the concentrates are then treated by the "Sulman process" which extracts 90% of the remaining values, making a total ex raction of 96%. The tailings are roasted for arsenic. A 10-stamp mill is producing about $6000 gold per month. The Belmont mine with a 10-stamp mill is producing about $6000 per month from free-milling ore. Air compressors are being put in at each of these mines and thirty to forty stamps will be added. The "Central Ontario" mining region about 1000 miles east of Rainy river district will soon become a factor in the gold product of Canada.

Bellville, Ont., March 6th, '99.

MEXICO.

Juan Romero claims to have found a rich vein thirty-five miles east of Ensenada, Lower California, near the San Nicholas mine.

A letter recently received from the camp at Alamo, Lower California, the scene of a stampede in 1889, says that there are some very good prospects in that section, which only require development to make them producers.

Two Republics: The Corralitos M. Co. has increased the number of its employes at the Cinco de Mayo mine in the Escondida mountains. The new owners of the Dos Cabezas have added 150 miners to the force and other owners of mines in the Sierra Madre country will do likewise.

Nogales *Oasis*: Professor Dumble is experting the coal fields near Barranca. Development work is in progress. In one place a drift is run 100 feet in a coal bed 8 feet in thickness. —— Development has progressed upon the gold properties of W. S. Sturges in the Altar district, nine miles from the Gulf coast, and reduction machinery will be ordered at once.——An exploration and development company, to prospect and work mines in the Yaqui country, about La Dura, has been organized at Prietas.——The La Bufa mine near La Dura continues to improve. Last week a pack train took thirteen tons of ore into Prietas for shipment. The value of the lot was more than $4000. The property adjoining the La Bufa—the Apache, same owners—is also improving.

Industrial Notes.

—Reno, Nev., has disincorporated to reduce the tax levy.

—Japan proposes to put $9,000,000 into a Government foundry.

—This will be a great year for pumps and irrigating machinery in California.

—Drought and local stress have caused the failure of two banks at San Luis Obispo, Cal.

—Work has begun on the new sewer system of the City of Mexico, to be finished in four years.

—The San Francisco Building Trades Council favors the Pacific Ocean and International Exposition.

—A new drydock is to be built at Mare Island, Cal., large enough to accommodate the largest vessels.

—Proposals for bids for the Cedar River, Wash., water system construction are advertised for on page 298.

—A telegraph line is to be built this season by the Dominion Government between Lake Bennett and Dawson, N. W. T.

—Large docks, great machine shops and suitable naval station are to be established by the United States at Manila.

—Governor Gage has vetoed the California Assembly bill, allowing laborers in sawmills and logging camps an hour for lunch.

—The San Francisco telephone exchange heads the list in ratio to population of any city in the world, with 13,799 subscribers.

—Santa Fe trains will be running across the Tehachapi and into Stockton, Cal., by July 1st, '99, by a trackage arrangement with the S. P. Co.

—During '96-'97 Mexico exported more tobacco to Cuba than to all the rest of the world. It reached the United States as "Havana" cigars.

—The bill appropriating $500,000 in aid of the Pacific Ocean and International Exposition, to be held in San Francisco in 1901, passed the California Assembly last Monday.

—C. A. Bailey writes to *Modern Mexico* from Tejamen, Durango, Mexico: "I am the only American in this rich mining camp of over 3000 people. We ship over $4000 worth of silver every week. A railroad is to be built at once, seventy-five miles to Durango. There is a fine opportunity here for Americans with brains, with or without cash."

—Despite Speaker Reed's sidetracking of the measure in the last Congress, it is believed that the Nicaragua canal will be built, and that at the next session of Congress a preliminary appropriation will be made therefor.

—McMutrie & Stone of San Francisco have a contract to complete the California coast railroad to Santa Barbara by May 1, 1900. The northern terminal on the gap is Hueneme. About fifty miles will close the gap thence to Elwood.

—The electric power plant of the California Standard Electric Co. is reported ready for business between Mokelumne and Stockton, Cal., 42¾ miles. This line, as in the case of the Sequalmie Power Co. of Washington, uses aluminum wire.

—Various American capitalists have recently invested large sums of money in numerous Mexican industries. One of the most recent is known as "The Mexican Plantation Association," J. A. Markley, secretary. This company has purchased a large hacienda (ranch), comprising 6000 acres, in the southern part of the State of Chiapas, near the ruins of the ancient city of Palenque. It will be utilized for the cultivation of numerous plants, chiefly caucho, coffee, cacao and vanilla.

—Consul Kindrick, of Ciudad Juarez, Mexico, writes: "There is no article of common use so much required in the northern section of Mexico as the ordinary hand pump. The soil is arid and dry and free from surface springs and small streams. There is not sufficient annual rainfall to keep cisterns filled with drinking water, and almost the only source of fresh-water supply consists of wells sunk in the earth. The water is secured by hand pumps and windmills. They are necessary at every Mexican home, at all the mining camps, and on the cattle ranges. At the camps and on the ranges, windmills are used, and they are invariably of United States manufacture. There is a growing demand for windmills and hand pumps of the latest and most approved pattern. A windmill or pump is as essential to a home in northern Mexico as a cooking stove. In consideration of the fact that pumps are such an important factor in the economy of domestic establishlishments, the Mexican Government admits them free of duty.

Commercial Paragraphs.

Juan Cuyas is the representative in Mexico of the Ingersoll-Sargent Drill Co. of New York.

The Weigele Pipe Works of Denver, Colo., put in pipe lines and giants for seven hydraulic plants in Colorado in '98. They also built three Ludlum hydraulic elevators, with auxiliary sinking pumps.

The Colorado & Southern Railway, formerly the "Gulf Road," has issued an instructive pamphlet folder called "Hints to Prospectors," giving valuable data and general information on mining in Colorado.

Flint & Lomax of Denver, Colo., are completing a mine signal system. The bells and wires for shafts are so insulated as to protect them from water that so often wets everything in the shaft. A dynamo and motor, built on the same base, can be run by live steam, compressed air, water or electricity.

The Jeanesville Iron Works Co., Denver Branch, Denver, Colo., has just received a large stock of mine pumps, No. 5 and No. 9B, improved sinkers, duplex station pumps, outside packed plungers, 4 in. to 8 in. diameter plungers by 12-in. stroke; also stock of duplicate parts for repairs. They are preparing for the spring water.

B. W. Sweet, of Denver, Colo., is the patentee and builder of a stamp mill, amalgamator and concentrator, which separates the concentrates into two classes and removes the silica therefrom. A 10-stamp mill of this pattern is being erected by the Golden Queen M. Co. at Cochise, Arizona, to be run by a 28 H. P. gasoline engine.

J. E. Greenawalt and Wm. Robinson, of Denver, Colo., are patentees and promoters of an ore reduction process, electro-chemical in character, the active agent therein being chlorine. They have a fifty-ton per day mill in operation in Denver, are erecting one of similar size in the Magnolia district, Boulder county, that State, and have sold the right to the process in a mill being erected on the Golconda mine, near Sumpter, Oregon.

The Mine & Smelter Supply Co. of Denver, Colo., are building seven Argall 4-tube roasting furnaces, of fifty tons daily capacity each, for the Economic Gold Extraction Co. at Victor, Colo. They will also ship in a few days a 20x32 hoister to the Cripple Creek district for the Independence Town & Mining Co., whose properties are better known as the Hull City placers. They are also putting in Wilfley concentrating tables to handle the chlorination tailings of the reduction works of the National Gold Extraction Co. at Florence, Colo.

The Vulcan Iron Works, San Francisco, report that they are crowded with orders at the present time, of which the more important are as follows: Cross-compound Corliss engine, 17 in and 34 in. by 36 in., to go with a pumping outfit; refrigerating and ice-making plant, complete with cold storage rooms, for steamer "Australia" of the Oceanic S. S. Co. for the transportation of chilled meat from San Francisco to Honolulu; power transmitting machinery, shafting, hangers, etc., for Mare Island Navy Yard; cast-iron screw shoes, caps, etc., for steel piles and superstructure for Government wharves at Pago Pago; machinery and miscellaneous iron work for "Chandler" coal bunkers, San Francisco; iron stairs for Hall of Justice Buildings, San Francisco; miscellaneous stamp batteries, rock breakers and other mining machinery; pair kettles, 10 feet diameter, fitted with steam coils, for Mexico; structural iron work for Bishop Museum, Honolulu.

The Denver Engineering Works Co. have just finished an 80-stamp mill for the Liberty Bell G. M. Co. of Telluride, Colo. They have also shipped thirty electric hoists of 5 to 30 H. P. each for Cripple Creek district. They have recently shipped three boilers and six electric hoists for Old Mexico, which makes twenty such hoists they have sent to that country. The same company are building six sets 16x36 Denver crushing rolls for the Economic Gold Extraction Co. of Cripple Creek. They are also making water jackets for the Globe smelter of Denver, the Colorado of Pueblo and the Bimetallic of Leadville, Colo.

The Lead Smelters' Combine.

During the week was received an advance copy of the agreement between the creators of the combination that has attracted so much recent interest, and which is styled "The American Smelting & Refining Company." The document goes into the details of the deal, and is herewith presented in full. The contract reads:

Agreement, dated March 7th, 1899, between the subscribers, severally, of the one part, and the Moore & Schley and Lewisohn Brothers of New York City, partnerships, and Henry H. Rogers of the same place, jointly and severally, hereinafter called the managers, of the other part, witnesseth as follows:

Each subscriber hereby agrees to take and pay for, at the price and in the manner hereinafter stated, the number of shares written opposite his signature hereto, or such smaller number as the managers may allot, of the full paid preferred stock, and seven-tenths of the same number of shares of the full paid common stock, of a corporation to be organized, capitalized and vested with properties, substantially, as hereinafter stated.

The price is to be $1000 in cash for each 17 shares, that is to say, 10 shares of preferred and 7 shares of common, of such stock, and is to be paid to such Trust Company as the managers may select or substitute to act hereunder, hereinafter called the Trust Company, within five days after notice calling for such payment shall be delivered or mailed to such subscriber by the managers, or any one of them, or by the said Trust Company in their behalf. If stock certificates are not then ready for delivery, the Trust Company will issue and deliver negotiable receipts, redeemable in the stocks when issued, or by return within a specified reasonable time, if the plan should be abandoned, of all payments.

The corporation which it is proposed to form with the name "American Smelting and Refining Company," or a similar name, will have appropriate powers for mining, smelting, refining and dealing in all kinds of ores, and such other powers as may be deemed convenient, and will have an authorized capital of $65,000,000, divided into 650,000 shares, of the par value of $100 each; of which stock $32,500,000 in par value is to be preferred stock, entitled, in preference to the common, to cumulative dividends of 7% yearly, and on distribution of assets to payment of its par value and the amount of such cumulative dividends then unpaid, but to no other dividend or payment, and the remainder, $32,500,000, in par value, is to be common stock.

By the issue of $27,000,000 par value of its preferred stock, and an equal amount of its common stock, the corporation will acquire $7,500,000 in cash for working capital and for other corporate purposes, and the stocks or lands, plants, properties and good wills under contract of the hereinafter named concerns in the smelting and refining business, and such other like properties, if any, as the managers may desire and be able to include, to wit: United Smelting and Refining Company; Omaha & Grant Smelting Company; Pueblo Smelting and Refining Company; Colorado Smelting Company; Hanauer Smelting Works; Pennsylvania Lead Company; Pennsylvania Smelting Company; Globe Smelting and Refining Company; Bi-Metallic Smelting Company; Chicago & Aurora Smelting Company; Germania Lead Works (or in lieu thereof all the stock representing same); and also a majority of all the stock of the Consolidated Kansas City Smelting and Refining Company, provision being made for the acquisition of the remainder of such stock from the stock to be issued by the corporation as aforesaid.

It being understood as follows:

1. That the Omaha & Grant property will be taken subject to a mortgage securing 6% bonds for the principal sum of $1,333,000, payable March 1st, 1911; and that the Kansas City Smelting and Refining Company's property is subject to a mortgage securing 6% bonds for $1,000,000, maturing May 1st, 1900.

2. That, if the managers deem it necessary or advantageous, any of the said plants, properties or stocks may be omitted from the transfer and conveyance to the corporation, the consideration therefor in such case being correspondingly reduced, or the aforesaid cash payment for working capital and other corporate purposes being correspondingly increased; and also that other plants, properties or stocks of like character may be included in such transfer and conveyance, in which case the aforesaid consideration may be increased, if the corporation shall so agree.

3. That this agreement shall not bind any subscriber until the full amount of preferred stock which shall be issued as hereinbefore recited, and the accompanying amount of common stock, shall be taken on or before May 1st, 1899, hereunder or by other agreements of purchase, but in that event shall be fully obligatory upon all subscribers.

4. That the subscribers intend their agreements herein, subject as aforesaid, to be relied upon by the managers in carrying out the plans hereinbefore referred to, and in providing the stock agreed to be taken, and that any action in that direction on the part of the managers shall constitute an acceptance hereof without notice to the subscribers, but no obligation to carry out said plans is hereby imposed upon the managers, who shall not be liable under any of the provisions of this agreement or in or for any matter therewith connected, it being understood that if the plans aforesaid are not carried out the subscribers shall be entitled only to the return of their payments and to be discharged from all obligations hereunder.

5. That the managers, or any of them, may become subscribers hereto in the same manner, and with like effect, as other subscribers.

6. That nothing herein contained or otherwise shall constitute the subscribers partners or make any subscriber liable to contribute more than the amount of his subscription, and that this agreement shall bind and inure to the benefit of the parties hereto, their personal representatives and assigns.

7. That this agreement may be executed and signed in separate writings, with the same effect as though all signatures were on one.

Personal.

C. L. & H. F. Berry have returned to the Klondike.

R. R Hedley is Mgr. Hall mines smelter at Nelson, B. C.

Gill S. Peyton has returned to Salt Lake City, Utah, from Milford.

J. W. Evans has been appointed Mgr. Four Aces mine, at Tintic, Utah.

Jas. Cusin, Lead, South Dakota, is that State's new mining inspector.

Nicholas Treweek of Salt Lake City, Utah, has gone East on mining business.

Ben Stanley Revett of Breckenridge, Colo, has returned from Boston.

Chas. Brockington is now local manager of the Orleans mine, Grass Valley, Cal.

Ex Senator S. M. White has been appointed a regent of the California State University.

Ross E Browne is still in London, and will probably visit Mexico before returning to San Francisco.

Capt. Thos. Mein has returned to San Francisco from a visit to the grant, Mariposa Co, Cal.

J. T. McConnell, Mgr. of the Raven M. Co., has left Salt Lake City, Utah, for Chicago and New York.

L. S. McLure of San Diego, Cal., is at Neihart, Montana, looking at prospects in the Little Belt mountains.

H. A. Cohen, formerly Mgr. for Capt. De Lamar, will visit the Marguerite group of mines near Milford, Utah.

L. Cummings of San Francisco is at Selma, Or., putting in a MacArthur-Forrest cyanide plant for the Requa M. Co.

E. N. Lindsay of San Francisco is in Calaveras Co., Cal., looking after the affairs of the Petticoat mine at Railroad Flat.

J. B. Adams, who is interested in copper properties in Wyoming, has returned to Denver, Colo., from the Atlantic coast.

The late Prof. Cumming Sherry, Sr., is credited with having made the first discovery of copper in the Lake Superior region.

Jas. W. Abbott, a California mining engineer for some time sojourning at Grant's Pass, Or., has gone to Lake City, Colo.

Frank S. Robbins, formerly with the Elkhorn Con. Co., Ltd., of Leadville, Colo., is now with the Brooklyn mine, Phœnix, B. C.

J. Harrowen of the Risdon Iron Works, San Francisco, Cal., is at Virginia City, Nev., in connection with the pumping work in the C. & C. shaft.

T. A. Rickard of Denver, State Geologist of Colorado, has been appointed consulting engineer of the Anchor-Moon property at Cripple Creek, Colo.

Hennen Jennings has returned to San Francisco, Cal., after an inspection of the mining properties on the Mariposa estate, Mariposa Co., Cal.

W. T. Little, of Prescott, Arizona, is in San Francisco buying machinery to replace that recently destroyed by the fire at the mine at Big Bug, Arizona.

R. J. Cory of the E. P. Allis Co. of Milwaukee is at Salt Lake City, Utah, in the interest of his company, which is equipping the Highland Boy with machinery.

M. S. Clarke, formerly Supt. Golden Province Co., Quesnelle, B. C., says that the Cariboo country will have a busy summer, and several new dredges will be built.

W. C. Ralston has returned to San Francisco from New York City. He is credited with intention to put a 100-stamp mill on the Melones mine in Calaveras Co., Cal.

Geo. Mitchell, formerly Supt. United Verde mine, at Jerome, Ariz., will go to Sonora, Mexico, to develop mines forty miles south of the international boundary.

Jno. Q. McDonald has just completed an 80-ton cyanide plant for the Rose mine near Victor, Cal., and left this week to take charge of a cyanide plant at Florence, Colorado.

W. L. Brown is in San Francisco from Crescent City, Cal., to get new machinery for his black sand deposit at the former place, with a view to saving the platinum as well as the gold.

Capt. Thos Couch of Montana and California is in San Francisco. Of big copper properties he says Calumet & Hecla has ore enough in sight at the present output rate to last thirty years.

L. Bauer, a Freiburg mining engineer, is in San Francisco en route to Corea to report on some proposed German mining investments therein. He contemplates two weeks observation of California mining methods.

Geo. E Truax, the Denver, Colo., ore car manufacturer, arrived in San Francisco from that city this week. John T. Plummer is in charge of the Denver branch of the Truax Ore Car Mfg. Co. Mr. Truax will make his home in California.

W J. Adams left yesterday, the 17th, for Alaska, where he will superintend the operations of the Latuya Bay Gold Placer Co., about 200 miles north of Juneau, about half way between that point and Yakitat. He returns next October.

On his 76th birthday was sent to Professor Jos. Le Conte of the University of California several large nuggets of South African gold from seven old graduates of the University, now prominent in gold mining in the Transvaal, viz., Webb, Hoefer, Garthwaite, Robertson, Samson, Hay, Roberts.

W. H. Blaisdell, of Yuma, Arizona, contemplates pumping water from the Colorado river to the King of Arizona mine, a distance of forty miles. Mr. Blaisdell supplied the old Paymaster mine in San Diego county, near Glamis, with water from the Colorado, a distance of seventeen miles, and more recently the Cargo Muchacho mine was similarly supplied, a distance of twelve miles.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING MARCH 7, 1899.

620,821.—HOSE COUPLING—Abbey & Phillps. Redlands, Cal.

620,731 —SEPARATOR AND CLEANER—D. Best, San Leandro, Cal.

620,732.—HARVESTER FINGERBAR—D. Best, San Leandro, Cal.

620,637 —WRAPPING MACHINE—H. Bohls. S. F.

620,735.—TRACTION ENGINE—G. Cashmore, Oakland, Cal.

620,696.—CONTINUOUS RAIL—E. V. Chamberlin, San Diego Cal.

620 739.—CABLE SPLICE—P. T. Cristensen, S. F.

620,699.—VOTING MACHINE—H. A. Clifford, S. F.

620,761 —DOOR CHECK—H H. Fassett, S F.

620,767.—VOTING MACHINE—J. A. Gray, Adin, Cal

620,707.—LOCOMOTIVE ASHPAN—T. W. Heintzelman, Sacramento, Cal.

620 709.—GRATE—E C. Horst, S. F.

620 653 —CAN-HEADING MACHINE—R. D. Hume, Gold Beach, Or.

620 873 —GLOVE STRETCHER—L. Isaacs, Los Angeles, Cal

620,657.—WRENCH—J. G. Kernek, Stockton, Cal.

620 849.—HOE—C. E. Long, Pomeroy, Wash.

620,795.—FRUIT DRIER—W. Mitcham, Oakville, Or.

620,798.—FAUCET BUSHING, ETC. — R. Piotrowski, S. F.

620,801.—GRAVITY HOIST — A. C. Pratt, Carson, Nev.

620,814.—SHAFT COUPLING—C. Warren, Wolf, Cal

620,624.—MEASURING TOOL—C. R. Weymouth, Alameda, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

INTERCHANGEABLE COAL AND GAS GRATES.—E. C. Horst, San Francisco, Cal. No. 620,709. Dated March 7, 1899. This invention relates to an interchangeable apparatus which is designed for use in connection with fireplaces and grates, and the object is to enable the user to employ a device for burning gas when it is desired to use but little fire and in moderate weather, or to move this device entirely out of the way and expose the ordinary grate for wood or coal which may be used for a larger fire. The grate comprises the usual basket for coal or other similar fuel and in connection with this is the device for burning gas, such as a gas log or the deflector, with means for placing it in position for use, or removing it, and a counterbalance, together with extensible, telescopic or connecting pipes by which the gas is brought to the distributer when in use. When not in use the distributer is moved upwardly into a chamber or receptacle where it is entirely concealed and out of the way and the grate for burning the ordinary fuel is exposed. By also making the support for the pulleys of the counterweights movable, it is easy to withdraw the whole apparatus downward from its concealing chamber for any inspection or repairs necessary.

VOTING MACHINE.—Joseph A. Gray, Adin, Cal. No. 620,767. Dated March 7, 1899. This invention relates to a machine which is especially designed to enable the voter to indicate the candidate or candidates for whom he desires to vote upon a ticket having the names of the candidates imprinted thereon, and at the same time to register his vote or votes by means of an apparatus which marks the ticket and at the same time registers the vote. The operation of the mechanism is carried out by means of a push bar having a head projecting through the front, a tablet for the reception of the name of the candidate, a punch carried by the push bar and a pawl and ratchet registering mechanism actuated by the movement of the push bar and advanced one number by each advance of the bar. In the operation of voting the voter first stamps or marks his vote by means of these push-bar devices, of which there is one for each candidate, and the operation of marking also registers a vote for that particular candidate. When the ticket has thus been fully prepared, it is folded and deposited in the ballot-box in the usual manner; and as each ticket has been punched, it has necessarily added one vote upon the register to those recorded for the particular candidates. The apparatus thus forms a mechanical check for the tickets, while the ticket is a check upon the register.

HARVESTER, GRAIN SEPARATOR AND CLEANER ATTACHMENT. — Daniel Best. San Leandro, Cal. No. 620,731. Dated March 7, 1899. This invention relates to improvements in grain separating and cleaning machines especially designed to be applied to separators and cleaners which form a part of combined harvesters such as were adapted to travel over the field, cut and thrash the straw, separate the grain and afterwards clean separated grain and place it in sacks. It consists essentially of an endless traveling open slat belt, drums over which the upper part of the belt passes in a plurality of inclined sections, the intermediate portions forming approximately vertical connections between the upper end of each inclined portion and the lower portion of the following one. Pickers are stationed above the inclined sections of the belt and rotatable in opposite directions so as to loosen up and separate the straw and forcibly deliver it upon the inclined sections. A blast apparatus is fitted to discharge through the belt and an inclined floor beneath each section prevents the straw from passing through and becoming entangled with the belt. An inclined return board extends beneath the entire lower portion. A longitudinally oscillating shoe is adapted to receive the grain, including separate screens at each end and an intermediate close floor with oppositely inclined return boards beneath the ends of the shoe, with separate conveyors to receive the grain from the boards and a blast apparatus for each person.

SPLICE FOR OLD WIRE CABLES.—P. T. Christensen, San Francisco, Cal., assignor to the Washburn & Moen Mfg. Co. of Worcester, Mass. No. 620,739. Dated March 7, 1899. The object of this invention is to provide a splice which can be employed for repairing old and worn-out cables, but it is not suitable for uniting new cables nor is there any splice employed for uniting new cables which is suitable for this work. The splice consists of the opposing sections of the cable abutting together, each having projecting strands of different lengths and composed of a plurality of wires untwisted and divided into groups, the groups of each section of rope or cable alternately laid upon each other from opposite directions and occupying the grooves or channels previously occupied by the undivided strands and having their ends tucked under the strands and secured.

FAUCET BUSHING AND STOPPER.—R. Piotrowski, San Francisco, Cal. No. 620,798. Dated March 7, 1899. This invention comprises a permanent bushing fixed in the draw-off opening of a cask or other receptacle for beer or other effervescent liquid, a cage projecting into the cask from the inner end of the bushing and a closing stopper movable within the cage adapted to close the inner end of the bushing by the pressure from the inside. When it is to be opened, it is forced inwardly by suitable operating means, the stopper being pushed into the cage which allows a free passage for the liquid. The shape of the interior wall of the bushing is such that when the stopper is drawn forward it forms a perfectly tight joint therewith; when pushed back it fits snugly within the cage and is thus held in place and prevented from again moving forward to stop the opening. A loop or ring upon the outer end of the stopper may be engaged by a hook or suitable implement to either force the stopper back or draw it forward to close the bushing. The stopper can be pulled forward into the bushing when the interior of the cask is to be pitched, as it is termed, and the pitch flowing over the inner end of the stopper is prevented from entering and clogging the bushing. When the stopper is forced backward into the cage it breaks the pitch which is brittle and thus leaves a clear passage for the liquid when the faucet has been introduced.

HARVESTER GUARD FINGER BAR.—Daniel Best, San Leandro, Cal. No. 620,732. Dated March 7, 1899. The object of this invention is to provide for the making of the guards and fingers through which the reciprocating sickle moves in cutting the grain, in independent sets or sections, and in so constructing the guard as to prevent a loss of grain over the front when the machine is depressed at an angle to cut low grain. It comprises a plate secured to the upper surface of the bar or support at the front of the machine having integral fingers projecting horizontally in the plane of and from the front edge of said plate, said fingers provided with grooves or channels for the cutter sections and cutter bar having an upwardly projecting rib along the front edge with a lip projecting forward of the rib to overhang the cutter bar.

A Suggestion From Colorado.

TO THE EDITOR:—We note in your issue of March 4th, under "Concentrates," the following:

A question of some importance in California is how may the large piles of roasting sulphides (tailings of chlorination works), containing values in gold of $5 per ton and upward, be successfully treated at a profit?

The various chlorination mills operating in and around the Cripple Creek district, in this State, are daily handling about 500 tons of ore, the tailings of which are being concentrated by means of the Wilfley concentrating tables and are being made, commercially, a success, although the tailings, as delivered to the concentrators, contain from $1.10 to $1.40 per ton. Not knowing the exact conditions surrounding the tailings in California, we do not know if the same treatment can be applied, but simply offer you the above as a suggestion.

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"*Pumping and Hydraulic Machinery.*" W. T. Garratt & Co., a quarto, 106 pages, elaborate and complete; illustrated description of pumps and water-supplying devices for every requirement, of present interest to many; hand and power pumps, hydraulic rams, centrifugal pumps, and, in general, everything applying to the practical supplying of water; finely illustrated and described in detail. The book is unusually handsome throughout and of timely value. A copy will be sent to any address on request by W. T. Garratt & Co., Fremont & Natoma Sts., San Francisco, Cal.

Books Received.

"*Examination of Water (Chemical and Bacteriological),*" 12mo., pp. 1351. W. P. Mason. From a sanitary and analytical standpoint; with numerous tests, formulæ and examples. Jno. Wiley & Sons, N. Y., $1.25.

NOTICE TO CONTRACTORS.

NOTICE TO CONTRACTORS.—Sealed proposals will be received on or before one (1) o'clock P. M., April 12th, 1899, for the construction and completion of certain additions to the existing water works owned and controlled by the City of Seattle, Washington. The said additions include a gravity water supply from Cedar river, reservoirs and portions of an auxiliary high service system in the city. The contract will be let in four (4) separate subdivisions, and will embrace the following general terms of construction:

In Subdivision One (1):

Head works on Cedar river, consisting of Diverting Weir, Intake Canal (400 feet long), Settling Basin, Gate House, Dwelling House and Stable.

Pressure Pipe from Head works to High Service Reservoir in City Park, said pipe being 42 inches in diameter and 28.4 miles in length; of which 6.4 miles are to be riveted steel and 22 miles to be wooden stave pipe banded with steel bands ⅝ inch in diameter; wooden stave and steel pipe between High and Low Service Reservoirs, 30 inches in diameter, about one mile in length.

Wooden Stave Pipe 24 and 30 inches in diameter respectively, about 4400 lineal feet, as waste pipe from High Service Reservoir to Lake Union.

Change of Cedar River channel, 65,000 cubic yards excavation.

Improvements at Swan Lake, consisting of clearing land, construction of dam at outlet, Intake and pipe connection with said Lake.

In Subdivision Two (2):

High Service Reservoir and Gate House in City Park (capacity of said reservoir being about 16 million gallons); Low Service Reservoir with Gate House and Pumping Plant in Nagle Addition (capacity of reservoir about 20 millions gallons; capacity of pumping plant 3 millions gallons in 24 hours).

In Subdivision Three (3):

Stand Pipe on Queen Anne Hill, 30 feet diameter by 60 feet high, incased in "Ransome Concrete."

Force main from Low Service Reservoir to Stand Pipe on Queen Anne Hill, also to Renton Hill said mains consisting of 13,200 lineal feet of 12-inch and 2690 lineal feet of 16-inch Kalamein pipe.

In Subdivision Four (4):

Pipe line from the Low Service Reservoir to the present distributing system, consisting of 3580 lineal feet 30-inch riveted steel and 1240 lineal feet 30 inch cast iron pipe, also 250 lineal feet 24 inch riveted steel pipe, for connecting said reservoir with Tenth Avenue Sewer.

Separate bids will be received and separate contracts will be let for each of said subdivisions. The work will be let to the lowest bidders therefor. The total cost of said work is limited to $1 250,00. The contract to be entered into will provide that payment shall be made for this work only by warrants upon the "Cedar River Water Supply Fund of Seattle," as created and established by Ordinance No. 3990 as amended by Ordinance No 5258, and the contractor shall have no claim against the city except as therein provided. Said ordinance provides that such warrants shall have interest coupons attached, and shall bear interest at the rate of five (5) per cent per annum, payable semi-annually on the first days of January and July of each year; and the city of Seattle absolutely and irrevocably pledges, out of the revenues from its water works system now owned, or which may hereafter be owned, operated or controlled by it, a sum not less than one hundred thousand ($100,000) per annum, to pay the principal and interest of said warrants as aforesaid, when the same shall become due.

In addition to the warrants which will be issued in payment for the construction of said additions, the contractor will also be required to purchase at par any and all warrants which shall be drawn on said fund by the city in such amounts as shall be required to pay for any real estate, rights, easements or privileges necessary for the prosecution of the work of construction and the perpetual control by said city of the additions to the water works herein specified, whether obtained by purchase, agreement or condemnation proceedings, and also such warrants as shall be drawn upon said fund by the city in payment of engineering and other expenses necessarily incurred in connection with said additions; provided, that the total amount of the warrants thus required to be purchased by the contractor shall in no case exceed the sum of sixty thousand ($60,000) dollars, and shall be distributed as follows, to wit:

Against subdivision No. 1, the sum of forty-five thousand ($45,000) dollars; against subdivision No. 2, twelve thousand ($12,000) dollars; against subdivision No. 3, two thousand ($2,000) dollars; against subdivision No. 4, one thousand ($1,000) dollars.

Each bid must be accompanied by a certified check, payable to the order of the City Comptroller, for a sum not less than five (5) per cent of the amount of the bid, and no bid will be considered unless accompanied by such check.

The successful bidder will be required to enter into a contract and furnish satisfactory bond for the amount required by the City Charter and the laws of the State of Washington, within ten days after being notified of the award of the contract to him; failing so to do, the said check and the amount thereof shall be forfeited to the city. No person is eligible as a bidder who has within two years prior to the letting of said contract made default in payment of any just claim for any work or labor performed, or any skill or material furnished pursuant to any such contract as herein advertised, or who within said two years failed to complete any such contracts.

Special attention is called to article xxiii. of the City Charter, as now in force, relating to "hours of labor."

All bids must be made in accordance and compliance with the plans and specifications now on file in the office of the Secretary of the Board of Public Works, and in compliance with Ordinance No. 3990 as amended by Ordinance No. 5258.

The City of Seattle reserves the right to reject any and all bids.

Proposals must be endorsed on envelope "Bid for Constructing Subdivision No. —— of Certain Additions to the Water Works of the City of Seattle"

By order of the Board of Public Works.

FRANK OLESON, Secretary.

Date of first publication March 11th, 1899.

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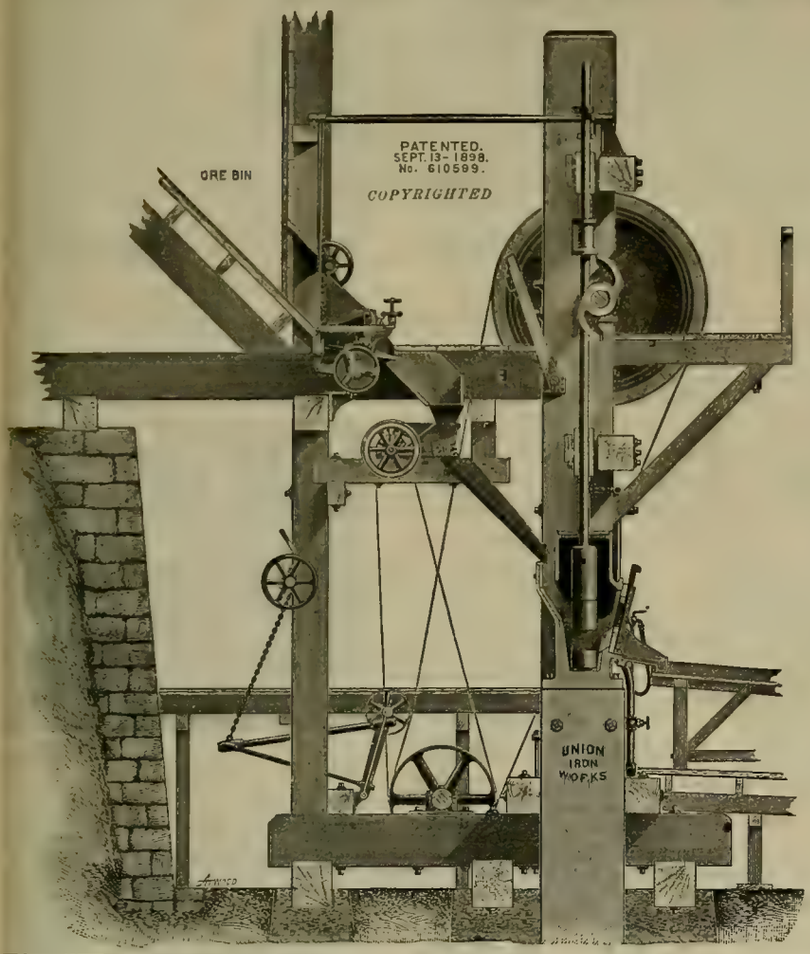

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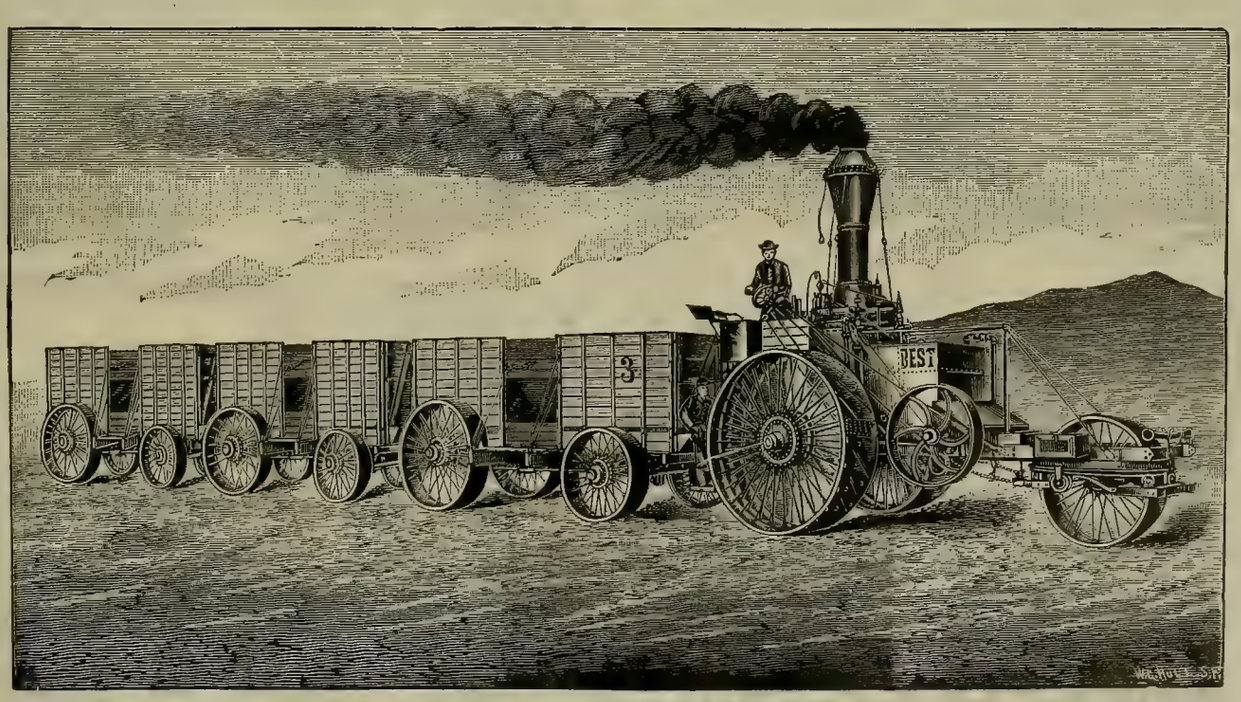

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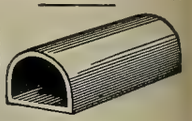

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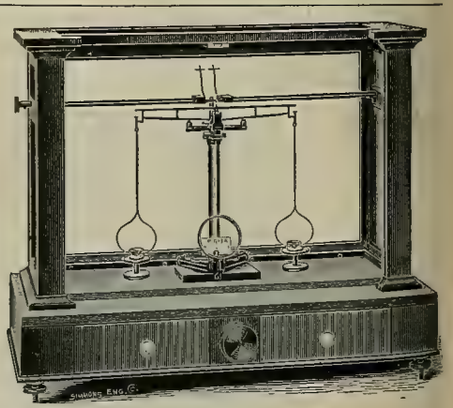

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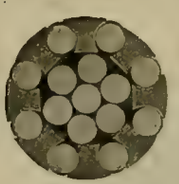

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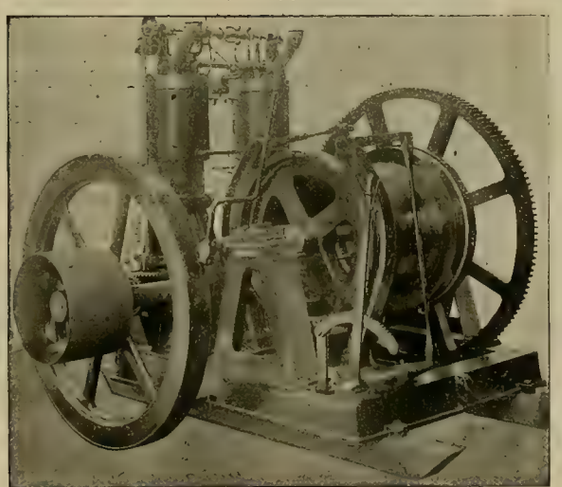

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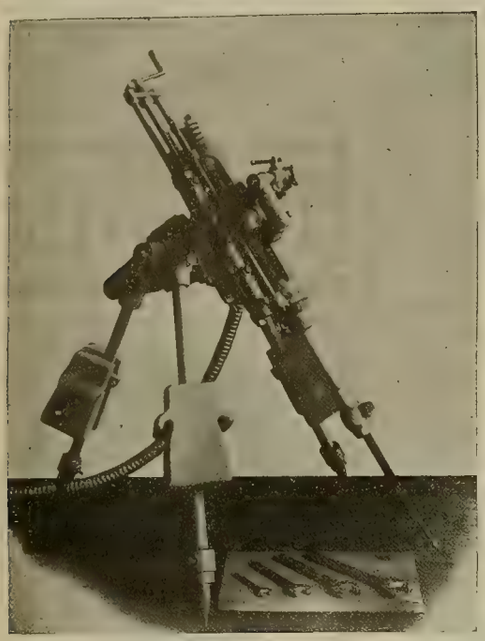

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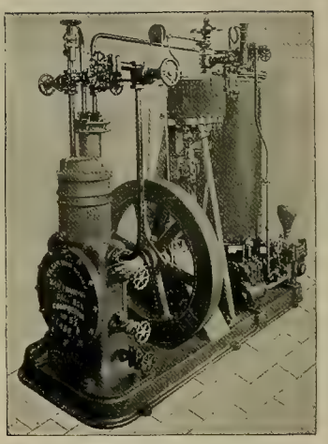

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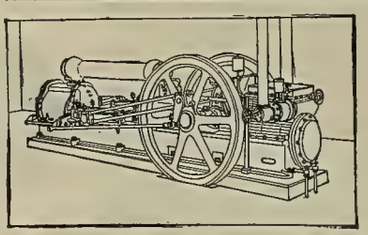

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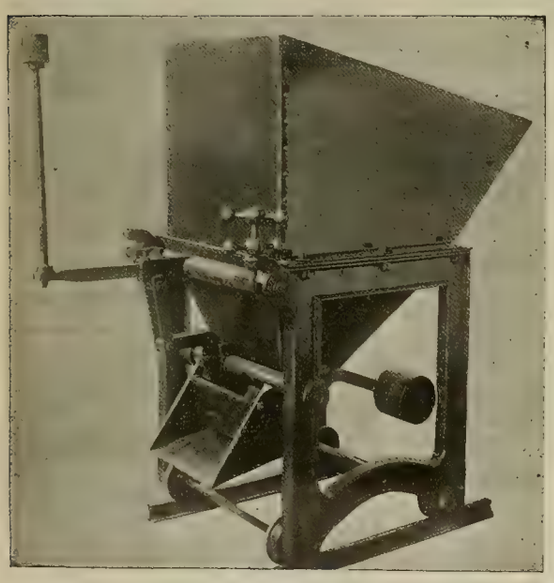

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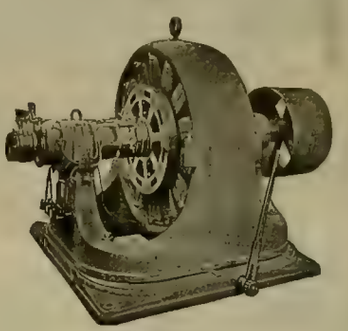

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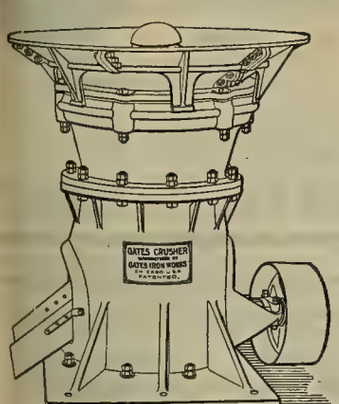

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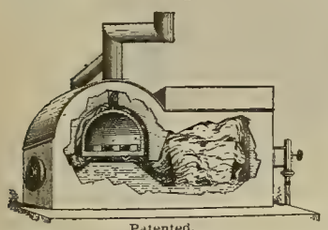

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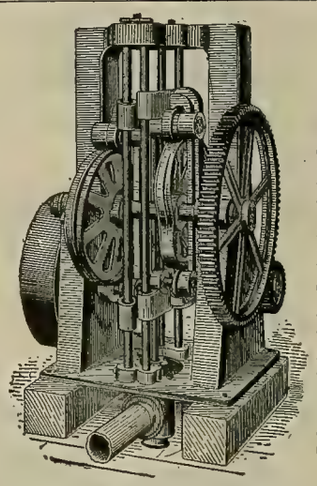

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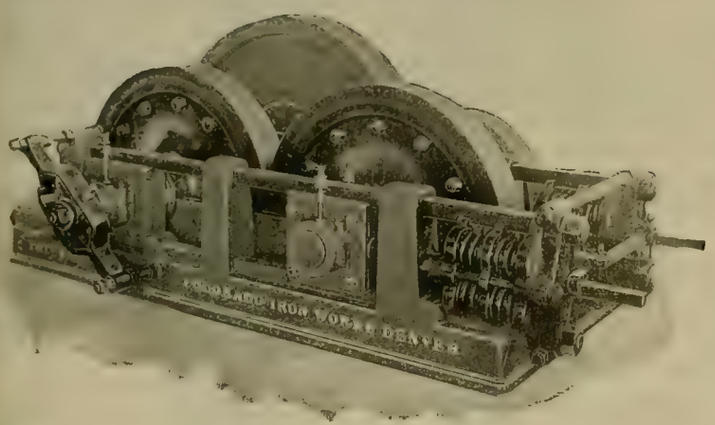

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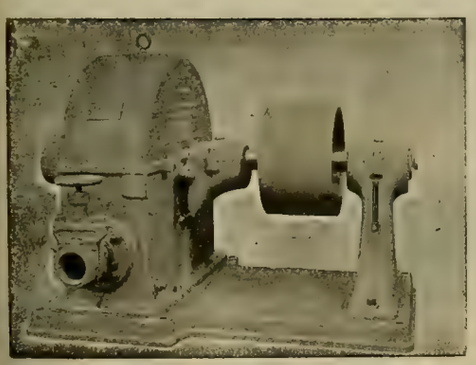

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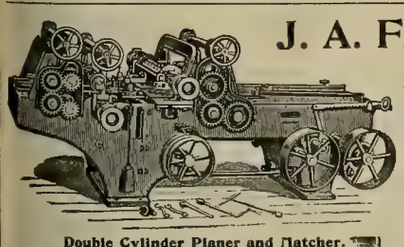

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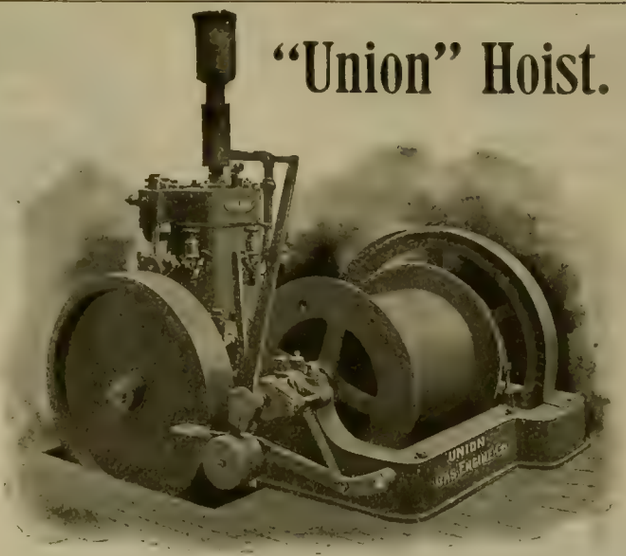

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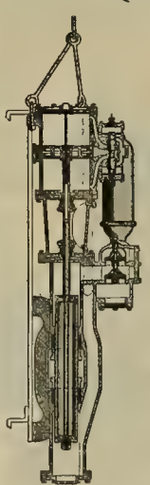

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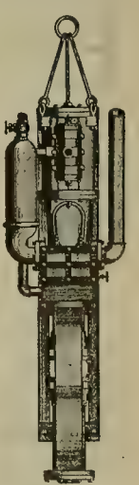

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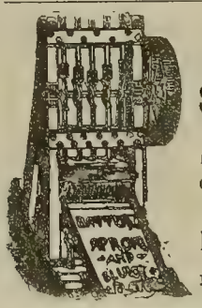

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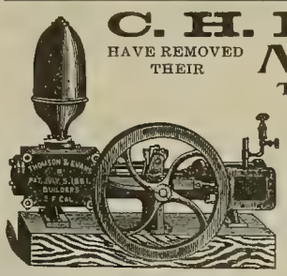

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Promptly, and at Reasonable Prices, and will continue the manufacture of
Thomson & Evans Steam Pumps,
Deep Well Pumps, Power Pumps, Etc.,
Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

FRANCIS SMITH & CO.,
—MANUFACTURERS OF—
SHEET IRON & STEEL PIPE
FOR TOWN WATER WORKS.
Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.
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Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

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THE TRUAX PATENT IMPROVED
AUTOMATIC ORE CARS,
— Made by —
THE TRUAX MFG. CO.,
114 FIRST STREET.....SAN FRANCISCO, CAL.
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Patented: Jan. 5, 1892. Aug. 27, 1895. July 19, 1898
In Canada: June 21, 1898.

Dewey, Strong & Co., Patent Agents,
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Inventors on the Pacific Coast will find it greatly to their advantage to consult this old experienced first-class agency. We have able and trustworthy associates and agents in Washington and the capital cities of the principal nations of the world. In connection with our scientific and Patent Law Library, and record of original cases in our office, we have other advantages far beyond those which can be offered home inventors by other agencies. The information accumulated through long and careful practice before the Office, and the frequent examination of patents already granted, for the purpose of determining the patentability of inventions brought before us, enables us to give advice which will save inventors the expense of applying for patents upon inventions which are not new. Circulars and advice sent free on receipt of postage. Address DEWEY, STRONG & CO., Patent Agents, 330 Market St., San Francisco, Cal.

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Just the thing for muddy water.

Hardly ever needs repacking.

Send for our new catalogue, entirely about pumps.

W. T. GARRATT & CO.

Cor. Fremont and Natoma Sts.

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Powell's Signal Oiler.

LEVER UP, Oil Dropping;
LEVER DOWN, Oil Shut Off.

Doesn't interfere with the adjustment.
Most perfect Oiler in the world.
Haven't you need for such an Oiler?

In stock by all Jobbing Supply Houses.

Manufactured only by
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Supported by the State of Michigan. Practical work. Elective system. Special advantages for men of age and experience. For catalogues address
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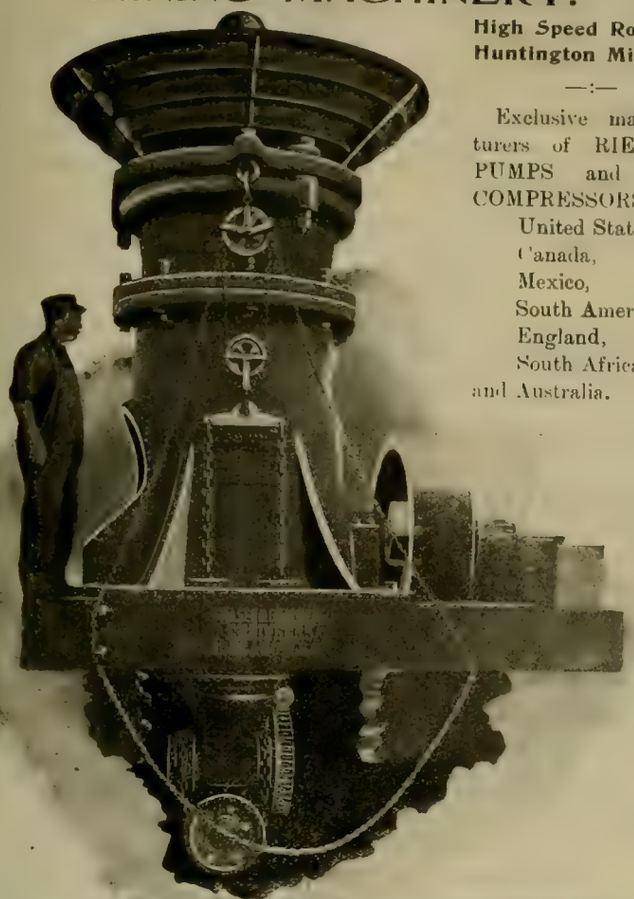
43 Threadneedle St., E. C., London, Eng

MINING MACHINERY.



High Speed Rolls, Huntington Mills

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Exclusive manufacturers of RIEDLER PUMPS and AIR COMPRESSORS for United States, Canada, Mexico, South America, England, South Africa, and Australia.

The Above Picture Shows Our IMPROVED ADJUSTABLE COMET CRUSHER.
We Invite Correspondence on Any Mining Plant.

FRASER & CHALMERS, General Agents for GREEN BLOWERS.

3

JONES HAND POWER ROCK DRILL.

The ONLY SUCCESSFUL and Practical Hand Drill Ever Offered.

THE EDWARD P. ALLIS CO.

DESCRIPTIVE CATALOGUE SENT ON APPLICATION.

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PATENT CENTRIFUGAL, TABER ROTARY, COLUMBUS STEAM } Pumps.
Highest Efficiency, Simplicity and Durability.
Petterson Current Motor for streams not less than 8-mile current. Horse Powers, Portable Wood Saws. Some second-hand Pumps and Gas Engines, Steam Engines and Boilers for sale cheap.
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For Mills and Factories.
Will not burn like shingles, nor be eaten out like iron by fumes, gases or vapors. Cheap. Durable.
PACIFIC REFINING & ROOFING CO.
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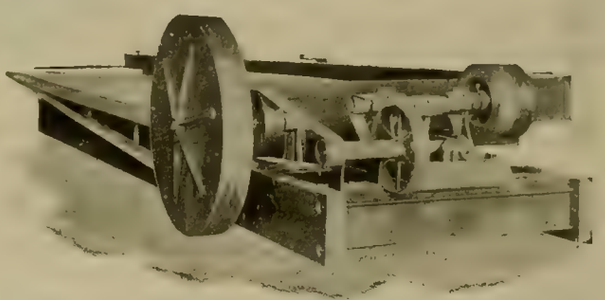
OFFICE, 306 PINE STREET, - - SAN FRANCISCO, CAL.

Sole Pacific Coast Agents and Builders of the Celebrated

WILFLEY CONCENTRATOR.



The Wilfley Table is fully covered by U. S. patents Nos 580,338 and 590,675
Infringements will be prosecuted to the full extent of the law.

PRICE, $450, F. O. B., San Francisco.

One of these machines will take the place of two or three belt concentrators of any style and do very much better work.

We furnish superior Machinery and erect Stamp Mills, Hoisting and Pumping Works operated by Steam or Water Motors. Complete Concentrating and Smelting Plants for the concentration and recovery of gold, silver, copper and lead. Improved Power Drills and Air Compressors, Wire Rope Tramways, etc.

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These Machines are Kept in Stock Ready for Immediate Shipment.

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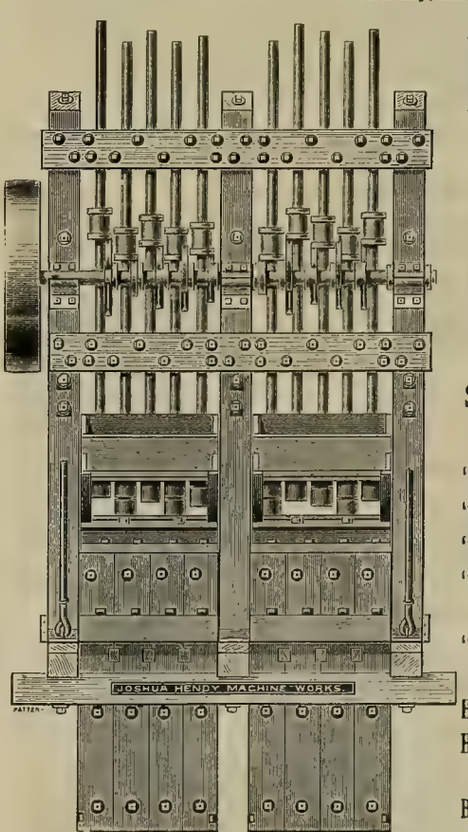
Office and Salesroom.....38 to 44 Fremont Street.
Works.....Cors. Bay, Kearny and Francisco Streets.



10-STAMP BATTERY.

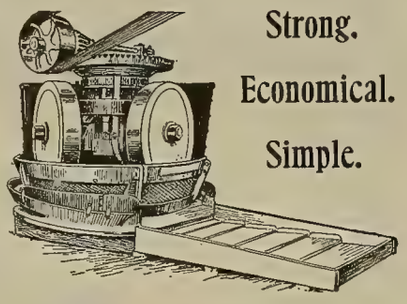
MINING AND MILLING MACHINERY.

Stamp Mills;

"Hercules" Ore Crushers;
"Challenge" Ore Feeders;
"Triumph" Ore Concentrators;
"Hendy-Norbom" Ore Concentrators;
"Triple Discharge" Two Stamp Mills;
Hydraulic Mining Machinery;
Hoisting, Pumping and Irrigating Plants;
Boilers, Engines and Pumps;
Tangential Impact Water Wheels.

THE BRYAN ROLLER QUARTZ MILL.

We are the sole manufacturers of this Mill. A test made by the Bullion-Beck Co. of Eureka, Utah, with this and the Huntington Mill proved conclusively every claim we made for the Bryan Mill, viz: that the Bryan would crush more ore with less repairs, less power and less slimes than any Mill made. Result—they are now operating three of the five-foot Bryan Mills and find them superior and more satisfactory than any Mill they ever used. L. C. Trent & Co., who had formerly sold the Huntington Mill, immediately manufactured a Mill infringing our patent. Suit brought in the U. S. Court resulted in a verdict in our favor, and we shall prosecute to the full extent of the law any infringement of any character whatsoever in the MAKING, USING or SELLING of the same. : : : : : : : : : : : :



Strong.
Economical.
Simple.

MANUFACTURED BY

The BRYAN MILL is constructed on the principle of the Chili Mill, except it has three rollers arranged to run in a continuous discharging pan. It crushes either gold or silver ores. It consists of an annular cast-iron mortar with fixed steel dies arranged in the path of its three crushing rollers. Power is applied direct from a pulley through a bevel gear and pinion secured to stationary center post. We present a few of many advantages it possesses over any other Mill: Larger screen capacity and free discharge. Amalgamates a larger percentage of gold. Quickly and cheaply erected; with regular feed and proper flow of water requires little attention. Crushes hard or soft ore with smaller amount of power per ton and less wear and tear of machinery. : : : :

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THE RISDON IRON WORKS, Beale and Howard Sts. SAN FRANCISCO, CAL., U. S. A.

CHAS. C. MOORE & CO.,

ENGINEERS AND DEALERS IN

BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES, HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES, GREEN'S ECONOMIZERS, WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS, HOPPES LIVE STEAM PURIFIERS, EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS, SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS, GOUBERT FEED WATER HEATERS, ATRSTTON STEAM SEPARATORS, SNOW STEAM PUMPS, QUIMBY SCREW PUMPS.

Watch this Space for Description of the Above Machinery.

Send for Catalogues and Full Information.

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GENERAL ELECTRIC COMPANY

Schenectady, N. Y.

Standard of the World.

EQUIPPED THE

Great Electrical Transmissions

—OF—

FOLSOM-SACRAMENTO (Cal.), 24 Miles,
SAN JOAQUIN-FRESNO (Cal.), 36 Miles,
WILLAMETTE-PORTLAND (Or.), 12½ Miles,

The Power is now used for Railways, and Lighting and Operating Large Mill Plants.

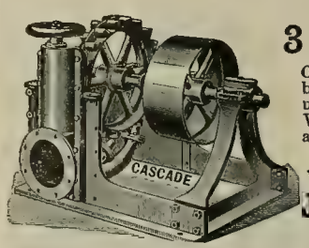
Write-- SAN FRANCISCO, CAL., Claus Spreckels Building. DENVER, COL., Kittredge Building. PORTLAND, OR., Worcester Building.

If You Want Anything Electrical.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

3 Feet to 2000 Feet.



Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.

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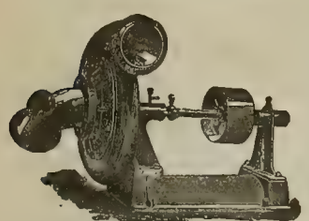
625 SIXTH STREET, SAN FRANCISCO, CAL.

—Manufacturers of—



"Whirlpool" Centrifugal Pumps

—FOR—

DREDGING, MINING, IRRIGATING, and RECLAMATION.

Will pump rocks as large as will pass through the pipes. Also Compound Centrifugal Pump for 200 feet or more lift.

"Whirlpool" Centrifugal for Pumping Rock and Gravel.

OIL, GAS OR GASOLINE ENGINES, COMPOUND STEAM ENGINES, HARVESTING MACHINERY, ETC.

THE JACKSON HAND POWER ROCK DRILL.

NO JAR. EASY RUNNING. POWERFUL BLOW. RAPID STROKE.

Operated by One Man. Works in Any Rock or Position.

.....Write for Circulars and Testimonials to Your Hardware Dealer or to the Company.....

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Offices 1756 Larimer St. Box 1352. Denver, Colorado.
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WE ALSO DEAL IN GENERAL MINING MACHINERY AND SUPPLIES.

FOR SALE BY ALL DEALERS.

Coast Representatives,

Schaw, Ingram Batcher & Co.

SACRAMENTO and SAN FRANCISCO.

Guaranteed equal to Jessop's or Firth's in rock work.

HAMMERED, NOT ROLLED.

CANTON STEEL CO.,

CANTON, OHIO.

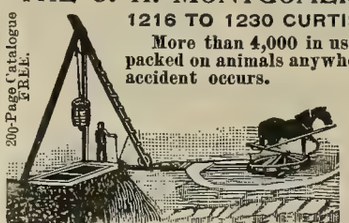
—Manufacturers of—

Canton Extra Drill Steel,
Canton Tool Steel,
Canton Pick Steel.

Superior to all others both in TOUGHNESS and ease of WELDING.

THE J. H. MONTGOMERY MACHINERY COMPANY.

1216 TO 1230 CURTIS ST., DENVER, COLO., U.S.A.



More than 4,000 in use. Made of wrought iron and steel. Can be packed on animals anywhere. The deadlock holds the load when an accident occurs.

Price of One-Horse Whim, complete, with shieves..... $90.
Two-Horse Whims, complete, with shieves..... $150.
Pumping Attachment with Pipe for either..... $40.
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Also Four, Eight and Twelve-horsepower Whims.

Cal. Anti-Caloric Company,

SOLE MANUFACTURERS OF

Anti-Caloric Sectional Coverings and Blocks for Boilers.

Telephone Main 5752.

ANTI-CALORIC PLASTER.

The Best and Cheapest Insulating Plaster in the Market.

Used exclusively by the S. P. R. R. Co., Pacific Mail and other large corporations.

Office, 507 Market Street.

A MODERN COPPER SMELTER (ROUND FORM).

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO.

MANUFACTURERS OF

Smelting Furnaces and Equipments

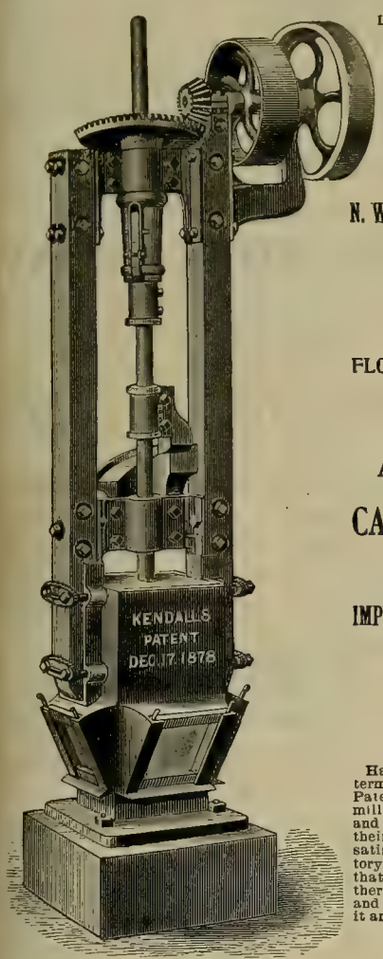
For the Treatment of

GOLD, SILVER, LEAD, COPPER and PYRITIC ORES.

THIS CLASS OF WORK IS A SPECIALTY WITH US.

We also manufacture all kinds of Ore Milling Equipments for Amalgamation, Concentration, Cyanide and Chlorination Processes.

(SEE PAGE 305.)



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NATIONAL IRON WORKS,

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ENGINES,

FLOUR, SUGAR, SAW AND QUARTZ MILL

MACHINERY.

AMALGAMATING MACHINES.

CASTINGS AND FORGINGS

OF EVERY DESCRIPTION.
All work tested and guaranteed.

IMPROVED PORTABLE HOISTING ENGINES

Sole Manufacturers of

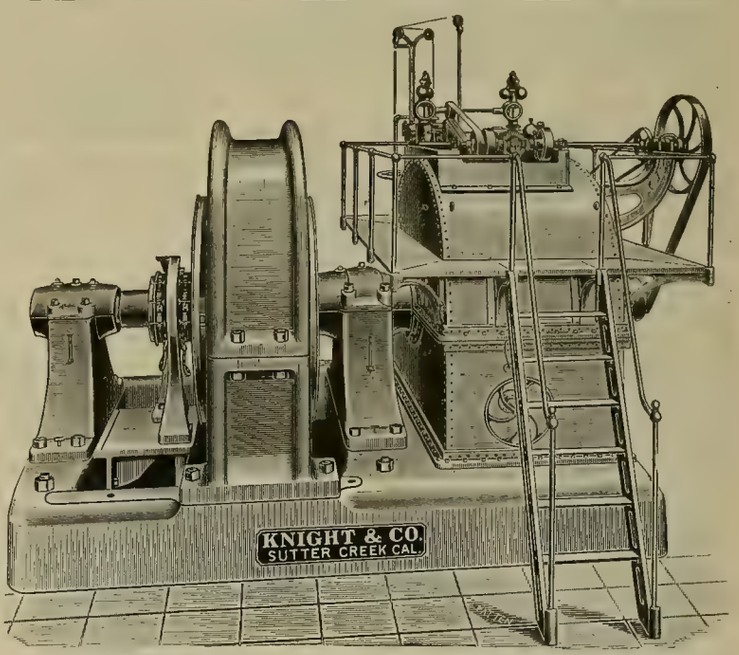
Kendall's Patent Quartz Mills.

Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.

KNIGHT'S WATER WHEEL.



The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.

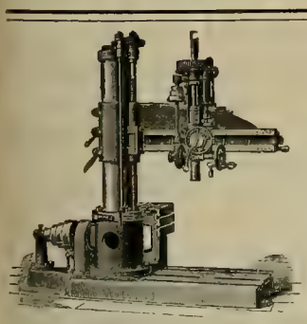
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**

WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.

Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.

For full particulars, send for descriptive catalogue.



RADIAL DRILLING and TAPPING MACHINES.

To tap on a Radial Drill is not a success unless done with our PATENT TAPPING ATTACHMENT, which is placed directly on the Drill spindle, and which is entirely automatic, no friction clutches or reverse belts. A guaranteed saving of from 50 to 75 per cent.

BICKFORD DRILL & TOOL CO.

CINCINNATI, OHIO, U. S. A.

HENSHAW, BULKLEY & CO., Agents, San Francisco, Cal.

LINK-BELT ELEVATORS —AND— CONVEYORS.

MALLEABLE IRON BUCKETS, Electric Coal Mining and Haulage Machinery, Luhrig Patent Machinery for Washing and Classifying Coal, Shafting, Pulleys, Bearing Rope Sheaves, Clutches, Etc.

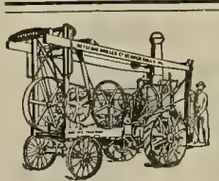
Machinery designed and erected to suit existing conditions and available space.

THE LINK-BELT MACHINERY CO.,

Engineers, Founders, Machinists. CHICAGO, U. S. A.

Denver, 1328 17th St.

A. E. LINDROOTH, Manager.

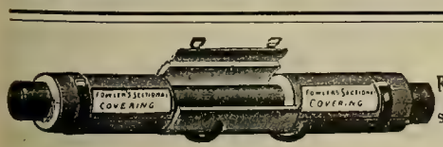


For Testing Placer Ground.

Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes.

Write for Catalogue and full information.

KEYSTONE DRILLER CO., Beaver Falls, Pa.



HOME MANUFACTURE.

FOWLER'S

Fossil and Asbestos Sectional Covering,

As a Non-Conductor, Unequaled.

Special Rates for Steam Boilers and Drums.

G. C. Fowler, 656-58 Howard St., S. F.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Market Reports.

The Markets.

SAN FRANCISCO, March 16, 1899.

SILVER. — London, 27⅝d; New York, 59⅛; San Francisco, 59¾; Mexican Dollars, 47⅛@48. New York exchange, sight, 15; telegraphic, 17½ cents premium.

Bags of silver, some of which have lain unopened in the New York sub-treasury since '77, are being packed for shipment to Cuba, to pay the Cuban troops. In all $3,000,000 will be sent, of which $1,500,000 will be in $5 gold pieces, $1,350,000 in dollars and $150,000 in subsidiary coin.

LEAD.—New York reports "unchanged," $4.35@4.40; brokers' price, $4.20.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 7c; bar, 7¼c.

COPPER. — New York reports Lake unchanged, $17.75; brokers' price, $17.62½. Local, bar, 24c per lb.

IRON.—American, soft, $22@24 per ton; Scotch, $27. Local bar, 2½c per lb.

TIN.—Pig, 30c per lb.; Bar, 35c. New York reports firm, $23.80.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8½c.

QUICKSILVER.—Local, $42.50; export, $39@39.50; carload lots, special rates.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1* 60%, carload lots, 13¼c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 738 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, bd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 00

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 2c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9¼@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₰ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 7¾c; 6s, 14 oz., 6¼c; 6s, 12 oz., 5¾c; 6s, 10 oz., 4¾c; Granite (Mining) Candles—6s, 16 oz., 8¾c, 6s, 14 oz., 7¾c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6, 12s, white, 8c; colored, 9c.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3 30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3 55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less. Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

CORDAGE.—

	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia.)	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 16, 1899.

9:30 A. M. SESSION.

400 Belcher	19c	500 Mexican	76c
200 Best & Belcher	56c	100 Potosi	28c
100 Challenge	32c	300 Savage	30c
200 Con. Cal. & Va.	$1 95	400 Union Con	59c
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300 H. & N.	34c	500 Yellow Jacket	25c

2:30 P. M. SESSION.

100 Ophir	$1 15	300 Chollar	39c
100 Mexican	76c	50 Yellow Jacket	24c
100 Best & Belcher	57c	800 Belcher	20c
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100 Savage	31c	100 Overman	11c

Recently Declared Mining Dividends.

Gwin Mine Co., California, 25 cents per share; March 10.

Bullion-Beck, Tintic, Utah, $10,000; March 15.

Centennial-Eureka, Utah, 5 cents per share, $15,000; March 15.

Silver King, Park City, Utah, $50,000; March 15.

Grand Central, Utah, $37,500; March 15.

Horn Silver, Utah, $20,000; payable March 31.

Portland M. Co., Cripple Creek, Colo., $60,000; March 15.

Helena-Frisco M. Co., (Ltd.), Idaho, 25 cents per share; $125,000; March 11. Total $600,000.

Deer Trail No. 2, Idaho, $2500; March 15.

Grand Central, Provo, Utah, 15 cents per share; $37,500; March 10.

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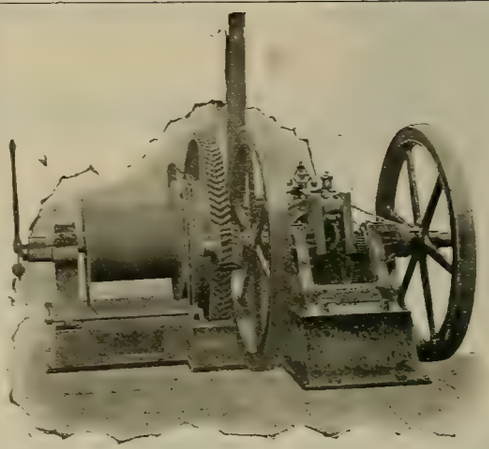

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Assessment Notices.

EUREKA CONSOLIDATED DRIFT MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of March, 1899, an assessment (No. 17) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 28th day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the seventh (7th) day of March, 1899, an assessment (No. 66) of ten (10c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 33 Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the tenth (10th) day of April, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the second (2nd) day of May, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33 Nevada Block, No. 309 Montgomery street, San Francisco, California.

MARINA MARSICANO GOLD MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of March, 1899, an assessment (No. 18) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of April, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

DELINQUENT SALE NOTICE.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 20) levied on the 10th day of January, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Mrs. Helen M. Stanley	4,201	25	$6 25
W. P. Stanley	6,153	25	6 25
Geo. B. Root, Trustee	6,817	100	25 00
Geo. B. Root, Trustee	6,818	100	25 00
Geo. B. Root, Trustee	6,819	100	25 00
Geo. B. Root, Trustee	7,157	200	50 00
Geo. B. Root, Trustee	7,178	50	12 50
Geo. B. Root, Trustee	7,289	100	25 00
Geo. B. Root, Trustee	7,290	100	25 00
Geo. B. Root, Trustee	7,291	25	6 25
Geo. B. Root, Trustee	7,292	100	25 00
Geo. B. Root, Trustee	7,334	25	6 25
F. Avery, Trustee	7,393	1,000	250 00
T. F. Bean	7,397	100	25 00
New York Issue.			
Herman Cohen	120	50	12 50
Mrs. Mary E. Wright Smith	1,000	50	12 50

And in accordance with law, and an order from the Board of Directors, made on the 10th day of January, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, No. 310 Pine street, Rooms 15 and 17, San Francisco, California, on TUESDAY, the 21st day of March, 1899, at the hour of 1 o clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, Rooms 15 and 17, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from D. M. Butterfield, in the Santa Cruz Placer Mine, near Quincy, Plumas Co., to deposit tailings in a worked-out pit; from the Horg Fat Company, in the Doherty Mine, at Howland Flat, Sierra Co., to deposit tailings in the East Branch of Slate Creek; from Sam Ahtye, in the Spanish Flat Mine, near La Porte, Plumas Co., to deposit tailings in worked-out pits; and from J. D. Wetmore and Martin Tufford, in the Dry Creek Mine, near Brownsville, Yuba Co., to deposit tailings in Dry Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on March 20, 1899, at 1:30 P. M.

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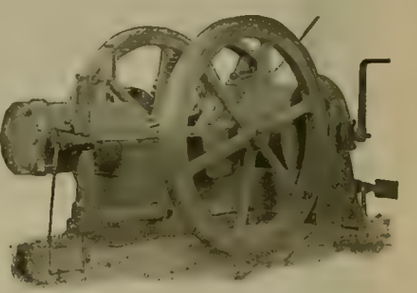

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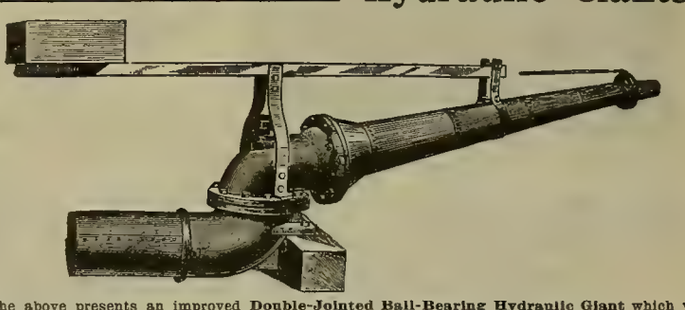

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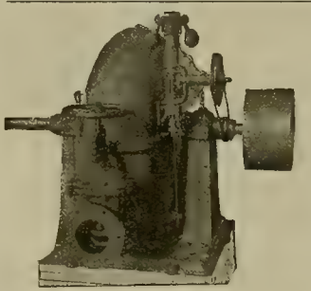

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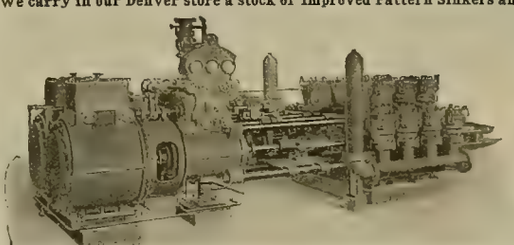

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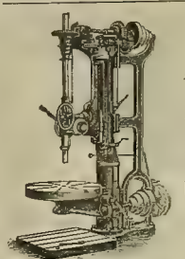

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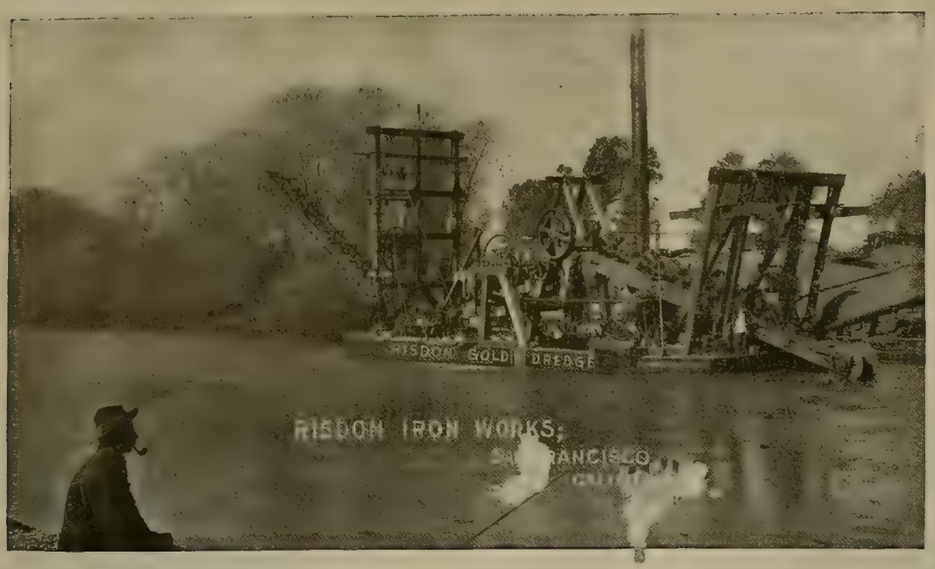

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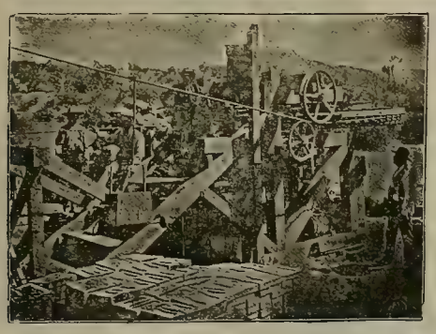

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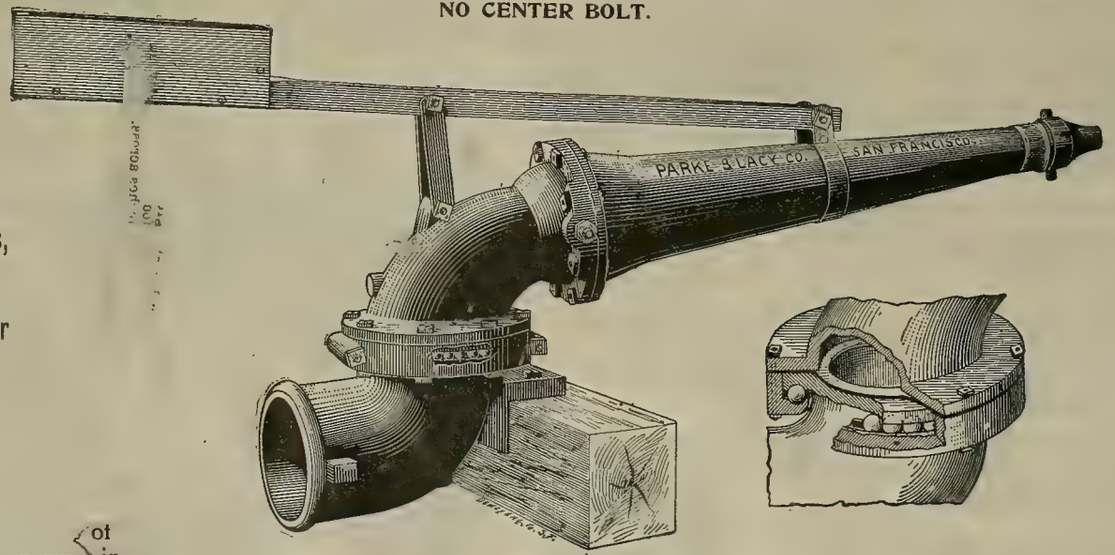

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Hydraulic Mining in California.

By rapid stages of progression hydraulic mining California was introduced soon after the discovery gold and was the outgrowth of the natural condi- ons which confronted the pioneers. At first the allow local placers in small gulches were attacked, e pan and rocker being the principal mechanical gents used in getting gold. Later the larger can- ons, in which were living streams, were lined with e camps of thousands of energetic, indefatigable iners, who, finding new obstacles daily, quickly in- nted various methods to overcome them. The ng tom, and, soon after, the sluice box were not ng in following the pan and rocker. Where the by the more ambitious miners of other nations.

Ere long attention was directed to the great banks of gravel found scattered all along the foothills of the middle counties of the Sierra Nevada range. The character of these vast deposits of gravel and sand was not understood, but the fact that they contained gold was quickly demonstrated, though the quantity of gold in these deposits was relatively so small that it was evident a large amount of material must be cheaply handled to make the undertaking profitable. Some of the first efforts in this direction were with the ground sluice, by which method the material was more cheaply handled than by shovelling. As a natural sequence came the introduction of the hydraulic method. It was at first a small, insignificant affair. A canvas hose was the conduit for the water which operated under a low head, but its usefulness was at once recognized and the new method grew rapidly in favor and was applied wherever practicable, the expense of obtaining water, the construction of dams, flumes, ditches and all the paraphernalia being, of coure, considered. In the operation of a gravel mine by the hydraulic method it became evident that there were two important considerations; first, the obtaining of a large quantity of water under high pressure, the expense of which should not be prohibitory; second, a grade below the bank which would afford sufficient fall for the sluices and a dump for the tailings. The various enterprises established from this early time grew in magnitude as the success of smaller ventures became assured, until ditches and flumes were projected and built which cost hundreds of thousands of dollars. Reservoirs constructed for impounding water on the Feather, Yuba, Bear and American rivers had a capacity of 50,000,000,000 gallons. The La Grange ditch and flume was thirty-five miles in length and cost $450,000. The Tuolumne county system was 125 miles long. The Park Canal and Water Co., taking water from the Cosumnes river, comprised 290 miles of ditch, eight miles of flume, and one mile of pipe line. The plant cost $2,000,000. The Mokelumne Hill system cost $500,000, and the California Water Co.'s plant in El Dorado cost $600,000. These are but a few of a score or more of similar undertakings. It is estimated that when hydraulic mining was prohibited that not less than $100,000,000 capital had been invested in these enterprises.

The duty of the miner's inch varies considerably with the character of the gravel and amount of pressure, and also upon the quantity of water used. The accompanying illustration is that of the North Bloomfield mine in Nevada county, Cal., piping with six giants discharging more than 2500 miner's inches of water under a pressure which would instantly kill a man should he be unfortunate enough to be struck by one of these powerful streams. The gravel banks range from a few feet to several hundred feet in height. Many methods are employed to facilitate the disintegration of the gravel where it is firm. Bank blasting is practiced with good results. Excavations are made at the base of the bank and lateral drifts run. Large charges of powder are exploded which shatters the ground and the streams from the giants become much more effective. In some portions of the State, as about Dutch Flat and Gold Run in Placer county, the entire topography of the country has been changed.

THE NORTH BLOOMFIELD HYDRAULIC MINE, NEVADA COUNTY, CAL., PIPING WITH SIX GIANTS.

old was won from bars above the level of the stream ttle difficulty was experienced, as water was con- ucted upon the bars by ditch and flume, and the round sluice was the natural outcome. But it was oon learned that gold existed in large quantity in he channels of the streams, in many of which the mount of water was so great as to make sluicing npossible. The miners overcame this difficulty, in umerous instances wing-damming the streams and n some places turning the stream into a ditch or ume having sufficient capacity to accommodate the ntire amount of water coming down the canyon. his left the river bed below comparatively dry and he gold was recovered rapidly. The first two or hree years made such inroads upon the modern lacers that one locality after another was aban- oned by white miners, who left the Chinese to clean p the tailings and poor spots and many of the lat- er made fortunes from the claims thus abandoned

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If any one industry more than another is entitled to be called a "business," it is mining. "Business" is simply the systematic supplying of wants, and the product of the mine is wanted about as universally as any natural product possibly can be.

It is estimated that the capitalization of trusts formed since Jan. 1st, '99, amounts to $500,000,000, which may be considered a fairly good start for the current year. Several other combinations are now under consideration, which will help to keep up the usual record and hasten the inevitable reaction.

The relation of railways to the mining industry has been clearly demonstrated in Colorado the past winter. Without the roads in operation many of the leading mines were obliged to suspend operations. In some parts of the State the mines could not be operated at any time profitably were it not for the railways.

Huge trusts continue to absorb many industrial organizations, and since the first of the year the movement has developed into a craze similar to that which overspread Great Britain just ten years ago. The aggregate of capitalized stock in the recent combines now runs into the thousands of millions, and, naturally, Eastern bankers and brokers grow apprehensive of so much sail and so little anchor, and are beginning to decline that class of security as collateral. The present activity is a repetition of former history in this regard. Former history shows that that species of speculation ends in a collapse. It is probable that the ultimate result of the present tendency to form trusts in all lines of industrial manufacture or production will result in disastrous reaction.

It is a difficult matter for the owner of a prospect to fix a proper valuation on his prospect, for the reason that if it is a prospect and not a developed mine, his property has a speculative value only. As a matter of course the possible investor is going to use every effort and argument to get the lowest possible price, and often his offer is so far below what the claim owner had set his mind upon that they cannot arrive at a mutually agreeable understanding. The claim owner often loses sight of the risk the investor must take in equipping even a promising prospect, and fixes his price at a sum which he thinks will meet his present requirements and leave a small fortune as well for the future. In the case of mines having considerable development it is somewhat different; the deal resolves itself into a commercial transaction, the element of uncertainty not being so prominent. But when this condition of affairs is reached the prospector usually places his price proportionately high.

Copper Production.

The chief present interest in mining still centers in copper. The magnitude of operations attracts universal attention, and the present profit of production, of course, greatly stimulates the quest for copper properties, a search that in California, Colorado and other states must certainly prove successful. Already Arizona as a copper producer is well in line with Michigan and Montana, and in other sections the stimulus of demand is daily discovering promising copper prospects.

Unlike other trusts and combines, no amount of combination on the part of leading copper producers can prevent others from discovering and supplying copper, or can permanently raise or lower the world's price for a metal that is in such world-wide demand.

The world's output of copper for the past five years has increased from 324,505 tons in '94 to 424,126 tons in '98, as shown by the following figures:

COPPER PRODUCTION—TONS.

	1898.	1897.	1896.	1895.	1894.
Australasia	18,000	17,000	11,000	10,000	9,000
Canada	8,040	5,905	4,000	4,000	5,000
Chili	24,850	21,900	23,500	22,075	21,340
Cape	7,060	7,440	7,450	7,080	6,500
Germany	20,085	20,145	20,065	16,555	17,300
Japan	25,175	23,000	21,000	18,430	20,050
Mexico	10,435	11,370	11,150	11,620	11,770
Spain and Portugal	53,245	54,060	53,325	54,950	54,175
United States	234,271	216,060	203,893	172,300	159,695

The demand has increased in like ratio. With the reopening of properties formerly worked, the discovery and development of new mines, and the increased product of present big producers consequent upon existing high prices, it is within bounds to assume, so far as the United States is concerned, that the 1900 copper product of the country could be made 250,000 tons, did the next eighteen months hold promise of existence of the present high price. At various times have been given herein authentic statements as to the cost of producing copper in various localities. From official reports of several prominent companies, it appears that the recent cost price of pure copper at the Anaconda, Montana, was $113 per ton, or less than 5¾ cents per pound; the cost at the Boston & Montana plant was reported as practically the same; as also the cost at the Calumet & Hecla, Michigan, mine; in each case there being a reduction from the comparatively recent cost of production—$162 per ton, or over 8 cents per pound; this reduction being in each case largely due, not to any increase in the value of the ore, but to improved and more economical methods, and the utilization of "by-products." These prices compare favorably with those furnished by foreign producers. The Newfoundland Copper Company is credited with ability to produce pure copper at $88 per ton, this being probably due to the advantageous shipping facilities of that concern. At Tilt Cove the production price is stated to be $163 per ton, and the old Rio Tinto of Spain reports cost of $124 per ton. In the last-named case the mine is most favorably situated, viewed as a commercial competitor.

The closing down of the 20-stamp mill of a leading Tuolumne Co., Cal., mine, for the alleged reason that ore could not be furnished fast enough for it, is an illustration of the short-sighted policy too often pursued of not keeping the work of exploration in a mine well in advance of stoping. There have been numerous instances of this practice in California. There is nothing which gives mining such a secure footing in the financial world as a long continued, judiciously regulated output. When a mine is so handled as to make a regular monthly output of a stated amount it should be done, and there are few mines that amount to anything where this cannot be accomplished. It is not best to set the mark too high, but at a medium figure which can easily and surely be reached and maintained. Every mine has rich and low-grade stopes, or streaks, in the veins. When the output is found running too high it can be equalized by extracting ore from the low-grade stopes, and if too low it can quickly be brought up to the desired amount. Many well regulated mines pursue this course, and the result is their output is uniform, or nearly so, and there is always more ore in sight in such a mine than in one which each and every month strives to produce a maximum output. When the latter course is pursued there is almost certainly a great difference in the monthly cleanup. It cannot be steadily maintained, and as a natural outcome the mine is gouged and often many ton of low-grade ore, but still ore which will pay, are left behind and eventually lost because of caving of ground or from some other cause, and its recov then becomes expensive. When the policy sugges is pursued the mine so managed comes to be loo upon as a legitimate and secure investment.

Elsewhere herein will be found one of the se of interesting articles on the alluvial deposits Western Australia in which appears the followi "The cement is underlain by a clay which is esse ally a steatite, and is as readily traceable to neighboring diorite as the kaolin at Kintore was ducible from the granite. The green color of cement is imparted by chlorite, derived from decomposition of the epidote in the diorite." Cl chemically considered, results from the decompo tion and disintegration of aluminous silicates, pari ularly feldspar. Clay is also often the mechani result of fine comminution of rocks. Quartz sufficiently fine crushing becomes clay under so conditions. Steatite is a secondary product of m erals containing but little alumina and bears no lation to clay. The component parts of steatite a all secondary; chlorite, talc and calcite are the esse tial constituents. Kaolin may be derived fr granite by alteration of its feldspars, but that ch rite is derived from the epidote in diorite is tremely doubtful. Epidote is not an essential c stituent of diorite, but occurs as an accessory gredient resulting probably from the alteration chlorite, which was derived from the amphibole the diorite. Chlorite is hydrated silicate of ma nesium, iron and aluminum, and epidote a hydro silicate of aluminum, iron and calcium.

The drouth in California is a thing of the pa Since the 15th inst. there has been an almost stea fall of rain in the valleys and foothills and snow the Sierras, and those who have pointed to dry hi and dusty channels as an excuse for inactivity mu conjure up some other reason for individual failur While the dryness of the past eighteen months h been the cause of enforced idleness to many willi workers, yet it has also served as a good excuse f those too lazy to work and who prefer to throw t blame on the weather or any other deterrent caus It is this class who mostly talk of "hard times Times are always hard with men who do not want work, who try to make it appear that somethin else beside themselves is the cause of their failure their poverty, and who, acting as though their nam were forever stricken from the muster rolls of dut seem content to slip down the back entry of Time musty oblivion.

A little mining "boom," with which (with th exception of Colorado) this west half of Ame ica has had but little to do, has revitalized zin Zinc ore has soared in price, and in zinc smelting lively metallurgical contest on economic basis b tween smelters using coal and smelters using gas fuel has resulted in a large transfer of the zin smelting industry to the Kansas natural gas bel From an average of $22.50 per ton in '97, the pric of zinc ore rose last December to $40. As in othe lines it is now proposed in Missouri and Kansas t organize a "zinc miners' association" and regulat supply, grouping the mines, and shutting them dow or resuming production according as surplus o scarcity of ore exists. It is not impossible to formu late such an idea, but the man who will have charg of the details will not have a particularly happy tim of it.

There are a great many books in circulation fo the use of prospectors, all of which contain man good "hints" and much information, but in most o these volumes is found a vast amount of materia calculated to give a "smattering" of scientifi knowledge, which the prospector does not need an which leads him estray when he reads it. It is no necessary for the prospector to be able to distinguis whether a certain rock is basalt or norite, o whether it is diorite or trachite. What he wants t know is how to determine whether a rock has a valu or not. The "genesis of ore deposits" may be in teresting to the scientific student, but it does no matter to the prospector whether the gold in his or came from below, from above or sideways, so long as it is pay rock.

Concentrates.

DESPITE the drouth, the gold yield of California for '98 exceeded that of '97, contrary to general statement, as the forthcoming official figures will shortly show.

REGARDING the absorption of the Salt Lake City, Utah, smelters by the trust, it is understood that the Germania stockholders get $276 per share for their 5000 shares.

THE new county of Ferry, taken from Stevens, is said to have the richest gold and the richest silver mine in the State of Washington—the Republic, in Eureka district, and the Zala M., in Sheridan camp.

ON pages 316, 317 and 318 of this issue appears the full text of the recent decision in the Argonaut-Kennedy case, Amador Co., Cal., accompanied by geological reports from two mining engineers. It will be appealed to the California State Supreme Court.

MINING MEN everywhere are invited to consider this paper as an open forum for discussion of any subject in connection with mining and metallurgy, as interchange of opinion and experience is of general and constant value to the mining industry.

WHILE the law accords the right to a patent to the later applicant who connects by due diligence a prior conception, the reduction to practice must be made by the applicant himself, or by his authorized agent, and not by some other third party.

THE "wonderful" mining discoveries in the far North, duly announced simultaneously with the advent of spring, are to be taken cautiously, and should not unduly influence those to whom transportation companies look to recoup some of last season's losses.

IN dense smoke per ton of coal burned are from ten to twelve pounds of soot, 10 to 15% ash and about 2% moisture. No smoke is produced when fuel is burned in an atmosphere of oxygen. Where no hydrocarbons exist, smoke cannot be produced in any atmosphere by any fuel.

AS IN rivalry to the "embalmed beef," the Klondike, which has just heard of it, sends from Dominion creek a statement that "a prehistoric mammoth, weighing thirty tons, with flesh still sweet enough to eat, was found on Feb. 8th by two miners, while working their claim, 40 feet from the surface."

TO MAKE the extent of fine cracks in tools, etc., visible, it is recommended to moisten the surface of the cracked article with petroleum, to rub off clean and to wipe the surface with chalk. The petroleum which has entered the fine cracks sweats out and the rent is made visible in its whole extent.

FROM Colorado and Utah come reports that not in thirty-five years was there such an unusual snowfall as that of this season. California's snowfall was tardy, but since the 15th inst. more has fallen in the high Sierras than during any season since 1889. This great depth means plenty of water and a busy season for miners.

IN the interests of a prospective copper combine, Montana's Legislature has passed over the Governor's veto a bill empowering the owners of two-thirds of the stock of a corporation to compel the holders of the rest of the stock to sell out at an appraised valuation or to accept stock in another corporation for their holdings.

CONTINUOUS possession of a mining claim, with due compliance of law, for a period equal to the time prescribed by the statute of limitations for mining claims, in the State wherein such claim is situated, entitles the claimant, under the provisions of Sec. 2332, Revised Statutes U. S., to a patent in the absence of any adverse claim.

THERE is some mining activity at Randsburg, Kern Co., Cal., mining there getting down to a substantial business basis, as it usually does in all new camps. Some of the former floating population has scattered out over the desert, seeking new fields, penetrating to Death valley and beyond. Some of these men have already made discoveries.

AS BETWEEN copper and aluminum, it is calculated that two-thirds of a pound of aluminum wire has the conductive capacity of a pound of copper. The former is quoted at 30 cents per pound, the latter, 21. Aluminum is the feed wire for the new Blue Lakes-Stockton line in California, at Snoqualmie Falls, Wash., and for a Chicago elevated railway.

TO DETERMINE the value of a gold specimen in quartz, basing the calculation on the relative densities, one way is to divide the specific gravity of gold by that of quartz, and also by that of the specimen; from the greater quotient subtract the lesser; the remainder is the proportion of gold; from the lesser subtract 1; the remainder is the proportion of quartz.

G. MCDOWELL, at Vancouver, B. C., who represents a Colorado syndicate, says he has come to an agreement with officials of the Canadian Pacific Railroad for a site on which he will build ore sampling works at Nelson. A thirty years' lease will be given for property. The work must commence within three months and be finished in six. McDowell says the works will be completed long before the specified time.

IT is possible, but not probable, that most exact assay might determine an inappreciable percentage of silver in a $20 gold piece, if weighed on scales so delicate as to weigh the unexpressed thoughts of an infant. The "fineness" of gold indicates the number of parts of pure gold in 1000 parts of an alloy—in U. S. gold coins, 900; that is, of 1000 parts of the alloy taken to make those coins, 900 parts are pure gold.

BOILER WATER may be heated almost to the boiling point by utilizing the exhaust steam from the engine A great many devices for accomplishing this are in use. One of the simplest is to pass the exhaust pipe through a cylinder which is filled with water. Only a small percentage of the heat of the steam is utilized by this means, but it will heat the water, which will be found to effect an important saving of fuel in making steam.

"WHEN a locator locates a mining location" crosswise of the vein, his "side lines" become end lines. Then his true side lines must be constructed with reference to the ascertained course of the vein—parallel with and not more than 300 feet on each side of its center. Should the originally marked width prove more than 300 feet, the excess should be discarded, so that the middle of the vein shall be in the center of the location. Such excluded area is subject to appropriation.

WERE the barometric reading on the summit of Mt. Shasta, in California, to be 19.5 in., and at sea level 30 in., the height of the mountain would be determined by the following formula: $\left(\frac{27{,}000 \times 30}{19.5}\right) - 27{,}000 = 14{,}538$ feet. In this, 27,000 feet is figured as the height of the homogeneous atmosphere. (It is believed, however, that more exact data would indicate the height of that peak to be about 100 feet less than the above result.)

CARBONS in diamond drills are usually reset after 40 feet of quartz or 150 feet slate. These and their settings constitute the greatest item of expense. Six 3-carat stones are used to each bit, and they cost about $15 per carat; as it costs $10 to set a bit, this would make each bit cost $280. The cost of wear and tear per foot varies from 30 to 50 cents, according to the hardness of the rock. The entire cost per foot foot of ground drilled would probably average 65 cents. An average drill, including, say, 600-foot rods and two bits, would cost about $2000.

GOLD occurs in calcite in the Alvord mine, twenty-three miles northeast of Daggett, Cal., and in the Carbonate mine at Oro Grande, in San Bernardino Co., Cal.; at Hedges, Cal., in an aggregate of mica scales and in partly altered hornblende; in El Dorado Co., Cal., in feldspar (albite); at Soulsbyville, Cal., in granodiorite; near Big Oak Flat, Tuolumne Co., in a diorite dike; on Castle creek, Arizona, fifty-five miles southeast of Prescott, in an aggregate of scales of specular iron; at Black Hawk mines, San Bernardino Co., Cal., in limestone.

IN the case of Hooper vs. California, 155 U. S., 648-652, the Supreme Court held that "the right of the Legislature to regulate the transaction of business by foreign corporations in this commonwealth, or to forbid it altogether, is beyond question." Still, notwithstanding this, and the enactment of a State law known as the "alien act," bearing directly upon this subject, it is manifest that the whole idea and intent is to hold all this as reserve power and not to actively discourage any alien acquisition of mining property or any other form of real estate.

TWO BILLS passed both houses of the California Legislature last Saturday, one prescribing the manner of locating mining claims upon the public domain of the United States, recording notices of location, amending defective locations, and prescribing the effect to be given to recordation of notices of location, the other repealing the act of March 26, '97, prescribing the manner of locating mining claims, and at latest accounts were in the hands of the Governor, who declined to say whether he had or had not signed them. Without his signature they will not become laws.

THE best procurable data on the question of the treatment of ore at the Bingham, Utah, mine, is as follows: the ore is quartz, iron oxide and lead carbonate; the capacity of the plant is forty tons per day; size of ore leached mesh ¼ inch; the preliminary treatment is sodium dioxide; the strength of the cyanide solution is 0.025 to 0.125; number of hours leached, 120; 1 pound of cyanide is consumed to each ton of ore treated; .30 of 1 pound of zinc is so consumed; the ore assays ¼ ounce per ton gold, and 2 ounces silver; the per cent of gold extraction is 80, at a cost of $1.85 per ton.

FOR a general treatment of ore, smelting, perhaps, is the most universally satisfactory. It is hard to say whether gold ore always does or does not require roasting preparatory to "leaching." The question is one that must necessarily be answered by local conditions—always suiting the process to the ore, not the ore to the process. In the case of tellurides the gold may be extracted by fine grinding and treating with cyanide, though cyanide action on tellurides is slow, and, as a matter of economy, it might be well to give the ore a preliminary roast, care being taken to obviate volatilization.

W. C. RALSTON of San Francisco will this season expend about $300,000 in further development of the property of the Melones M. Co. on Carson Hill, near Robinson Ferry, Calaveras Co., Cal. Among other things he will build a 120-stamp mill, run about 4000 feet of additional tunnel, build a concrete dam and two and one-half miles of ditch. In the issue of Nov. 5th, '98, was published an account (since reproduced all over the world) of fast and economical tunneling work on this property, a 7x8-foot tunnel or drift, 2608 feet in length, being driven through greenstone, slate and quartz stringers at an average of 10¼ feet per day, at a total cost of $11 per running foot.

METAL miners in the region west of the 100th meridian would consider some mining customs further east curious, though, from the working miners' standpoint, not wholly objectionable. According to local statements, the miners in the copper mines of Ontonagon county, Mich., have all along been claiming all the silver they found, as the mining was "for copper only," and, in the case of any silver, the company or mine owner wasn't "in it." This, of course, applied only to "tributers," who usually got 5 cents per pound for the copper they got out. Now, however, companies incorporating have a special clause intended to cover the ownership of any silver incidentally found in the search for copper.

SINCE July 1st, '98, the old construction of the Federal mining law affecting the patenting of mining claims is superseded by paragraph 53 of the new mining regulations, which reads as follows: "The claimant at the time of filing the application for patent, or at any time within the sixty days of publication, is required to file with the register a certificate of the Surveyor General that not less than $500 worth of labor has been expended, or improvements made, by the applicant or his grantors, upon each location embraced in the application, or if the application embraces several locations held in common, that an amount equal to $500 for each location has been expended upon, and for the benefit of the entire group; that the plat filed by the claimant is correct; that the field notes of the survey, as filed, furnish such an accurate description of the claim as will, if incorporated in a patent, serve to fully identify the premises, and that such reference is made therein to natural objects or permanent monuments as will perpetuate and fix the locus thereof; *provided*, that as to all applications for patent made and passed to entry before July 1st, '98, or which are by protests or adverse claims prevented from being passed to entry before that time, where the application embraces several locations held in common, proof of an expenditure of $500 upon the group will be sufficient, and expenditure of that amount need not be shown to have been made upon, or for the benefit of, each location embraced in the application." It will be observed that the $500 need not be expended "on" each claim where the application comprises several locations, but "for" each claim. The aggregate amount in such cases must represent as many times $500 as there are locations, and in such case the entire amount can have been expended on one of the claims provided it can be shown that such amount tended to develop or improve the entire group.

THE following is a simple yet accurate formula for determining the volume of water a given sized pipe with a given fall will furnish, or for calculating the size of pipe required where the maximum quantity of water is known. For velocity in second-feet, for rough pipe, let V = velocity, D = diameter of pipe in feet, and H the fall in feet per 1000 feet. $V = \sqrt{D \times H \times 1.5}$. The quantity delivered by the pipe line can be found by the formula $Q = D^2 \sqrt{D \times H}$, in which Q = quantity in gallons per minute, D = diameter of pipe in inches, and H = fall in feet per 1000 feet. The last formula gives $D^5 = \frac{Q^2}{H}$; that is, knowing the quantity desired in gallons, and the proposed head of pipe line to point of delivery, the diameter in inches of pipe required can be found by dividing the square of the quantity by the fall in feet per 1000 feet, and extracting the fifth root of the quotient.

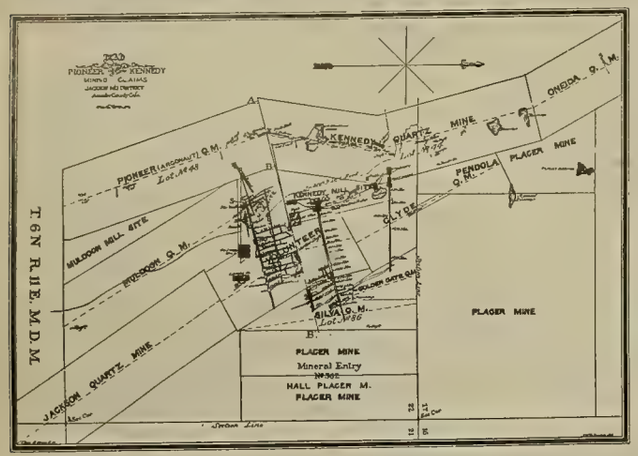
THE first mortar at the Homestake mill, Lead City, South Dakota, weighed 5400 pounds and was 54½ inches high, 54¾ inches long; feed opening, beginning 6½ inches below the top, 24 inches long, 4½ inches wide and 7 inches deep; on entering the mortar it remained 24 inches long and 7 inches deep. At the bottom of the feed, forming the continuation of the incline over which the ore passed into the mortar, was a lip, 4¾ inches wide and 1¼ inches thick, designed to discharge the ore against the upper half of the stamp head; lower edge of lip, 14 inches above the inside bottom of the mortar; 15¼ inches from the bottom was the discharge opening, 48½ inches long and 21¾ inches high, the frame inclined outward about 10° from the vertical; on the short sides of the discharge opening were grooves to receive the chuck block, screen frame and curtain, held in place by keys and sockets; the chuck block fastened at the bottom by two horizontal keys, supported by lugs on the outside lip of the mortar below the discharge. The bottom of the mortar (the mortar bed) was 7¼ inches thick, the sides, at the foot of the dies, 3½ inches; inside dimensions: width at bottom, 10½ inches; length, 50 inches; height to issue of mortar (not of pulp), 8¾ inches; width at that point, 13⅝ inches; at the top of the discharge opening, 20 inches; at the top of mortar, 16 inches; total inside height, 47 inches; casting, ¾ inches thick, from the top down to the feed opening, on three sides, the back being a little thicker.

"WHY do you want to sell your mine or prospect if it is so good a thing as you seem to think? Why don't you keep it if, as you say, the possession of a few thousands would make it so valuable and raise the money?" are questions often asked a mine claim owner. It may, in return, be asked why does any one, anywhere, want to sell anything that he owns. It at once raises the other question, why does any one, anywhere, want to buy anything? Things are mostly bought and sold for convenience and profit. Why does a farmer want to sell his farm; why should any one buy it; why should a city resident want to sell his lot or his house; why does any one want to buy such a piece of property? All these "whys" sound silly—as silly as that oft-asked question of the prospector. As well might the foundryman ask him from whom he buys his pig iron, "Why do you want to sell this raw material? Why don't you yourself make castings of it?" As well might the miner ask the maker of machinery, "Why do you want to sell this concentrator, or hoist, or engine, or pump; why don't you use and operate it yourself?" A prospector or owner of a mine wants to sell from a variety of motives; he may lack (usually does) the money necessary to properly develop the mine (for mines are made), or he may have tired of beans, bacon, black coffee and camp bread, and may want to see and taste other things; or, if he has a good developed property, he may want to sell it for less than it is worth to give himself or his family a desired change. But in any event, it is not in order to ask or quibble as to the motives of any would-be seller of mines any more than of anything else. The business proposition for the buyer is not to ask the vender, "Why do you want to sell?" but to ask himself, "Why do I want to buy?" All this as to the actual mine owner. As to the promoter, the intermediary, the middleman—but that is another story.

GRANITE and syenite look much alike to a casual observer. They cannot be distinguished by the texture. The essential constituents of granite are quartz, orthoclase (potash) feldspar and mica, either black or white. This is simple granite; but in this rock also occurs numerous other minerals, most of which cannot be distinguished without the aid of the microscope. Syenite consists of orthoclase feldspar and hornblende—quartz not an essential constituent, but often occurs. Diorite differs from the above in the character of the feldspar. Its essential constituents are hornblende and plagioclase (soda-lime) feldspar. When quartz occurs it is called quartz-diorite, and when mica is present, as well, it is known as quartz-mica-diorite. Magnetite often occurs so abundantly in the fine-grained varieties as to give the rock a black color. Diorites range in color from light gray to green and black. Typical rocks are rare. They usually graduate from one variety to another, and the name is usually applied in consideration of the most prominent constituents. In California the granite of the Sierra Nevada contains the essential constituents of both typical granite and typical diorite—hence the name grano-diorite. Phonolite is usually rather fine-grained, dark and compact, and when struck gives out a ringing sound. It would be impossible to identify the rock without a great deal of knowledge of the rock-forming minerals. In the Black Hill's phonolite the principal constituents are nepheline, sanidine, ægirine, noselite and sodalite—minerals familiar only to students of petrography. Porphyry is a name employed to designate a rock having distinct crystals occurring in a ground mass of finer grain, as quartz porphyry and granite-porphyry, meaning a granite of even grain, in which occurs large crystals of feldspar. Porphyry does not mean any particular kind of rock, but has reference to the structure only.

Decision in the Argonaut-Kennedy Case, Amador Co., California.

The full text of the decision of Judge G. W. Nicol of the Superior Court of Tuolumne county, Cal., in the case of the Argonaut Mining Co. vs. the Kennedy Mining Co. of Amador Co., Cal., is herewith given in full:



In the Superior Court of the County of Calaveras, State of California.

Argonaut Mining Company (a corporation), plaintiff, vs. Kennedy Mining & Milling Company (a corporation), defendant.

Formerly No. 1408 in the Superior Court of Amador County:

The plaintiff commenced two actions against the defendant in the Superior Court of Amador county, said actions being numbered respectively 1179 and 1408 in the Superior Court of said county Upon the petition of the defendant, the cases were transferred to the Circuit Court of the United States. Motion by plaintiff was subsequently made in the Circuit Court to remand both cases to the Superior Court of Amador county, which motion was granted Argonaut M. Co vs. Kennedy M. & M. Co., 84, Feb 1. Upon the cases being remanded to the State Court, they were removed to the Superior Court of Calaveras county for trial and determination.

The complaint in each action is in the form of an ordinary declaration in trespass, coupled with a prayer for an injunction. The first action was commenced Aug. 11, 1894, to recover $325,000 damages. The second action was commenced Aug. 5, 1897, to recover $125,000 damages for trespasses alleged to have been committed since the commencement of the first action.

The two causes were submitted to the court upon an agreed statement of facts and were both argued together The underlying questions of fact in both cases are identically the same, and the opinion of the court in one will apply with equal force to the other. There is a slight difference as to the defense in the first action from the defense in the second action, but both cases involve a trespass upon the same vein claimed by the plaintiff and differ only as to the locality and the time of the alleged trespasses The arguments of the attorneys were principally directed to the issues involved in the second action, No. 1408, and to those issues the court will direct its opinion.

The facts of the said cause may be epttomized as follows: Plaintiff and defendant are both corporations, organ zed and existing under and by virtue of the laws of the State of California. The plaintiff is the owner of the mining claim designated on Exhibit "A" as the "Pioneer" mine, and the defendant is the owner of the mining claim designated on said exhibit as the "Kennedy" mine; both of said mining claims are patented. The Kennedy M Co. (a corporation), the grantor of the defendant, filed its application for patent for the Kennedy mine on the 13th day of October, 1870; and the Pioneer Gold & Silver M. Co. (a corporation), the immediate predecessor in title of the plaintiff, filed its application for patent for the Pioneer mine on the 13th day of January, 1871.

Thereafter on the 15th day of March, 1871, the Surveyor General of the United States for the State of California issued his instructions to William L. McKin, Deputy Mineral Surveyor, to make survey for patent of said Kennedy mine, and in pursuance of said instructions said McKin, during the months of April and May, 1871, made and completed such survey, and on the 19th day of October, 1871, the said survey was approved by the Surveyor General. On the 11th day of November, 1871, the said Kennedy M. Co entered and paid for said mining claim so surveyed, and on the 29th day of July, 1872, the Government of the United States issued to said Kennedy M. Co. a patent for the said mining claim. On the 28th day of December, 1886, said Kennedy M. Co. conveyed the said mine to the defendant, the Kennedy M. & M. Co.

On the 16th day of June, 1871, the United States Surveyor General, for the State of California, issued his instructions to said William L. McKin to make survey for patent for the Pioneer quartz mine, and on the 1st day of September, 1871, said McKin completed the said survey, and the Surveyor General approved the same on the 21st day of December 1871. On the 23rd day of February 1872, the Pioneer G. & S. M. Co. entered and paid for said mining claim, and the Receiver of the Land Office thereupon issued his duplicate receipt evidencing such entry and payment; and on the 13th day of August, 1872, the Government of the United States issued to the said Pioneer G. & S M Co. a patent for the said Pioneer quartz mine The plaintiff, the Argonaut M Co., became the owner of said mine by deed, executed July 3, 1893, by said Pioneer G & S. M. Co.

The two mining claims are adjoining properties; the line A..B.. marked on the diagram "Exhibit A," is the northern end line of the said Pioneer quartz mine as patented, and to the extent of the length of said line, to-wit: 7 chains and 65 links, is coincident with the southern end line of the Kenuedy mine, and described in the patent of said Kennedy mine. The course of said line A..B.. is north 74 degrees 51 minutes east. The dotted line B....B' is the line A..B.. produced indefinitely in its own direction.

The plaintiff has sunk an incline shaft which has its collar or top in the Pioneer millsite, at a point marked "S" on Exhibit "A," and descends into the earth downward from its collar easterly at an average angle of approximately 62° from the plane of the horizon Traversing said Kenned, and Pioneer mines in a general northerly and southerly direction is a well defined vein, varing in width from 3 inches to 30 feet, said vein dips and descends into the earth easterly at an average angle of approximately 40° from the plane of the horizon until it reaches a point in the Argonaut shaft about 440 feet below the collar th reof, below which point said vein dips and descends into the earth easterly at an average angle of approximately 63° from the plane of the horizon The general direction of the dip of said vein is indicated by the arrows on Exhibit "A." The general course of said vein is S 19 degrees 14 minutes E, or N. 19 degrees 14 minutes W, as is apparent on the surface by the outcrop visible in said Pioneer mine. Said vein in its course southerly passes out of said Kennedy quartz mine, crossing the line A..B.. at a point thereon marked "2" on Exhibit "A," and enters the Pioneer ground; thence pursuing its general southerly course towards the southern end line of the Pioneer quartz mine, which it crosses.

The defendant within the Kennedy millsite at the point marked "X" on Exhibit "A," has sunk a shaft, which is vertical or nearly so to the depth of 305 feet, or thereabouts, at which depth it encounters the vein as it descends from the overlying apex. thence said shaft is an incline following the vein on its dip to the present depth of approximately 1225 feet. From this shaft the defendant has extended levels and drifts southerly on said vein, which are shown in horizontal projections on Exhibit "A," marked 1450, 1550, 1650 and 1750 levels. Some of these levels have been extended on the vein southerly and beyond a vertical plane drawn through the line A..B.. produced in the direction of B.

Between the 8th day of October, 1895, and the 12th day of December, 1895, the defendant extracted and converted to its own use 2604 tons of gold-bearing ore from the said vein southerly and beyond said vertical plane, but within the vertical boundaries of the Silva quartz mine delineated on Exhibit "A."

The gross value of the said ore so extracted and converted by defendant was the sum of $62,218.45. The aggregate cost of mining and milling the said ore was the sum of $6119.40, which amount plaintiff consents may be deducted from the gross value of the ore stated, in the event that the Court should determine that plaintiff is entitled to recover in this action, leaving the sum of $56,099 95 in gold as the net profit realized by defendant from said ore.

The vein exposed in defendant's underground workings south of the vertical plane drawn through the line A..B.. produced in the direction of B is the identical vein which has its top or apex in the Kennedy quartz mine and in the Pioneer quartz mine, and such vein is continuous from the top or apex in both mines downward to the lowest depths, and said vein at all points below the surface continues on its course in a general southerly direction indefinitely towards the south end line of the Pioneer quartz mine, which it crosses, and the said 2604 tons of ore were extracted by defendant from said vein south of the vertical plane drawn through the line A..B..B'. Said vein is the identical vein mentioned in the Kennedy patent as the Kennedy vein or lode and in the Pioneer patent as the Pioneer vein or lode.

The Silva quartz mine, delineated on Exhibit "A" as Lot No. 86, lies to the east of the Pioneer and Kennedy mines. The surface of the said Silva quartz mine overlies so much of the dip of the Kennedy and Pioneer vein as may be found between vertical planes drawn through the boundaries of the said Silva quartz mine. The defendant, the Kennedy M. & M. Co., is the owner of the said Silva quartz mine by virtue of a quartz mining patent issued to it on the 6th day of February, 1893.

No part of the ore bodies in dispute lie between vertical planes drawn downward through the end lines of the Kennedy mine. The defendant, the Kennedy M. & M. Co., makes no claim of right or title to the ores in dispute by reason of its ownership of the Kennedy mine; but it claims title to the ores in dispute by reason of its ownership of the Silva quartz mine. The patent for the Silva mine is in the usual form of patents for quartz mining claims and contains the usual exceptions and reservations. It is presumptively based upon a vein having its apex within the exterior boundaries of the Silva mine. Like all quartz mining patents, it contains the usual reservation that the premises granted, with the exception of the surface, may be entered by the proprietor of any other claim, lode or ledge, the top or apex of which lies outside the boundaries of the granted premises, should the same in its dip be found to penetrate, intersect or extend into said premises, for the purpose of extracting and removing the ore from such other vein, lode or ledge.

The ore bodies in dispute are within the vertical boundaries of the said Silva quartz mine, but are a part of the vein having its top or apex within the Pioneer quartz mine, which vein on its dip to the east extends under the surface of the Silva mine.

At common law a grant of land carries with it all beneath the surface of the earth. In the absence of some one having a better right to the vein which on its dip underlies the surface of the Silva quartz mine, the defendant would own it. The defendant, the Kennedy M. & M. Co., has the right to say, in the language of Judge Hawley, "Hands off of any and everything within my surface lines extending vertically downward, until you prove that you are working upon and following a vein which has its apex within your surface claim, of which you are the owner." (Con. Wyoming M. Co. vs. Champion M. Co., 63 Fed., 540.) For "within the lines of each location the owner shall be regarded as having full right to all that may be found until some one can show a clear title to it as a part of some lode or vein having its top or apex in other territory In other words, we may say that there is a presumption of ownership in every locator as to the territory covered by his location, and within his own lines he shall be regarded as the owner of all valuable deposits until some one shall show by a preponderance of testimony that such deposits belong to another lode having its top or apex elsewhere" (Leadville M. Co. vs. Fitzgerald, 4 Mor. Min. Rep., 380; see, also, King vs. Amy and Silversmith M. Co., 152 U. S., 222; Duggan vs. Davey, 26 N. W. Rep. 887; Doe vs. Waterloo M. Co., 54 Fed., 935; Chessman vs. Shreve, 37 Fed., 36.)

A party claiming the right to follow a vein on its dip under the surface of another person's mining claim is required to show by a preponderance of evidence that he has that right by virtue of his ownership to the vein which has its top or apex within his surface claim and to which is attached under the law an extralateral right.

The end lines of the Pioneer quartz mine, as patented, are not parallel. The northern end line diverges substantially toward the north from a direction parallel to the southern end line; such divergence being to the extent of 14 degrees and 45 minutes northerly from a direction parallel to the southern end line; such divergence between the said end lines is easterly and in the direction of the dip of the Pioneer vein

By reason of such non-parallelism of the end lines of the Pioneer mine, the defendant claims that no extralateral right is attached to the Pioneer, and that the plaintiff has no right to follow the Pioneer vein beyond the vertical boundaries of the Pioneer mine.

The controlling question, then, in this case is: Has the plaintiff the right to follow the Pioneer vein on its dip beyond the vertical plane drawn through the eastern side line of the Pioneer mine? This question is a most important one, and the court has given to it its most careful and earnest consideration.

The patent for the Pioneer quartz mine recites that in pursuance of the Act of Congress approved July 26, 1866, entitled, "An Act granting the right of way to ditch and canal owners over the public lands, and for other purposes," the Act amendatory thereof, approved July 9, 1870, and the Act approved May 10, 1872, entitled, "An Act to promote the development of the mining resources of the United States," there had been deposited in the General Land Office of the United States the plat and field notes of the survey of the Pioneer G. & S. M. Co. upon the Pioneer quartz lode bearing gold, accompanied by the certificates of the Register of the Land Office at Sacramento, in the State of California, whereby it appears that in pursuance of said Act of Congress, the Pioneer G. & S M. Co. did on the 23d day of February, 1873, enter and pay for said mining claim or premises, being mineral entry No. 63 in the series of said office designated by the Surveyor General as Lot No. 48 in the Jackson mining district in Amador county, California, in the district of lands subject to sale at Sacramento, embracing 22.32 acres of land more or less; and which is fully described by metes and bounds.

The following is the granting clause of the patent with the conditions and stipulations annexed: "Now, know you, that the United States of America in consideration of the premises and in conformity with the acts of Congress, have given and granted and by these presents, do give and grant unto the said Pioneer G. & S. M. Co and to their successors and assigns, the said mining premises hereinuefore described as Lot number 48, embracing a portion of the northeast quarter of section 20, in township 6 north of range 11 east, Mt. Diablo meridian, with the exclusive right of possession and enjoyment of all the land included within the exterior lines of said survey, not herein expressly excepted, from these presents, and of 589.94 linear feet of the said Pioneer quartz vein, lode or ledge or deposit as hereinbefore described *throughout its entire depth although it may enter the land adjoining*, and of all the veins, lodes, ledges or deposits throughout their entire depth the tops or apexes of which lie inside the exterior boundary lines of said survey at the surface extended downward vertically although such veins, lodes, ledges or deposits in their downward course may so far depart from a perpendicular as to extend outside the vertical side lines of said survey; provided, that the right of possession hereby granted to such outside parts of said veins, lodes, ledges or deposits shall be confined to such portions thereof as lie between vertical planes drawn downward through the end lines of said survey at the surface so continued in their own direction that such vertical planes will intersect such exterior parts of said veins, lodes, ledges or deposits. And provided further, that nothing in this conveyance shall authorize the grantees herein, their successors or assigns, to enter upon the surface of the mining claim owned or possessed by another. To have and to hold said mining premises, together with all the rights, privileges, immunities and appurtenances of whatsoever nature thereunto belonging, unto the said Pioneer G. & S. M. Co. and their successors and assigns forever, subject, nevertheless, to the following conditions and stipulations:

"First.—That the grant hereby made is restricted to the land hereinbefore described as Lot number 48, with 1589 94 linear feet of the Pioneer quartz vein, lode, ledge or deposit throughout its entire depth as aforesaid, the tops or apexes of which lie inside of the exterior lines of said survey, and to which no valid adverse claim existed on the 10th day of May, 1872.

"Second.—That the premises hereby conveyed, with the exception of the surface, may be entered by the proprietor of any other vein, lode, ledge or deposit, the top or apex of which lies outside of the exterior limits of said survey, should the same in its downward course be found to penetrate, intersect, extend into, or underlie the premises hereby granted, for the purpose of extracting and removing the ore from such other vein, lode, ledge or deposit.

"Third.—That the premises hereby conveyed shall be held subject to any vested and accrued water rights for mining, agricultural, manufacturing or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local laws, customs and decisions of courts.

"Fourth.—That in the absence of necessary legislation by Congress the Legislature of California may provide rules for working the mining claim or premises hereby granted, involving easements, drainage and other necessary means to its complete development."

It is argued that the said patent for the Pioneer quartz mine in so far as it attempts to grant an extralateral right is absolutely void, as being beyond the jurisdiction of the Land Department of the United States to make such a grant for the reason of the non-parallelism of the end lines of the Pioneer quartz mine.

Numerous authorities are cited to the effect that if the officers of the Land Department acted without authority of law, then their acts are void for want of power to issue the patent. Of the correctness of this proposition there can be no question. The authorities are uniform in holding that a patent issued by the Land Department of the United States to land over which that Department has no power of disposition is absolutely void and conveys no title whatever.

New Dunderberg M. Co. vs. Old, 79 Fed. 598; Rose vs. Richmond M Co., 17 Nev. 25; Reichart vs Felps, 6 Wall. 160; Best vs. Polk, 18 Wall. 112; Sherman vs. Buick, 3 Otto 209; Fanceour vs. Newhouse, 40 Fed 618; Smelting Co. vs Kemp, 104 U. S. 841; Wright vs Roseburg, 121 U. S. 519; Davis' Adm'r vs. Weibold, 139 U. S. 507; Doolan vs. arr, 135 U. S. 624; Deffenback vs. Hawke, 115 U. S. 392; Larkin vs. Dolly, 53 Fed. 333; Larkin vs. Roberts, 54 Fed. 461.

The plaintiff's title to the Pioneer quartz mine was derived under locations made prior to the passage of the Act of May 10, 1872, in other words its right accrued under the Act of Congress of July 26, 1866 This Act was the first general legislation in respect to the disposal of mines. By first section of the said Act it is provided: "That the mineral lands of the public domain, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and occupation by all citizens of the United States, and those who have declared their intention to become citizens, subject to such regulations as may be prescribed by law, and subject also to the local customs and rules of miners, in the several mining districts, so far as the same may not be in conflict with the laws of the United States." The second section gave to the claimant of a vein or lode bearing gold, silver, cinnabar or copper the right to file in the local Land Office a diagram of the same, so extended laterally or otherwise as to conform to the local laws customs and rules of miners, and to enter such tract and receive a patent therefor, granting such mine, together with the right to follow such vein or lode, with its dip, angles and variations, to any depth, although it may enter the land adjoining, which land adjoining shall be sold subject to this condition. Section 3 sets forth the steps necessary to be taken to obtain a patent, and provided that such plat, survey or description shall in no case cover more than one vein or lode, and no patent shall issue for more than one vein or lode, which shall be expressed in the patent issued. Section 4 among other things provided: "That no location hereaf ter made shall exceed 200 feet in length along the vein for each locator, with an additional claim for discovery to each discoverer of the lode, with the right to follow such vein to any depth with all its dips, variations and angles; together with a reasonable quantity of surface for the convenient working of the same, as fixed by local rules; and provided further, that no person may make more than one location on the same lode, and not more than 3000 feet shall be taken in any one claim by any association of persons"

As before stated, the patent for the Pioneer quartz mine was issued on the 12th day of August, 1872. But all the steps necessary to obtain a patent under the Act of 1866 were had and taken by plaintiff's grantor, the Pioneer G. & S. M. Co., prior to the passage of the Act of Congress of May 10, 1872. By sections 2 and 3 of the Act of July 26, 1866, it was provided that a claimant of a lode or vein could file a diagram of the same so extended laterally or otherwise as to conform to the local laws, customs and rules of miners, and enter such tract and receive a patent therefor, granting such mine together with the right to follow such vein or lode with its dips, angles and variations to any depth although it may enter the land adjoining, which land adjoining shall be sold subject to this condition: that upon the filing of this diagram and the posting of the same together with a notice of intention to apply for a patent, the Register of the Land office should publish and post the notice for the period of ninety days, and after the expiration of said period, if no adverse claim has been filed, the Surveyor General should on application of the party survey the premises, make a plat thereof endorsed with his approval, designate the number and description of the location, the value of the labor and improvements, and the character of the vein exposed; and upon the payment of $5 per acre, together with the costs of survey, plat and notice, and giving satisfactory evidence that the diagram and notice had been posted for the period of ninety days, the Register should transmit to the General Land Office the plat, survey and description and a patent should issue for the same thereupon

All of this had been done by the Pioneer G. & S. M. Co. long before the Act of May 10th, 1872, was passed. On the 23d of February, 1872, the claimant of the Pioneer mine entered and paid for the said mining claim and the Receiver of the Land Office on said day issued his duplicate receipt, evidencing such entry and payment. As soon as this payment was made the Pioneer G. & S. M. Co was entitled to a patent. When the Act of May 10, 1872, was passed plaintiff's grantor held the obligation of the Government to issue to it a patent for the Pioneer mine under the Act of July 26, 1866.

"By the mining laws of the United States three distinct classes of title is created, viz.: 1. Title in fee simple. 2. Title by possession. 3. The complete equitable title. The first vests in the grantee of the Government an indefeasible title, while the second vests a title in the nature of an easement only. The first, being an absolute grant by purchase and patent without condition, is not defeasible, while the second, being a mere right of possession and enjoyment of profits without purchase and upon condition, viz., to perform the labor or make the annual improvements required by the State. The equitable title accrues immediately upon purchase, for the entry entitles the purchaser to a patent, and the right to a patent once vested is equivalent to a patent issued." (Benson M. Co. vs Alta M. Co., 145 U. S., 428.)

"When the price is paid the right to a patent immediately arises. If not issued at once it is because the magnitude of the business in the Land Department causes delay. But such delay in the mere administration of affairs does not abolish the rights following from the purchase or cast any additional burdens on the purchaser or expose him to the assault of third persons." (Benson M. Co. vs. Alta M. Co., 145 U. S., 431-432.)

In the case of Stark vs. Starrs, 6 Wall, 402, the United States Supreme Court held that: "The right to a patent once vested is treated by the Government when dealing with the public lands as equivalent to a patent issued. When, in fact, the patent does issue it relates back to the inception of the rights of the patentee, so far as it may be necessary to cut off intervening claimants." In Carroll vs. Safford, 3 How., 441, it is said that "lands which have been sold by the United States can in no sense be called the property of the United States than lands patented, for, as the rights of the purchaser are concerned, they are protected under the patent certificate as fully as under the patent when sold. The Government, until the patent issues, holds the mere legal title for the land in trust for the purchaser." In Cons. Wyoming G. M. Co. vs. Champion M. Co., 63 Fed., 540, and in Walrath vs Champion Co., 63 Id., 552, it is held by Judge Hawley that "a receipt and certificate of purchase from the United States Land Office is the equivalent of a patent," and to the same effect is the decision of the United States Supreme Court in Defferback vs. Hawk, 115 U. S., 392. In People vs. Shearer, 30 Cal., 645-648, the Court, speaking through Mr. Justice Sawyer, said: "By the payment and acceptance of the purchase money the claimant has performed everything to be done by him, and the purchase has been complete ed. The payment, receipt and certificate of entry therefor constitute an entry of the land. The contract of purchase is executed and the land is his, and no longer belongs to the Government. The conveyance has not been made, but the Government of the United States only holds the legal title in trust for the purchaser. The land no longer constitutes a part of the public domain. The United States has ceased to have any proprietary interest in it. It is henceforth private property." * * * When a party pays the purchase money and receives the certificate of sale he is the owner of the land. "The United States has ceased to have any pecuniary interest in it. They hold the naked, dry, legal title for the holder of the certificate." Hamilton vs. Southern Nevada M. Co, 13 Sawy., 113, 33 Fed., 562; Union M. Co. vs. Danberg, 2 Sawy., 455; Amador Medean G. M Co. vs. outh Spring G. M. Co., 13 Sawy., 113, 36 Fed., 668-670; Aurora Hill Cons. M. Co. vs. 85 M. Co., 12 Sawy., 355, 34 Fed., 515.

In Wirth vs. Branson, 98 U. S., 118, Justice Bradley, who delivered the opinion of the Court, speaking of the value, force and effect of proceedings anterior to the issuance of a patent, says: "The rule is well settled, by a long course of decisions, that when public lands have been surveyed and placed in the market a person who

complies with all the requisites necessary to entitle him to a patent in a particular lot or tract is to be regarded as the equitable owner thereof * * *. The public faith has been pledged to him * * *." The authorities are uniform in holding that when a person pays the Government the purchase price of the land and received the certificate of purchase he is then vested with the complete equitable title, and the mere dry, naked, legal title remains in the Government in trust for the holder of the equitable title, in whom is vested all the rights and obligations of ownership. In Benson M. Co. vs. Alta M. Co., 145 U. S., 428. Mr. Justice Brewer, speaking for the United States Supreme Court, uses the following language at page 434: "There is no conflict in the rulings of this Court upon the question. With one voice they affirm that when the right to a patent exists the full equitable title has passed to the purchaser, with all the benefits, immunities and burdens of ownership, and no third party can acquire from the Government interest as against him."

By the foregoing authorities it is established that when on the 23rd day of February, 1872, the purchase price was paid and the certificate of purchase issued the Pioneer G. & S. M. Co. was invested with the complete equitable title, and held the obligation of the Government to issue to it a patent for the Pioneer mine. A patent when granted relates back to the first initial valid step, which is the foundation of the right and in pursuance of which the patent is issued. Kahn vs. The Old Telegraph M Co., 2 Utah, 174, 11 Mor. Min. Rep., 645; Benson M. Co., vs. Alta M. Co., 145 U. S., 428-434; Stark vs. Starrs, 6 Wall, 402; Sly vs. Frisbee, 17 Cal., 350; Yount vs. Howell, 14 Cal., 465; Touchard vs. Crow, 20 Cal., 150; Aurora Hill Co. vs. S. M. Co., 12 Sawy., 355-34 Fed., 515; Eureka M. Co. vs. Richmond M. Co., 4 Sawy., 302.

As the plaintiff's grantor received its certificate of purchase prior to the passage of the Act of May 10th, 1892, and the patent which was subsequently issued related back to the inception of the rights of the patentee, it is clear to my mind that the extralateral rights of the plaintiff may be determined under the Act of July 26th, 1866. When the Act of July 10th, 1872, was passed the plaintiff's grantor was already the owner of the absolute equitable title to the Pioneer quartz mine, and had been such owner ever since the 23rd day of February, 1872, the day on which it paid the Government of the United States the purchase price of the land. The fact that the patent was not issued until the 12th day of August, 1872, is, in my judgment, wholly immaterial. If on account of the magnitude of the business in the Land Department the patent was not issued immediately after the payment, such delay will not cast additional burdens upon the purchaser, nor deprive him of any right which he otherwise would have had. If by the Act of July 26th, 1866, parallelism of end lines was not required, then my opinion is that the plaintiff is entitled to extralateral rights irrespective of the provisions of the Act of May 10, 1872, which makes parallelism in end lines an essential requisite to the existence of any right the locator or patentee to follow his vein on its dip outside of the vertical planes drawn through the side lines.

As before stated, the Act of July 26, 1866, was the first general legislation looking to the disposal of mines. Before its passage the rights of miners upon the public domain of the United States were governed by the local rules and customs of miners. The Act did not interfere with those rights, but was confirmatory thereof. (Walrath vs. Champion M. Co., 63 Fed., 540; Carson City G. & S. M. Co. vs North Star M. Co., 33 Fed., 658; Eureka Cons. M. Co. vs Richmond M. Co., 4 Sawy., 302.) In no provision of the said Act is there any intention manifested to interfere with the possessory rights previously acquired, or which might thereafter be acquired. The intention expressed was to secure them by a patent, and the general purpose of the Act was to give the sanction of the Government to those possessory rights, acquired under the local customs, laws and decisions of the courts. (Jennison vs. Kirk, 98 U. S., 453.) Under these rules the lode was the principal thing, and the surface ground was a mere incident to the same for the convenient working thereof. (Walrath vs. Champion M. Co., 63 Fed., 540; Golden Fleece G. & S. M. Co. vs. Gable G. & S. M. Co., 12 Nev., 312, 1 Mor. Min. Rep., 120.) The location was made for a certain number of feet of the lode and the locator was entitled to the number of feet claimed in whatever direction the lode was found, with its dips, spurs and angles. (Carson City G. & S. M. Co. vs. North Star M. Co., 83 Fed., 658.) By the Act of 1866 the claimant of a lode who had occupied and improved the same according to these local rules and customs of miners, and having expended in actual labor and improvement thereon an amount of not less than $1000, and in regard to whose possession there was no controversy or opposing claim, could receive a patent for the same from the Government of the United States. A party applying for a patent under said Act was required to file in the local land office a diagram of the same, so extended laterally or otherwise as to conform to the local laws, customs and rules of miners, and to enter such tract and receive a patent therefor, granting such mine, together with the right to follow such vein or lode, with its dips, angles and variations, to any depth, etc. Under the terms of the Act of July 26, 1866, "However tortuous might be the course of the lode, the claimant had a perfect right to follow it up and prepare his diagram so as to include it, together with the surface ground on each side thereof allowed by the local laws. There is no language in the Act that requires the diagram to be in the form of a parallelogram or in any other particular form." Wolfey et al. vs. Lebanon M. Co., 4 Colo., 112, 13 Mor. Min. Rep., 235; Carson City G. & S. M. Co. vs. North Star M. Co., 83 Fed., 658-669. "As might be expected, the patents issued under this statute describe surface areas of different and sometimes irregular form. Often they were like a broom, there being around the discovery shaft an amount of ground deemed large enough for the convenient working of the mine, and a narrow strip extended therefrom as the handle of the broom. This strip might be straight or in a curved or irregular line, following, as was supposed, the course of the vein. Sometimes the surface claimed and patented was a tract of considerable size, so claimed with the view of including the apex of the vein in whatever direction subsequent exploration might show it to run. And, again, when there were local rules giving to the discoverer of the mine possessory rights in a certain area of surface, the patent followed those rules and conveyed a similar area." Del Monte M. Co. vs. Last Chance M. Co., 171 U. S., 55-84.

There is no provision of said act that requires the end lines of a mining claim to be parallel, nor is there any intention manifested to make parallelism essential. Up to the passage of Act of May 10, 1872, there was nothing whatever in the Statute which called upon the locator to make his end lines parallel, and it is only by virtue of the Act of May 10, 1872, that parallelism was made essential. The local rules and customs of the miners before the passage of that Act did not require it, nor did the Act of Congress of July 26, 1866. It is said by Mr. Justice Brewer in Del Monte M. Co. vs. Last Chance M. Co. (171 U. S. 87) that, "there is no inherent necessity that the end lines of a mining claim should be parallel." They must be parallel because the statute so specifically provides. (Section 2320 Revised Statutes.) Parallelism of end lines is purely a requirement of the Act of 1872. The object of the statute in this respect was no doubt to prevent a party from claiming more outside his lines than within them. Doe vs. Sanger, 83 Cal., 203. This was one of the evils the Act of 1872 provided against; but a right previously acquired not not interfered with by the Act of May 10, 1872. Section 9 of said Act is as follows: "That Sections 1, 2, 3, 4 and 6 of an Act granting the right of way to ditch and canal owners over the public lands and for other purposes, approved July 26th, 1866, are hereby repealed, but *such repeal shall not affect existing rights.* Applications for patents now pending may be prosecuted to a final decision in the General Land Office; but in such cases, where adverse rights are not affected thereby, patents may issue in pursuance of the provisions of this Act, and all patents for mining claims heretofore issued under the Act of July 26, 1866, shall convey all the rights and privileges conferred by this Act, where no adverse rights exist at the time of the passage of this Act." (Section 2328 Revised Statutes.) The intent of Congress is expressly declared by said section to prepare unaffected all existing rights acquired under the Act of 1866. Congress, instead of designing to interfere with the previously acquired rights, expressly enlarges them, as are the rights of all patentees under the Act of 1866, by granting all veins, lodes and ledges having their tops or apexes within the exterior boundaries of their surface claims. Thus a patent under the Act of 1866 conveyed only the one vein or lode applied for; all other veins were expressly reserved. The said Act provides that the "plat, survey or description shall in no case cover more than one vein or lode, and no patent shall issue for more than one vein or lode, which shall be expressed in the patent issued." (Section 3, Act of 1866.) The effect of the Act of 1872 (where no adverse rights existed) was to grant to such prior patentees all other veins, lodes and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically in whatever course or direction they might run. (Walrath vs. Champion M. Co., 63 Fed. 552-557.)

That the intent of Congress was not to abridge any of the rights of the miners acquired under the Act of 1866 is further manifested by Section 12 of the Act of 1872 wherein the following language is used: "Nothing in this Act shall be construed to enlarge or affect the rights of either party in regard to any property in controversy at the time of the passage of this Act, or of the Act entitled 'An Act granting the right of way to ditch and canal owners over the public lands and for other purposes, approved July 26, 1866, *nor shall this Act affect any right acquired under said Act;*" and Section 16 provides, "That all Acts and parts of Acts inconsistent herewith are hereby repealed: *provided that nothing contained in this Act shall be construed to impair in any way rights acquired under existing laws.*" The proviso contained in said Section 16 is embodied in the same terms in Section 2344 of the Revised Statutes of the United States.

That the policy of Congress was to preserve previously acquired rights and not to impair them, sufficiently appears by Section 5597 of the Revised Statutes, which section reads as follows: "The repeal of the several Acts embraced in said revision *shall not affect any act or any right accruing or accrued* or any suit or proceeding had or commenced in any civil cause before the said repeal, *but all rights* and liabilities under said Acts *shall continue and may be enforced in the same manner as if said repeal had not been made* * * * *."

It is apparent to my mind from the foregoing provisions of the statute that the intention of Congress was not to abridge but to preserve and continue the rights of the miners acquired under the provisions of the Act of July 26, 1866.

The Act of May 10, 1872, did not curtail and was not intended to curtail or modify any rights acquired under the Act of 1866. None of its provisions are capable of that construction, nor could the Court so construe the Act as to give it a retrospective effect and thereby impair vested rights. Of course, such being the case the extralateral rights of the plaintiff must be determined under the provisions of the Act of 1866.

As before stated there is no provision of the Act of 1866 that requires the end lines of a mining claim to be parallel, nor is there any intention manifested by said Act to make parallelism essential. That the Act of 1866 (under the provisions of which plaintiff's rights accrued) did not require parallelism of end lines has been adjudged in the following cases: Eureka Cons. M. Co. vs. Richmond M. Co., 4 Sawy. 302; Carson City G. & S. Co. vs. North Star M. Co., 83 Fed. 659-669; Walrath vs. Champion M. Co., 63 Fed. 552; Cons. Wyoming G. M. Co., 118 U. S. 196; Carson City G. & S. M. Co. vs. North Star M. Co., 73 Fed. 597.

Upon the question of parallelism of end lines under the Act of 1866 the case of Eureka Cons. M. Co. vs. Richmond M. Co. (4 Sawy 302) is important. The plaintiff, the Eureka M. Co. was the owner of several locations, among which were the Champion, At Last, and the Lupita or Margaret mining claims. The Champion was patented with parallel end lines. But the end lines of the At Last and the Lupita or Margaret as patented were not parallel, *but diverged in the direction of the dip of the vein.* The Champion was located in May, 1870, and was patented in 1872. It did not appear in the record when the At Last and the Lupita or Margaret claims were located. The patent shows that Lupita was entered and paid for on the 14th of February, 1877, and the patent issued on the 30th day of March, 1877. The At Last, as appears by the patent, was entered and paid for on the 29th day of March 1873, and the patent issued on the 12th day of December, 1876. The defendant, the Richmond M. Co., made objection to the validity of the patents to the At Last and the Lupita or Margaret, because the end lines were not parallel, as required by the provisions of the Act of 1872. To this contention of the Richmond Co. Justice Field said: "But to this objection there are several obvious answers. In the first place, it does not appear upon what locations the patents were issued. They may have been, and probably were, issued upon locations made under the Act of 1866, where such parallelism in the end lines of the surface locations was no required. The presumption of law is that the officers of the executive department specially charged with the supervision of applications for mining patents and the issue of such patents did their duty; and the assertion of a contrary mere surmise to the contrary will not be listened to. If, under any possible circumstances, a patent for a location without such parallelism may be valid, the law will presume that such circumstances existed. A patent of the United States for land, whether agricultural or mineral, is something upon which its holder can rely for peace in security in his possession. In its potency it is ironclad against all mere speculative inferences. In the second place the provisions of the Statute of 1872, requiring the lines of each mining claim to be parallel to each other, is merely directory, and no consequence is attached to a deviation from its direction. Its object is to secure parallel end lines drawn vertically down, and that was effected in these cases by taking the extreme points of the respective locations on the length of the lode. In the third place, the defect alleged does not concern the defendant, and no one but the Government has the right to complain."

Unquestionably the above doctrine of the Eureka case in so far as it holds that the provisions of the Statute of 1872, requiring the end lines of mining claims to be parallel, is merely directory and that no consequence is attached to a deviation from its direction has been modified by the United States Supreme Court. Iron Silver M. Co. vs. Elgin M. Co., 118 U. S. 196; Del Monte M. Co. vs. Last Chance M. Co., 171 U. S. 55.

The defendant, the Richmond M. Co., also held several patents issued to it upon different locations, but it specially relied upon the patents to the Richmond and the Tip Top claims. It alleged that these patents were issued upon locations made prior to any upon which the patents to the Eureka Co. were issued; and its contention was that inasmuch as the croppings of the vein were within the surface of the patented locations it had the right to follow the vein wherever it went, although it be outside of the end line planes. Its position was that "whenever under the law of 1866 a location was made on a ledge or vein, a right was acquired to follow the vein wherever it might lead, without regard to the end lines of the location." In the discussion of this contention of the Richmond Co. Mr. Justice Field among other things said: "Now, as neither the rules of miners in Eureka mining district nor the Act of 1866 in terms, speak of end lines to locations made on ledges nor in terms impose any limitation upon miners following these veins wherever they may lead, it is contended that no such limitation can be considered as having existed and be enforced against the defendant. The Act of 1866, it is said, recognizes the right of the locator to follow his vein outside of end lines drawn vertically down when it permits him to obtain a patent granting his mine, together with the right to follow such vein or lode with its dips, angles and variations to any depth, although it may enter the land adjoining, which land adjoining shall be sold subject to this condition.

"It is true that end lines are not in terms named in the rules of the miners, but they are necessarily implied and no reasonable construction can be given to them without such implications. What the miners meant by allowing a certain number of feet on a ledge was that each locator might follow his vein for that distance on the course of the ledge and to any depth within that distance. So much of the ledge he was permitted to hold as lay within vertical planes drawn down through the end lines of his location, and could be measured anywhere by the feet on the surface. If this were not so, he might by the bend of his vein hold under the surface along the course of the ledge double and treble the amount he would take on the surface. Indeed, instead of being limited by the number of feet prescribed by the rules, he might in some cases oust all of his neighbors and take the whole ledge. No construction is permissable which would substantially defeat the limitation of quantity on a ledge, which was the most important provision in the whole system of mining."

The Court is here speaking of the claim of the Richmond Co. under the Act of 1866 to follow its vein wherever it might lead, without regard to the end lines of the location. In the consideration of the Eureka case the fact must not be lost sight of that the Court is here dealing with patented locations. Whatever may have been the rights of a locator under the Act of 1866, to follow his vein or lode wherever it might lead, still when he received a patent, those rights were controlled by the patented lines, and he could not follow the vein on its course beyond those lines. The contention of the Richmond Co. was that it had the right to follow the vein on its strike beyond the end lines and this Mr. Justice Field held should not be done, because if this were so a party "might by *the bend of his vein* hold under the surface along the course of the ledge double and treble the amount he could take on the surface." This does not mean the dip of the vein, but it means a bend on its strike, a change in its course, where it may pass out of and beyond the surface location. The decision in the Eureka case gives to the plaintiff all the ground in dispute lying within planes drawn vertically downward through the end lines of the plaintiff's patented locations. The end lines of the At Last and Lupita or Margaret claims as before stated were not parallel, *but diverged in the direction of the dip of the vein*; and to hold that the language above quoted from the Eureka case requires parallelism of end lines under the Act of 1866, to support the extralateral right would be to ignore the ultimate conclusion reached by the Court. Therefore this language of Justice Field must be applied exclusively to the contention of the Richmond Co. to follow the vein on its strike beyond the end line planes. This doctrine of the Eureka case against the right claimed by the Richmond Co. to follow the vein beyond the end line planes is but the forerunner of the following decisions that subsequently defined the rule that you could not follow the vein on its strike beyond your surface boundaries: Mining Co. vs. Tarbet, 98 U. S. 463; Argentine M. Co. vs. Terrible M. Co., 122 U. S. 478; King vs. Amy and Silversmith M. Co., 152 U. S. 222; Iron Silver M. Co. vs Elgin M. Co., 118 U. S. 196. See also Wolfey vs. Lebanon M. Co., 4 Colo. 112; 13 Mor. Min. Rep. 232. New Dunderberg M. Co. vs Old, 79 Fed. 598.

It is contended by the defendant in the case at bar that the Eureka case was substantially decided upon the ownership by the Eureka Co. of the Champion claim alone; a mining claim which had parallel end lines. With this contention of the defendant I am unable to agree. It is true that the Champion had parallel end lines. But the decision of the Court was not based on the ground of the ownership by the Eureka Co. of the Champion alone, but was based on the ground of its ownership of the Champion, the At Last and the Lupita or Margaret claims.

The Eureka Co. was the patentee of several locations, but for the purposes of the action Justice Field said it was only necessary to refer to three of them: the Champion, the At Last and the Lupita or Margaret claims. The diagram accompanying the opinion (4 Sawy. 304) shows the relative positions of these three mining properties. The Court found that the *top or apex of the lode was within the surface lines of these three mining claims.*" (Finding of fact No. 17.) And as the ground in dispute was within planes drawn vertically downward through the end lines of these patented locations, Justice Field held that the ground was the property of the Eureka Co., and that it was entitled to judgment for its possession.

The Eureka case went to the Supreme Court of the United States, and the judgment in favor of the Eureka M. Co. was affirmed. The Supreme Court after passing upon the comprimise agreement said the Richmond Co. is in no condition to dispute the validity of the Eureka's patents for the At Last and the Margaret because the end lines of the surveys are not parallel as it has agreed with the Eureka, for a consideration not to work in the limestone to the south and east of the compromise line. Upon the face of the patents the United States has granted to the Eureka the right to small veins, lodes and deposits, the tops or apexes of which lie on the inside of its surveys as patented, throughout their entire depth, and wherever they may go provided it keeps itself within the end lines the surveys. The finding that the ground in dispute is within the end lines and that the apex is within the surface lines settles the rights of the parties between themselves as well under their patents as under their compromise agreement." (Richmond M. Co. vs. Eureka M. Co. 103 U. S. 839-847).

There is nothing in Mining Company vs. Tarbet 98 U. S. 463, as I read the decision, that requires parallelism of end lines under the Act of 1866 nor does the decision, as I understand it, qualify the doctrine of the Eureka case (4 Sawy. 302). In Mining Company vs. Tarbet commonly called the "Flagstaff case" a surface location was made which was 100 feet wide by 26 feet long. This location was known as the Flagstaff mine and for which the plaintiff in error held a patent issued under the Act of 1866. It lay across the lode, not along it. The location was made on the supposition that it followed the course of the ledge, but subsequent developments show that it crossed the vein at right angles, so that there was but 100 feet of the vein within the surface boundaries.

The claim of the plaintiff in error was of the ownership of 2600 feet in length of such vein. In other words the contention was that it was the lode which was granted, and that the surface ground was a mere incident for the convenient working of the lode. This contention of the owner of the Flagstaff was presented in the following instruction propounded by the plaintiff in error in the trial court, which instruction the Court refused:

"By the Act of Congress of July 26th, 1866, under which all these locations are claimed to have been made it was the vein or lode or mineral that was located and claimed; the lode was the principal thing and the surface area was a mere incident for the convenient working of the lode; the patent granted the lode as such irrespective of the surface area which an applicant was not bound to claim; it was his convenience for working the lode that controlled his location of his surface area; and the patentee under that Act takes a fee simple title to the lode, to the full extent located and claimed under said Act."

The Supreme Court of the United States in affirming the judgment of the lower court held, that in such case the so-called side lines were in fact end lines and that the locator was restricted to so much of the lode as his claim covers. That the right to follow the dip outside of the side lines was based on the hypothesis that the direction of these lines corresponded substantially with the course of the lode or vein at its apex or near the surface. "It was not the intent of the law to allow a person to make his location crosswise of a vein so that the side lines shall cross it, and thereby give him the right to follow the strike of the vein outside of his side lines. That would subvert the whole system sought to be established by the law." If he locates crosswise of the lode and his claim is only 100 feet wide that 100 feet is all he has a right to. The end lines of a location are those which are laid crosswise of the general course of the vein on the surface, and by those lines the locator's rights must be measured, no matter how he may have located his claim.

The question of parallelism of end lines under the Act of 1866 was not a question before the court in the Flagstaff case; nor does the court in any manner pass upon it.

The case of New Dunderberg M. Co. vs. Old 79 Fed., 598, affirms the rule laid down in the Flagstaff case to the effect that when the side lines of a location cross the course or strike of the veins they constitute end lines and the owner of the claim cannot follow the vein outside of those lines. Other questions were also raised and decided but none of them have any bearing on the question of parallelism of end lines under the Act of 1866.

The case of Carson City G. & S. M. Co. vs. North Star M. Co. 83 Fed., 658, in many of its features resembles the case at bar; except that the end lines of the North Star mine converge, whereas the end lines of the Pioneer mine diverge in the direction of the dip of the vein. But the principal in both cases in my judgment is the same. The application to enter and receive a patent for the North Star mine was made on the 15th day of September, 1899, and the patent was issued on the 11th day of August, 1875. In the North Star case it was contended for the plaintiff in error that because the patented claim of defendant was composed of a number of locations, no extralateral rights were secured to it unless it showed the lines of each separate location. That Section 2322 Rev. St. U. S. refers exclusively to a single location. That if the boundaries comprising the aggregate amount applied for and patented do not appear in the patent, but only the exterior boundaries of the entire aggregated tract then the patentee, if he claims the extralateral right as to any vein, the apex of which is found within the surface of his aggregate tract, should be held to establish by proof where some location was, and how it was laid upon the ground, or be denied the extralateral right.

The court held that this contention could not be sustained. "That the defendant was not required to show the separate lines of any of the original locations embraced within the surface boundaries of the patented claim." It was enough for it to show that a lode running in an easterly and westerly direction (lengthwise with the claim) and having its apex within the surface boundaries of the defendant's patented ground, extended, in its dip downward into plaintiff's ground.

The Court then discusses the rights conveyed by a patent and the presumptions in favor of patents regularly issued; citing authorities to the effect that the issuance of the patent is conclusive as to all precedent acts and facts which the land department must find to exist before the patent can rightfully issue.

As to the end lines of the North Star claim not being parallel, the court speaking through Judge Hawley said:

"The plaintiff in error contends that if the patented area of the North Star is to be considered as a location its end lines are not parallel, as found by the court, and that under Section 2320 Rev. St., the defendant possesses no extralateral rights under it. The Act of 1866, under the provisions of which the patent in this case was applied for, and under which the rights of defendant in error accrued, did not require parallelism of end lines."

From the foregoing it follows, that the plaintiff possesses extralateral rights, and is entitled under its patent to follow the Pioneer on its dip beyond the vertical plane drawn through the eastern side line of the Pioneer mine.

As to the question of interest, my opinion is that under Section 3287 of the Civil Code the plaintiff is only entitled to recover interest from the date of the stipulation.

I have examined the numerous cases cited with care and after a most careful consideration of this case my conclusion is that plaintiff, the Argonaut M. Co. is the owner of the ore bodies in dispute and that it is entitled to judgment. And it will be so ordered.

Dated March 13th, 1899.

G. W. NICOL, Judge Presiding.

(Endorsed)

Filed March 15, 1899, by J. S. JACK, Clerk.

The following is from two reports made in September, '98:

Geology of the Argonaut Vein.

In the Argonaut and Kennedy mines is found a perfect example of that class of mineral deposit known as and called a "true fissure" vein. By the term "true fissure" is meant a vein or fissure which cuts through rock formations of either similar or unlike character, wholly independent of either the dip or strike of the rocks which form the walls of the vein.

Veins of undoubted fissure type do occur, however, which conform with strike or dip of the wall rocks, and in some instances with both.

That the Argonaut vein is persistent for thousands of feet

in both strike and dip is abundantly proven in the extensive workings of the Argonaut and Kennedy mines, connection of their levels at numerous points showing clearly the identity and continuity of the vein in these mines.

The geology of the vein is very simple and may be briefly stated. That geological horizon known as the "Mariposa Beds" (U. S. Geological Survey), which here, as elsewhere in California, consists of finely laminated black clay slates, is found intruded by dyke-like masses of diabase.

These are of varying width and appear to have been thrust in from the northward, where, at a distance of 1000 feet or thereabouts, to the northward of the Argonaut shaft along the base of the Reservoir hill, the diabase seems to have almost wholly displaced the clay slates. To the westward of the most westerly of these slate strips is found a broad area of diabase mostly massive and granular, extending many thousands of feet to the northward and southward.

When in their normal position and condition we find the slates of the "Mariposa beds" along the "gold belt" almost universally dipping to the eastward and striking a few degrees west of north. In the Argonaut mine local disturbances have resulted in folding, faulting and crushing these slates, the degree of foliation and alteration appearing in proportion to the amount of crushing and shearing to which the rock has been subjected. Whether or not the cleavage planes of the slates are coincident with the planes of sedimentation cannot be determined, nor is it important.

The diabase has also shared in this alteration from the same causes, namely, movement and fracture of the rock masses due to tremendous compressive stress resulting in a process of crushing and shearing of this hard, tough, granular rock and its consequent alteration to splintery, schistose and slaty rocks with every phase of transition from granular normal diabase to chloritic slate and schist. (Amphibolite schist U. S. G. S.) Diabase when so altered to a slaty condition forms the "gray slate" of the miners.

The slaty structure in these rocks is often so perfect that is some instances, particularly when found in the vicinity of the black clay slates, where the chloritic rocks have become blackened by metamorphosing influences, it is extremely difficult and often impossible to distinguish one from the other by their physical appearance.

The vein can be followed continuously from its apex in the Argonaut claim to the lowest level of the mine without break or interruption of any kind.

The apex and upper portion of the Argonaut mine is wholly in massive diabase which is found much decomposed for some distance on either side of the vein to a depth of several hundred feet, but for most part retaining its massive structure.

In proximity to the vein an alteration to a splintery or schistose condition may often be observed, and impregnations of pyrite are of frequent occurrence where such alterations are found. In the hanging wall diabase are found numerous small veins and seams of quartz, some of which lie nearly parallel with the principal fissure plane, but the greater number have a westerly dip, extending upward from the fissure into the hanging wall.

Similar seams and vein-like sheets also occur in the foot wall diabase, but usually in lesser number. These attendant sheets and veins of quartz are incidental to many veins elsewhere and very frequently contain sufficient valuable mineral to entitle them to be included in the zone of "pay rock" together with the main fissure when the entire zone of mineralization is, and very properly should be considered as a single vein or lode.

In making an examination of the vein structure and wall rocks in a raise extending upward from the 470-foot level to the adit (Pioneer tunnel) level of the Argonaut mine geological conditions exist which at once determine the fact that the vein occupies a "fault-fissure," the hanging wall having moved upward relatively to the foot wall, constituting a "thrust" or "reverse" fault. There may possibly have been also a lateral movement along the fissure plane to the southward, striations found on the walls of the vein, dipping to the northward, tend to strengthen this belief. The amount of displacement as determined by measurement in the raise is about 125 feet.

VERTICAL CROSS SECTION OF THE VEIN IN THE ARGONAUT MINE.

The quartz occurs along this fault plane in a most persistent manner and is rarely absent, even for a short distance. In width the quartz varies from 1 to 2 inches to upward of 30 feet. When for a brief space quartz disappears in the raises above the 470-foot level, the "gouge," resulting from attrition caused by the movement of these rock planes upon each other, and which always accompanies this vein, clearly indicates the plane of the fissure. In passing through these raises it may be noticed that where no quartz appears in the fissure on one side of the cutting it may usually be found on the opposite side. No more conclusive evidence of a continuous vein than the fact that it occupies a fault plane could be desired.

It may be contended that this vein occupies a contact fissure, but abundant evidence, found on the several levels of the mine, indicates clearly that the contact is of purely local character and that the fissure is absolutely independent of it, for the vein does not conform for any considerable distance, in the Argonaut mine, in either strike or dip, to the contact planes of the black clay slates of the "Mariposa beds" and the diabase, or the schistose and slaty rocks resulting from its alteration.

The dip of the vein varies from a comparatively small angle at the apex to about 67° from the plane of the horizon in the lower levels, and in general at a somewhat lesser angle than that of the inclosing rocks.

W. H. STORMS.

The Pioneer lode location, as patented, includes the apex of a quartz lode, the surface course of which extends through the length of the location, along the center line thereof and parallel with both side lines. This apex is shown on the surface in shallow pits and cuts at the north end line for about 60 feet southward within the Pioneer ground. Its further course southward is covered by a body of conglomerate cement, which forms the capping of this part of the hill. At a point 314 feet from the north end line, and on the center line of the location, a vertical shaft, 71.5 feet deep (commonly called the 60-foot shaft) has been sunk through this conglomerate to the apex of the lode, which is clearly disclosed at the bottom of the shaft. A shallow inclined winze has been sunk on the lode at this point, and a drift has been run on the lode northward for about 32 feet. This drift discloses a continuous lode under the conglomerate capping.

Southward from the said 60-foot shaft the conglomerate extends for several hundred feet, forming a practically level summit ridge, but at a point about 500 feet from the south end line of the Pioneer ground the surface falls away rapidly southward, and the conglomerate capping being no longer present (having been removed doubtless by erosion), the underlying rock is again exposed at the surface, and the apex of the vein is shown in several pits and trenches, which exhibit the vein quartz in place, nearly on the center line of the location. The course of the apex of this lode is thus shown to be along the said center line, notwithstanding the difference in altitude at different parts of this course. An absolutely horizontal line in the vein would show the "true course," in a technical sense, to be more nearly north and south than this actual surface course or apex course. In other words, if the south end of the claim had not been reduced in altitude by erosion, the apex, existing in that case at a higher level, would cross the south end line at a point farther west than the point where it now crosses.

The lode thus disclosed at the surface or under the conglomerate lies between greenstone walls on both sides and dips eastward. It is again encountered at a point about 71 feet vertically lower than the bottom of the 60-foot shaft, and 205 feet farther east, by the so-called Spring tunnel, which cuts the lode 184 feet from the tunnel mouth. From this point an upraise has been started to connect with the apex at or near the bottom of the 60-foot shaft, an inclined distance of 225 feet. This upraise will be somewhat oblique and flatter than the true dip of the vein. It has not yet been finished so as to exhibit a connection on the vein throughout; but an inspection of the map will show that the level of the Spring tunnel is within the ground of the Pioneer location and that it is physically impossible for the lode there revealed to apex outside of the said ground. However, I am entirely satisfied as to the fact, not questioned so far as I am aware by any person, that the lode in the level referred to is the same as the lode shown at the bottom of the 60-foot shaft.

From the intersection at the Spring tunnel this vein is exposed continuously down to the Pioneer or adit level by an upraise showing quartz, gouge and walls. This level has been run in the lode for 812 feet north and 112 feet south, showing a continuous vein. The course of the level is, for the reason given above, more nearly north and south than the surface course of the apex.

From this level down to the 290-foot level of the Argonaut mine the vein is exposed by an upraise between the walls and within the vein. Gouge and quartz and sometimes (but not at all points) the walls can be seen. The walls are greenstone, softened and altered by surface influences to some extent, but clearly recognizable. The dip of the vein continues to be flat—say about 37½°.

A similar upraise between the 490 and the 290 foot levels shows the vein to continue with a dip of 48° to the 470. But about 31 feet below the 290 the greenstone of the hanging wall gives way to the black slates characteristic of the Mother Lode zone. In other words, the lode in its downward course reaches the contact between the greenstone and the slates which overlie it. The contact at this point stands steeply, dipping 69° to the east.

The two rocks are "frozen" together, and there is neither quartz nor gouge in the plane of contact.

From this point down to a point about 38 feet below the 385, and 63 feet above the 470 level, the upraise shows the lode to have a slate hanging wall and a greenstone footwall. In other words, the lode is for this distance and on this particular cross-section "in the contact." At the 470 level it is wholly in the slate, both opposite the shaft, and at the point where the upraise leaves the level. But farther north on the level the greenstone is again seen in the footwall, thus showing that the vein does not everywhere occupy the contact, even on that level. In other words, this lode has no structural relation to the contact, but cuts through it obliquely in both strike and dip. It is a matter of no importance how far the lode is, at any given point on any level, from the contact.

The lode apparently occupies a fault plane, which has cut through greenstone and slates, without regard to their position and relations. There are signs of movement in the walls, such as crushing and contortion of the slates, slickinsides, etc., indicating that the movement was a thrust or reverse fault—that is, that the hanging wall was moved relatively upward. If the direction of this movement had been straight up on the dip, its extent could perhaps be measured by the distance between the point where the faulting lode reaches the contact and the point where it fully enters the slates—say about 123 feet. But I think it more likely that the movement of the hanging wall was obliquely upward—that is, was a southward as well as an upward movement, and its extent was proportionately greater than its upward component of 123 feet, as measured in the upraise.

It is probably impossible at this time to unravel and analyze all the movements which have taken place in these rock masses since they were first consolidated, and it is fortunately unnecessary to do so, since the ultimate result, as left by the final process (whatever it was) is a continuous fissure vein, extending from the apex to the bottom level of the Argonaut mine. Nor is it necessary here to state in detail the proofs of the identity and continuity of this lode from the 470 to the 1350 level. They consist in winzes and upraises exposing the vein and successive levels and stopes upon it, from which thousands of tons have been removed. The character of ore and gouge is maintained, except so far as the nature of the walls modifies it. The heavy black gouge, for instance, is characteristic of the vein in the slates. The walls sometimes show greenstone on the so-called gray slates, which are a schistose variety of greenstone; but these occasional alternations, doubtless due to the cutting of layers of different rock by the vein fissure, do not affect its course or dip.

In the Kennedy mine the same lode is worked to a much greater depth. Its identity is shown wherever the workings of the two mines are connected by continuity of stopes, walls, gouge and quartz. From the 1350 level of the Argonaut to the 2100 level of the Kennedy mine, these proofs of identity and continuity appear.

On the 470 level of the Argonaut and on every level below the workings of the Kennedy Co. have been encountered in driving northward. I consider, therefore, the following to be the facts proved:

1. The Pioneer lode, which is worked in the Argonaut mine, has its apex in the Pioneer location, both end lines of which it crosses.

2. It maintains its identity and continuity from the said apex to the bottom of the lowest level of the Argonaut mine.

3. It is the lode upon which the adjacent workings of the Kennedy Co. have been made, including all the underground workings of said company, which proceed from the South Kennedy shaft and extend southward as far as the boundary formed by a vertical plane drawn through the north end line of the Pioneer location.

R. W. RAYMOND.

That First California Mining Electric Plant.

TO THE EDITOR:—Referring to your statements in "Concentrates," March 4th and 11th, regarding first use of electrical power transmission in California mining, I would say: At the Big Bend mine, Feather river, Cal., an electric plant was installed in '88 and used during that season. The plant consisted of two Edison dynamos, 70 H. P. each, driven by water wheels; one 8-foot Knight and one 4-foot Pelton, under 300 feet head; twelve motors, 5 H. P. each and eight miles of line of four wires. Power was delivered at four camps where mining was being done in bed of river. Eight motors were used to drive as many Richards centrifugal pumps, 4-inch suction and discharge, and the other four to furnish power for derricks used in moving boulders. The wire used on pump circuit was about ⅜-inch diameter and weighed 1600 pounds per mile. Wire on derrick circuit was ¼-inch diameter and weighed about 800 pounds per mile.

A great deal of trouble was experienced on account of motor armatures burning out, a number being removed by the California Electrical Works at a cost of $100 each. Prof. Keith of San Francisco removed one or two late in the fall. The plant was taken out and the wire (52,000 pounds) shipped to New York in January, '89.

Mr. N. A. Harris of 414 Cole street, San Francisco, was Gen. Supt. and myself foreman, until August, '88, when Mr. Harris resigned to take the management of the Golden Gate mine at Oroville, and I was appointed Supt. in which position I remained until the mine was finally closed down.

A. K. BEATSON.

Oakland, Cal., March 14th, '99.

Numerous Rotary Engines.

This class of inventions now averages about three patents per week. There are now on file at Washington nearly 500 rotary patents.

The rotary engine in its perfected state will have seven distinctive advantages already recognized by mechanical authorities over the reciprocating form. They are:

1. Absolute control of the steam power by cut-off and valves.
2. Minimum of space occupied, both for engine and boiler.
3. Minimum of cost of manufacture.
4. Minimum of steam necessary to develop a given amount of power.
5. Minimum of friction and wear, and the avoidance of dead working parts.
6. Interchangeability of its eight simple working parts.
7. Regulation of speed without loss of power or sacrifice of durability.

MOST of the circulars sent to busy men are consigned immediately to the waste basket without so much as a hasty perusal. An Eastern firm, realizing this, prints the following on the envelope: "Caution: Remove the envelope carefully and exercise still greater care in handling the enclosed circular. Don't throw it in the waste paper basket, or give it to the servant to light the fires with, as the most disastrous results will follow, inasmuch as the circular is dipped in a solution of dynamite. Hang it up in a cool, dry place, and after a few days' exposure its dangerous properties will disappear, and it can be burned like any other circular." Then at the lower edge of the envelope is printed: "N. B. Most firms do their heavy lying in their circulars; we alone do all of ours on the envelopes."

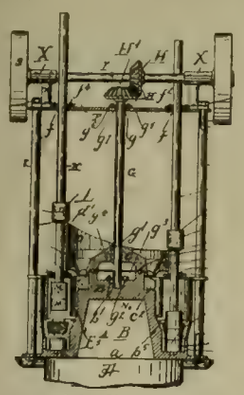
AN electric rock drill is reported in use by a coal company of southern France for tunneling through very hard rock wherein the power of a waterfall several miles away is utilized, and to the axle of the turbine wheel an alternator with a three phase current is attached. The current is made use of in various ways, for it drives the drills, furnishes power to a motor carrying out the debris and actuates the fresh air fans.

Latest Mining and Metallurgical Patents.

Patents Issued March 14, 1899.

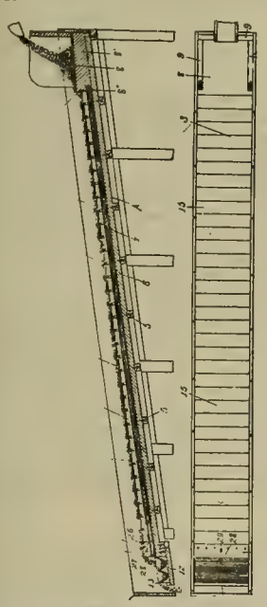
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ANNULAR STAMP MILL.—No. 620,962; F. L. Pres-, Beloit, Wis.



An annular central-feeding stamp mill; a combina- with a mortar frame provided with an annular chamber, stamps mounted to reciprocate therein an annular ledge or shelf on frame adjacent to upper surface thereof, of a camwheel mounted to ate on the upper surface of mortar frame to op- te stamps; provided with a conical hub and a rality of apertures through which ore may drop on annular ledge, plows mounted on wheel and apted to scrape the ore from ledge to the die cham-, and means for rotating camwheel. The stamps mounted to coact with the dies, provided with rtically extending rotatable stems, a frame unted on mortar adapted to support the guide mp stems, tappet surfaces on stems, a camwheel atively mounted on mortar, the cam surfaces of ich have rolling contact with tappet surfaces; rtures between the periphery of wheel and its for the passage of ore therethrough upon the ular ledge or shelf.

OXIDIZING FURNACE.—No. 620,887; H. J. Clark, ver, Colo.

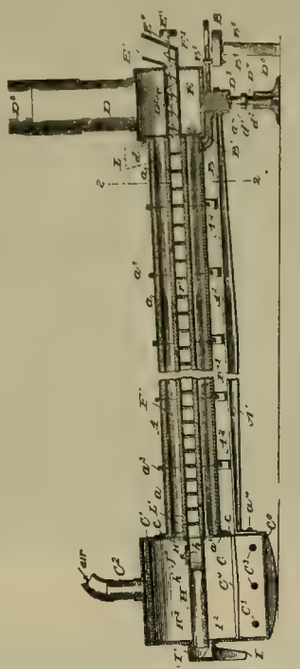


An oxidizing furnace combining an oxidizing flue, ans for oscillating the same, and retarding de- es extending transversely from opposite sides and rtially across flue, of a fire box and smoke box at posite ends thereof, a supporting beam connected fire and smoke boxes, and means upon beam for pporting flue and rotatable bearings for same, an e roasting passage and ore drying passage, means introducing and removing ore from drying pass- e and independent feeding and delivery devices ore roasting passage.

ANODE.—No. 621,121; J. T. Morrow, Great Falls, nt.

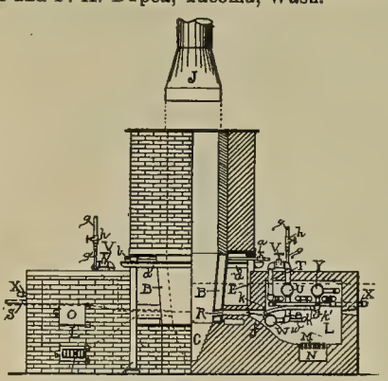
An anode, consisting of impure cast copper and one or more loops of sheet metal, both ends of which are secured in the impure copper by being cast therein.

AMALGAMATOR.—No. 621,092; A. H. Jocelyn, New York, N. Y.



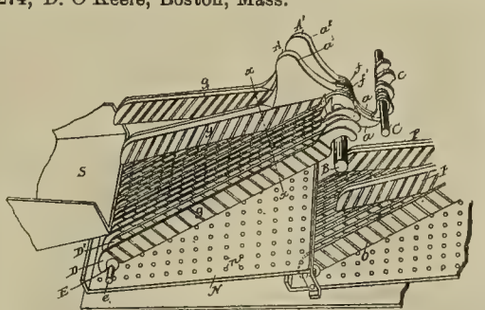
An amalgamating device comprised of a sluice formed of a series of shiftable, freely removable, interchangeable, overlapping and interlocking flat, non-pan-formed amalgamating plates disposed in position to form a stepped surface to permit the free passage of water thereover, all of the plates being simultaneously shiftable on the removal of one or more from the series, and each of a construction and formed of precious metal throughout, whereby it may be melted up with the amalgam attached thereto.

SMELTING STACK FURNACE.—No. 621,088; C. A. House and F. A. Dupea, Tacoma, Wash.



A stack smelting furnace comprising a set of hydrocarbon gas generating and combustion furnaces connected with and located on the sides of a stack furnace, each generating and combustion furnace having a superheating steam-pipe coil and a superheating air-pipe coil fixed in the upper part thereof; the steam-coil having a valve for regulating the steam supplied therethrough, connections for supplying oil to coil, a suitable chamber for receiving and mixing the oil and the superheated steam simultaneously, pipes leading therefrom into a discharging chamber, air-coil having a discharging chamber with discharge outlets opening into a flue passage leading from the generating and combustion furnace into the stack furnace, all to be used in combination therewith and to furnish heat thereto.

MECHANICAL DISINTEGRATION OF ORES.—No. 621,274; D. O'Keefe, Boston, Mass.

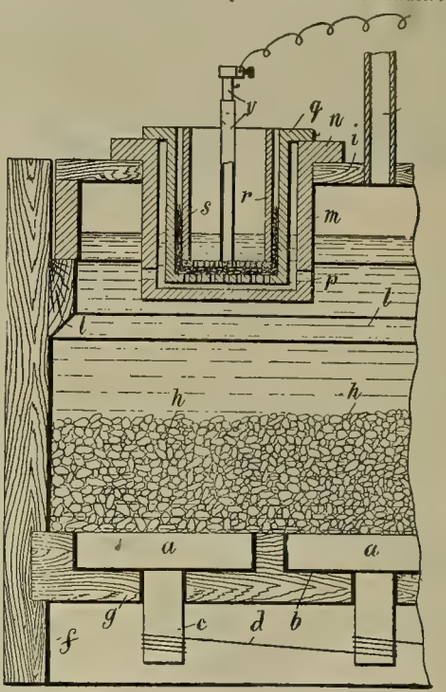


A machine for the mechanical disintegration of ores; a combination of hinged rising and falling beaters, A, A', A², A³, and P, P', P², P³, supported on stationary shafts, B, actuated by cams, *c*, revolved by shaft, C, which is driven by any suitable means; the bars having vertical depending rods, H, which pass through upper member, *k*, of the traverse box girders, K, attached to the frame of the machine carrying disks, *k'*, supporting springs, I, in compression between disks, *k'*, and upper member, *k*, of transverse girders, K, and which are further compressed by this vertical movement of these beaters.

Gold Extraction by Electrolysis.

In connection with electrolysis in utilization for gold extraction a description of a process recently devised for this purpose may be of interest.

The apparatus may, as claimed, be used for the extraction of gold from any auriferous material by direct chlorination and the simultaneous generation of sodium amalgam, or it may be used as a separate generator of chlorine gas and sodium, to be afterwards used in connection with gold extraction or for the electro deposit of gold from solution. As will be seen from an illustration reproduced from *Industries*



and Iron, the electrolytic cell is composed of wood having carbon blocks or plates *a* set in the bottom with bitumen or other suitable non-conducting material. Carbon studs shown at *c* pass out through the bottom and have their extremities copper plated, a conductor marked *d* being connected with them and carried to the terminal. The sides of the cell are carried for convenience below the bottom of the cell shown at *g*. When this form of cell is used for chlorination purposes the carbon plates set in the bottom, as hereinbefore described, form the anode; and if it be used for direct chlorination of material within the cell itself the material *h* to be so treated is placed in the cell with a solution of sodium chloride. The cell has a lid cover *i* resting on supports, and this lid carries the cathode pots *m*, which drop into holes in the lid and rest upon flanges *n*, the said supports which carry the lid being below the water line, so that the lid is sealed and forms a trap for the gases liberated in the cell. The cathode pots are fitted into the lid in such a way that by their flanges the lid is sealed, and forms a trap for the gases liberated in the cell, this being obtained by rubber packing, clay luting, or other convenient means. The lid is fitted with a tube *o*, which may be placed in any convenient position, and by means of which the liberated gases, such a chlorine, may be carried off.

The cathode pots are constructed of porcelain or other suitable material, and are made in three parts, comprising an outer pot *m*, perforated all round a little above the bottom with holes, *p*, an inner pot *q*, having its bottom perforated all over with holes, and a plain cylindrical sleeve *r* over the bottom, of which a piece of linen, canvas or other suitable fibrous material, shown at *s*, is stretched before it is inserted in the inner pot, marked *q*. These three pots when put together with a suitable piece of linen or canvas form a porous pot, having very little electrical resistance and suitable for use with a mercury cathode. The fabric *s* preferably extends beyond the edges of the sleeve *r* and fills part of the space between the sleeve and the inner pot. Mercury to the desired depth is placed on the fabric on the perforated bottom of the pot, and any mercury or amalgam dripping through falls into the bottom of the outer pot *m*, and is retained therein owing to the perforations being situated some distance above the level of its bottom.

The Genesis of Petroleum and Asphaltum in California.

NUMBER VIII.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

At the time of their deposition in sea water and before any alteration had taken place the red shales should contain chloride of calcium, carbonate of calcium, carbonate of iron, carbonate of magnesia, sulphate of calcium, etc., vegetable matter in a fine state of subdivision, and in some places large deposits of vegetable matter; this organic matter in time becoming carbonaceous shales and seams of coal. When these shales are heated with a chemical heat the following described vapors and gases are given off: sulphur dioxide, carbonic acid, sulphuretted hydrogen, carburetted hydrogen, distilled from the carbonaceous substances, nitrogen derived from the same source, etc. These vapors are forced into the circumjacent formation which are highly charged with mineral matter originally present in the shale and which had been deposited from hot water. Chemical actions arise when these vapors or their condensations come in contact with the minerals existing in the shales causing heat. There remains in the shales, after the vapors and gases are eliminated by heat, oxide of calcium, oxide of iron, etc. Mineral waters and gases coming in contact with these substances produce heat. These chemical actions and reactions are complex and numerous. By these chemical actions and reactions, distillations and condensations the alteration of the shale by heat becomes progressive and cyclic. This heat, under great pressure and through subsidences and orogenic movements, is intensified. Chemical reactions are augmented through pressure and hydrothermal action. The hydrocarbons and other substances are distilled and condensed, dissociated and united a multiplicity of times. Mineral springs, ranging in temperature from that of the earth from which they issue to the boiling point, are frequent in the neighborhood of these burnt shales. They contain in notable quantities sulphate of sodium, magnesium, calcium, aluminum, carbonate of sodium, calcium and magnesium, chloride of sodium, potassium and calcium, silica, and, in excess, carbonic acid, sulphuretted hydrogen, carburetted hydrogen and traces of arsenic, sulphuric acid and iron. Besides the visible phenomena, the warmth of these springs shows that this metamorphic action is still in progress.

Deposits of bitumen in California are found in sedimentary rocks of all ages, and principally in three different ways: 1. In superficial detritus. 2. In veins. 3. In porous or seamed strata. The bitumen may be of any consistency, gaseous, fluid, viscous or solid.

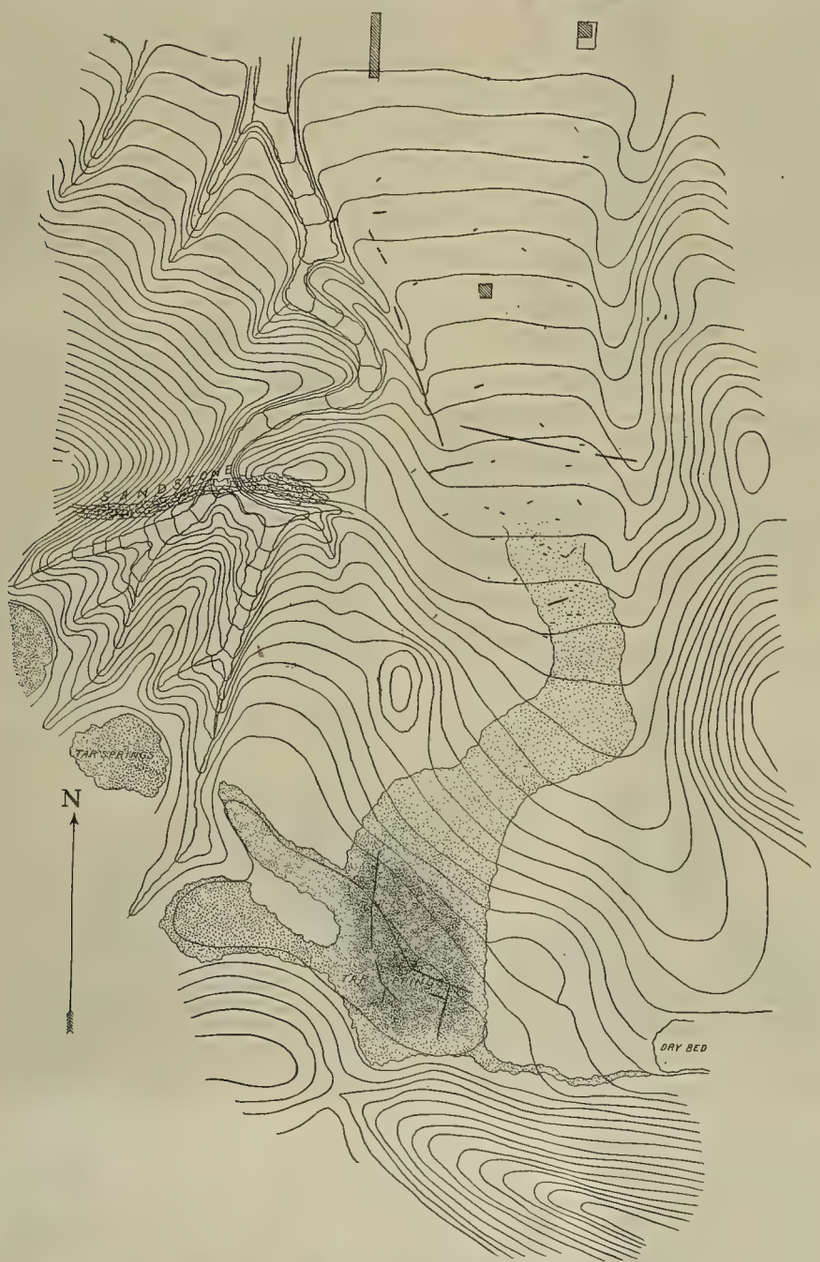
Bitumen often occurs in superficial detritus or alluvium. This character of deposit is usually the overflow of tar springs, into which the detritus from the surrounding country has been washed or blown, and in case where mineral tar is sufficiently liquid it has percolated into the underlying earth. The detritus when saturated with mineral tar most always has been repeatedly burned, leaving black vesicular clinkers, which are frequently refilled where there has been a flow of tar after the fire.

Cooking utensils of the Indians are found in the vicinity of these tar springs, showing that they were used for purposes of fuel. After this they were set on fire by shepherds, so that the fleeces of their sheep would not be injured or lambs suffocated by going into the sticky mass. Where the bituminized detritus has escaped the fires and exist below the clinkers, it contains about 5% of brown and friable bitumen, having a specific gravity less than water. It consists of 70% of asphaltene and 30% of petrolene. The accompanying map section and view show the Buena Vista oil spring at Asphalto, Kern Co., Cal. The mineral tar reaches the surface at the place marked tar spring. At the place marked tar springs a number of trenches have been cut, and a tank erected so as to intercept and save the tar. These trenches are cut in clinkers and comminut shale, which is often saturated with tar. Thin l ers of detritus impregnated with mineral tar lyi nearly horizontal are intercalated with thicker l ers of detritus which contain no bitumen. The beds are formed by flows from the tar springs a deposition of detritus denuded from the adjoini hills. Before this deposit was worked mineral t had flowed from the springs over the surface of t clinkers, until it had reached a thickness of fron to 6 inches; it had evaporated and oxidized, beco ing stiff. It was of different degrees of purit sometimes absolutely pure; at other times it co tained as high as 80% of detritus. In 1891 and 18 this concreted tar was being mined and refined. the present time there are but a few tons, which a scattered over the ground in small pieces. It h been estimated that in recent years these sprin afforded about 160 barrels annually. There are large number of other tar springs in Californ nearly all of which have been burned in the mann described above.

In the shaft sunk at the Hancock deposit, lyi northwest of the city of Los Angeles, in the center what appeared to be an old tar spring, on the surfa were found the bones of domestic animals—horse cattle, sheep, etc.; at a greater depth the bones the bear, elk and other wild animals, and resting the shale beneath the bituminized sand, at a dep of about 30 feet, were the bones of the *Elephas Am icanus*. During the latter part of the summer se son in California the natural grasses dry up, b owing to the slight amount of water which ascen with the bitumen, as it does at the present time, ma years ago, during the dry season, there grew, su rounding these asphalt springs, green and succule herbage. This herbage was the bait of the tr which tempted these herbivorous animals to the death. With everything else dry, these green her were an irresistible temptation. In struggling get to them the animals became mired in the t lake and suffocated, their bones gradually sinking the bottom.

The *Elephas Americanus* seemed to be the first o that met this fate, as his bones rest upon the unde lying shale, below the remainder of the fossil These springs must be very old, as it is many yea since the American elephant fed upon the plai adjacent to the spring.

(To be Continued.)



BUENA VISTA OIL SPRING, ASPHALTO, KERN COUNTY, CAL.

Telluride Ores.

There is much interest now in telluride ores, as is becoming known that they occur much more com monly than was supposed. Important localities ar Cripple Creek and other mining districts of Col rado, the northern Black Hills of South Dakota, an several counties in California. Following is a de scription of several of the most important gold an silver tellurides, from Dana's Mineralogy:

Altaite—Lead telluride, usually massive with cubi cleavage; color, tin white with yellowish tinge tar nishing to bronze yellow.

Naumanite—Silver-lead telluride, in cubic cry tals; also massive, granular and in thin plates cleavage cubic; color and streak iron black.

Hessite—Silver telluride, usually massive, com pact, or fine grained; cleavage distinct and usuall somewhat sectile; color batween lead gray and stee gray. This species also often contains gold, an graduates toward petzite.

Petzite—Massive; granular to compact; slightl sectile to brittle; color steel gray to iron black; tar nishing.

Sylvanite—Telluride of gold and silver; often i branching arborescent forms resembling writte characters; also bladed, and imperfectly columna to granular; cleavage perfect; fracture uneven hardness 1.5 to 2; brittle; luster metallic, brilliant color and streak pure steel gray to silver white, in clining to yellow. Comp.: tellurium 62.1, gold 24.5 silver 13.4.

Calaverite—Gold and silver telluride, much lik sylvanite but contains more gold; massive; hard ness 2.5; color pale bronze yellow. When crystal lized it is known as kennerite.

Nagyagite—A sulpho-telluride of lead and gold containing also 7% of antimony; in tabular crystals also granular, massive and foliated; cleavage per fect; flexible; hardness 1 to 1.5; luster metallic splendent; streak and color blackish lead gray.

Tellurium—In prismatic crystals; commonly col umnar to fine granular; massive; color tin white contains no gold or silver.

Tellurides heated in the open tube give a white or grayish sublimate which is fusible to colorless drops. On charcoal gives a white coating and colors the flame green.

In some instances telluride ores rich in gold are so finely disseminated in the gangue as to make identification by physical appearance impossible.

EACH letter is not of equal importance in the formation of words. The relative proportions re quired in the English language are these: a, 85; b 16; c, 30; d, 44; e, 120; f, 25; g, 17; h, 64; i, 80; j, 4 k, 8; l, 40; m, 30; n, 80; o, 80; p, 17; q, 5; r, 62; s, 80 t, 90; u, 34; v, 12; w, 20; x, 4; y, 20; z, 2.

The Alluvial Deposits of Western Australia.*

NUMBER IV.

By T. A. RICKARD, State Geologist, Denver, Colorado.

The cement deposit occupies a very shallow depression, and in its structure bears internal evidence of considerable geological age, suggesting that it was formed at a time when the Sugar Loaf reefs reached the surface at a level superior to the slight ridge now separating them.

Another deposit of similar character has been explored at Kanowna, twenty-five miles northeast of Kalgoorlie, and about sixty miles east of the locality just described.

The discovery was made in '93. Each digger secured a claim 50 feet square and sunk a shaft to the gold-bearing cement which the dry blowers had uncovered in the course of their prospecting. The deposit became in due time "gophered" with holes and shafts, so that the boundaries of the cement were accurately determined. In '95 an English company secured the property and consolidated the claims into larger leases. The expectations held out freely by responsible engineers that an extremely profitable enterprise could be based on the remnants of gold-bearing ground were wholly dissipated in the succeeding two years, a gross blunder having been made simply through insufficient and unsystematic sampling.

The deposit lies in a shallow trough, the longer lying axis east and west. The body of gold-bearing cement has a length of about 700 feet and a maximum width of 105 feet. Vertical sections exhibit an overburden of sandy loam, from a few inches to 2½ feet thick. This was the material worked by the dry blowers. Then comes a layer of detritus, called "wash" by the miners, composed of fragments of ironstone and quartz imbedded in clay, and reaching to a maximum of 25 feet from the surface. This overlies the cement itself 6 inches to 5 feet thick, and is easily distinguished from its roof of detritus and its floor of clay. The cement consists of particles of quartz in a greenish clay. Near the rim of the trough the quartz occurs in larger and more angular pieces. A typical

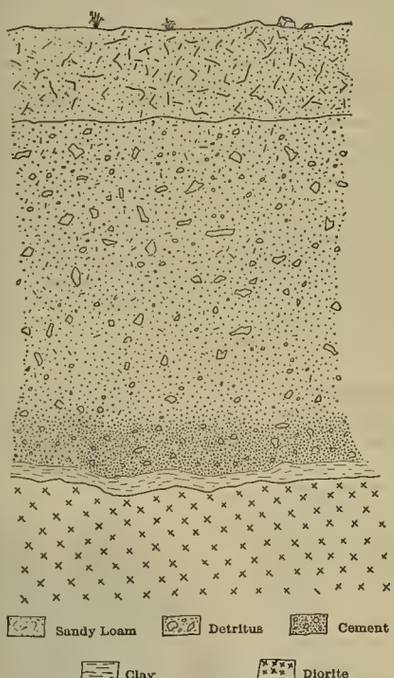


FIG. 15.—TYPICAL SECTION OF KANOWA.

section, obtained from a pillar in the old workings, is given in Fig. 15.

The gold contents are irregular. The whole body of cement probably averaged one ounce per ton; but only the richest parts were worked, and these carried many ounces to the ton; so that the remnants now accessible average, from the surface down, about 3½ dwts. The clay carries 2 dwts. per ton. The material was treated at neighboring stamp mills.

When the neighboring mines, the White Feather Reward and the White Feather Main Reef, were visited, it seemed as natural to deduce this cement deposit from the erosion of gold-bearing quartz veins as it had been to relate the Sugar Loaf reefs at Kintore with the deposit worked by the West Australian Proprietary Cement Co. Further investigation confirmed this inference.

The McAuliffe vein (worked by the W. F. Reward mine) and the Main Reef (worked by the W. F. Main Reef mine) traverse diorite at or near the line where large dikes of porphyry penetrate. The two reefs are probably identical, and have a strike which takes

DRY BLOWERS AT WORK.

them right across the longer axis of the cement deposit at a point near the head of the trough in which it lies. A shaft recently sunk to a depth of 200 feet by the Golden Cement Co. reached this reef by means of a crosscut and found a comparatively barren quartz vein, carrying small spots of rich ore. The enclosing rock was diorite, and the quartz itself was encased on both sides by bands of clay fully 2 feet thick.

On comparing the veins and their encasing rocks, as seen in the workings of the two mines on opposite sides of the alluvial deposits, it is not found necessary to go further for the origin of the latter. The cement is underlain by a clay which is essentially steatite, and is as readily traceable to the neighboring diorite as the kaolin at Kintore was deducible from the granite. The green color of the cement is imparted by chlorite, derived from the decomposition of the epidote in the diorite. The "ironstone" of the detritus overlying the gold-bearing part of the deposit consists of fragments of altered diorite. The quartz in the cement and the gold accompanying it are both identical with those of the reefs close by.

Here also the topography confirms the suggested explanation. The cement lies in a shallow depression, at the upper rim of which the quartz reefs cross the country. Furthermore, these reefs traverse a low divide, which in a rough way separates the deposit from another, which slopes in the opposite direction. The latter is known as the Fitzroy cement. In this deposit rich discoveries were made during

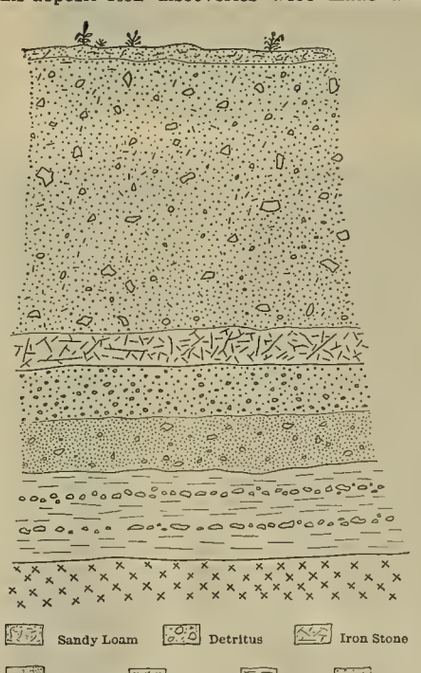


FIG. 16.—SECTION IN FITZROY CEMENT.

October, '97. A typical section is exhibited in Fig. 16.

Apart from their importance as depositories of gold, the cements have played an interesting part in the development of the gold fields, because they often cover the tops of reefs. This feature proved a serious hindrance to the recognition of the lodes at Kalgoorlie, where worthless quartz veins were worked for some time before a trench traversing the cap of the cement accidentally uncovered the top of one of the rich deposits of telluride ore, which did not outcrop, on account of the comparative softness of the lode.

Theories of Origin.—Of course, several theories have been mooted, the most fanciful of which have naturally been those of the working miner himself. The fact that the gold-bearing cement is in places overlain by a considerable thickness of partially consolidated rock has led to the supposition that the deposit was a "deep lead," while the resemblance to a conglomerate has caused more than one Africander to liken it to the "banket" of the Transvaal.

The latter is an immense shore deposit of gold-bearing conglomerates, now covered by a series of later sediments. Its dimensions, comparative homogeneity and persistence are in striking contrast to the narrow, restricted, irregular patches of detritus which have been described as occurring in West Australia. This total unlikeness renders unnecessary any discussion of a fancied similarity of origin.

But because this alluvium disappears under an overburden of rock, the Australian digger fancies he is working a deposit similar to the "deep leads" with which he became familiar at Ballarat, for example. A distinguished government geologist from a neighboring colony visited Kanowna in October, '97, and gave authority to the term "deep lead" by using it himself. "Deep" it may be, for that is a comparative adjective, but a "deep lead" in the technical sense it most assuredly is not. On the Forest Hill divide, in Placer county, Cal., and at Creswick, in the Ballarat district, Victoria, the typical "deep leads" occur. They are, as is well known, old (Miocene) gold-bearing river channels, which have been saved from erosion by a cap of lava. The lava probably overflowed the original surface as a steaming mud, and is now found consolidated into a volcanic rock sufficiently hard to need little timbering when penetrated by underground workings. The cement deposits of West Australia occur under an overburden of "made ground"—that is to say, both the deposit itself and all the material under which it dips are of distinctively detrital origin, the products of weathering and erosion accumulated in shallow depressions of the much-decomposed surface of granite or diorite.

It is the placer of a country destitute of running water. The climatic conditions and the physiography of the Coolgardie gold fields have been carefully described, in order to make it evident why these deposits differ from those of more favored countries, like California or New Zealand. Surely it is not in keeping with the scientific method to seek for fantastic or far-fetched explanations, when processes in operation to-day are able to supply an adequate understanding of the observed facts.

The quartz of the cement is subangular; it has evidently undergone very little attrition, and suggests, therefore, that it has not traveled far. On comparing it with the matrix of neighboring veins, an identity appears obvious. The examination of the topography renders highly probable the derivation of the one from the other. The cementing material is similarly found to be the clay resulting from the decomposition of the rock encasing the quartz veins, and varying according to the composition of that rock, whether it be granite or diorite. Finally, the

* Condensed from paper read before the Am. Inst. M. E.

gold particles which have rendered the cement worth mining are found to be identical in fineness and physical appearance with the gold of the neighboring veins, and their scarcely rounded edges invite the conclusion that the gold also has not been borne far from the place of its origin. The comparatively unclassified condition of the deposits is in keeping with the evidence afforded by the material of which they are composed. The absence of running water on this desert plateau has prevented any such sifting process as in other regions leads to the deposition of well defined layers of clay, gravel and gold upon a clean bedrock. It is an exceptional illustration of the working of those agencies to whose unceasing play is due the configuration of the earth's surface; it is geological action in its most instructive form.

Water Supply.—The early history of the gold fields of West Australia is the record of a struggle to exist amid conditions which were inimical to human life on account of the scarcity of water. That great necessity has been, in some sort, satisfied by the energetic action of the government, supplemented by private enterprise. The gold fields are now dotted over with condensing plants, which turn the brine of the wells into water fitted for the use of man and beast. Existence is thus rendered endurable; but the mining industry is still handicapped by an item of cost unknown in more favored regions.

The water of the country is salt, sometimes almost to the point of saturation. Sea water contains 3½% of salts, three-quarters of this percentage being common salt, the chloride of sodium. At Menzies, in September, '97, I found one of the two important mines of that district using water which contained 17% of salts, and the manager informed me that in December evaporation increased the amount to 30%. For this liquid he paid 25 shillings per 1000 gallons. It came from a neighboring "soak." The condensed (distilled) water, bought for use in the boilers, cost £1 per 100 gallons. Milling in a 10-stamp mill was carried on at an average cost of 30 shillings, or $6 per ton, the item of water alone amounting to 13 shillings, or $3.25 per ton.

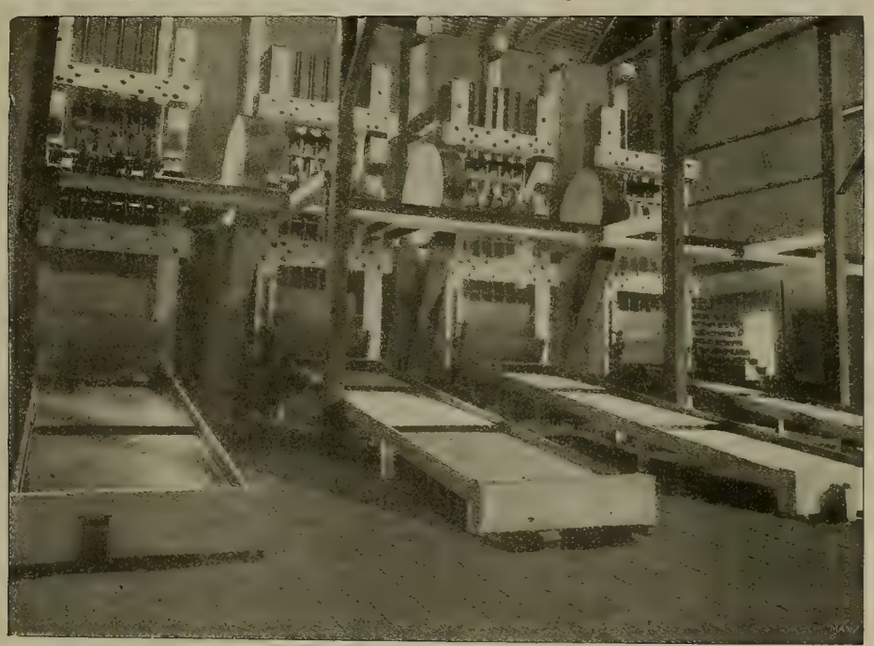
Under these conditions a wet mine becomes a source of revenue. Many properties at Kalgoorlie, unable to find pay ore, lessened the expenses of development by selling their water to those that had mills. The price varied according to the season. At the Great Boulder Main Reef mine, for example, the lowest price paid for water during '97 was £3 10s per 1000 gallons, and the highest £11 5s. This was piped from neighboring shafts, and had not passed through the condenser; it therefore had the character of sea water, but it was four times as saline.

(To be Continued.)

THE quantity of water used in California hydraulic mining at the height of its career was enormous. An estimate made of the amount used and discharged into seven different streams amounted to more than 10,000,000 miner's inches daily and the material of the gravel banks removed by this water was estimated at nearly 40,000,000 cubic yards.

Two Recent Stamp Mills.

On this page are illustrated two stamp mills equipped with Fraser & Chalmers machinery. One shows a 10-stamp mill built for the Athabasca Co., B. C., a graphic illustration of a modern, up-to-date mill interior. The screen plates are removed so that the stamp shoes may be seen. The other cut shows a 20-stamp mill for the Alameda mine in California. This mill has heavy cast iron base plates on concrete foundations, the same as 520 stamps furnished Alaska-Treadwell and allied companies, and is another example of an improved and modern milling plant. The features of the Fraser & Chalmers battery with such details as Blanton self-tightening cams and other labor-saving devices are already familiar to most mill men, but these pictures of mill interiors will be of interest to many.



TWENTY-STAMP MILL, ALAMEDA MINE, CALIFORNIA.

ATHABASCA MILL, NELSON, B. C.

Joint Location of Placer Ground.

TO THE EDITOR:—If eight people want to locate twenty acres each of placer land, and act conjointly so as to make one joint location of 160 acres, can some one of the party locate the eight claims in their names, and can one of the party, as power of attorney for the others, transfer the 160 acres as a whole to another person or company? Is there a published blank for a joint placer location? Must the eight form a co-partnership in order to locate and hold the joint location? Must the locations conform to the surveyed lines, or can not the locator determine by his own selection what he wants, if he marks his boundaries properly?

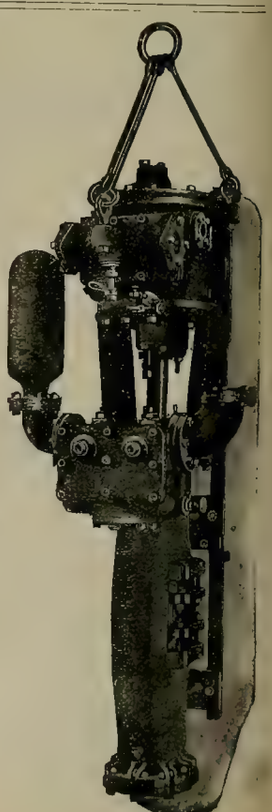
San Francisco, March 20th, '99.

The law permits a single person to take as many placer claims of twenty acres (no more) each as he may desire, and they may be contiguous or not, but requires a separate discovery for each separate twenty-acre tract. Where more than one person (not exceeding eight) participates, an area equivalent to twenty acres for each is permitted, but they locate the area jointly and are not required to locate each particular twenty-acre tract, becoming tenants in common of the entire area. Placer ground so taken also requires a separate discovery for each twenty-acre tract of the 160 acres. A single member of the party may act as agent for each of the others and locate each of the several tracts. If several persons locate contiguous claims in common, such act would in itself constitute co-partnership, and the proceeds of such operation should be equally divided, unless stipulations to the contrary were entered into by all the members of the party holding such claims jointly. Where the land has been legally subdivided, tracts of forty acres may be subdivided into ten-acre tracts; but where no legal subdivision of the public lands has been made, claims may be located with reference to the stream or bank along which the placers occur. Any one member of such association may, if legally constituted an attorney-in-fact, transfer the property to another individual or company. There are no regular blank forms such as you desire.

EIGHT exposition projects are under way in American cities and two more are contemplated; 1899, Omaha; 1899, Philadelphia; 1901, Detroit; 1901, Buffalo; 1901, San Francisco; 1902, Toledo; 1903, St. Louis; 1903, New Orleans. Omaha will hold a "colonial" exposition, Philadelphia an "industrial" exposition, Detroit celebrates its second centennial of discovery, Buffalo calls its show the "Pan-American," San Francisco has decided on "Pacific Ocean and International Exposition," Toledo's show marks the centennial of the admission of Ohio into the Union, and St. Louis and New Orleans commemorate the Louisiana purchase. As expositions in the international aspect they have each other and the Paris and Glasgow world's fairs to compete with or imitate. The Paris exposition in 1900 does not conflict with any dates so far chosen, although Omaha, if again successful, doubtless will repeat in 1900. The Glasgow exposition is set for 1901. Besides those enumerated, a twentieth century exposition for New York city in 1901 is being discussed, without much probability of realization, and a northwestern international exposition in 1902 for St. Paul and Minneapolis has been proposed.

Jeanesville Improved Mine Sinking Pump.

Herewith is illustrated the Jeanesville improved mine sinking pump for sinking shaft, or recovering mines, or for use where a varying water level must be accommodated. The plunger is in one piece, outside packed, particularly adapted for gritty water. The water valves are rubber, with heavy bronze cover and springs. The valve seats are also bronze, driven in the is decks on a taper. The water valve chest cover provided with priming valves, arranged to prime the lower valves from the column pipe, to protect the pump from losing suction while sinking, pumping water and air. The stems are so close that they are in no danger of being broken off. The lower cap under the plunger is held in place by hinged bolts. The whole pump is made up very heavy, to stand hard usage. Material and workmanship are first-class in every particular and are guaranteed. Manufactured by the Jeanesville Iron Works Co., Jeanesville, Pa. Stock carried in their Western branch store, 1328 Seventeenth street, Denver, Colo., A. Middlebrook, manager.



Mining Summary.

ALASKA.

Between Aug. 1st and Nov. 15th, '98, upwards of 15,000 claims were located and staked in the Atlin country, 95% of the locations being made by American miners. It was a new district, but gave promise of rivaling the Klondike in richness. The rush was so sudden and so great that, though the Canadians immediately had a mining recorder and a gold commissioner on the ground, the officials had no books or blanks with which to conduct business, and were unprepared to meet the occasion. A few of the first locators succeeded in getting their claims recorded, the others being merely given a written leave of absence, "until June 1st, '99, on account of inclement weather."

The Exclusion act will deprive Americans from participating in the benefits derived from discoveries made by them. No trouble is anticipated. They will cross over into American territory and prospect for gold in a land where what they find will not be taken from them The Exclusion act will do a great deal for American territory.

The latest Northern steamer reaffirms the former statement from Sitka that the Pande Basin mines have been sold for $2,650,000. The payment of this big amount is to be made quarterly in sums of $132,500 until the entire amount has been cancelled. The Pande Basin property is on Baranoff island, where a lake was drained, and work is to begin upon the receipt of machinery. P. Voorhees of New York is the reputed purchaser. The deal is the largest ever reported from Alaska.

Captain Abercrombie and party will arrive in San Francisco from Washington next Wednesday, en route to the Copper River country. Captain Glenn and party, who are to explore Cook's inlet, left Washington, D. C., on the 23d inst. The War Department has named three stations on the Copper river all-American route to the Klondike country in Alaska—Howard, Tetling and Slahna—to be occupied by United States troops under similar duty to that performed by the Canadian mounted police.

Land travelers have mostly abandoned the road through Chilcoot Pass and they now go through the White Pass from Juneau to Dawson. The distance by land is about 700 miles, while the water route via St. Michaels, on the Yukon, winds around for over 5000 miles.

There are said to be more than 40,000 people at Dawson City.

Miners recently from Copper river, Alaska say that Governor Brady has been requested to ask the Government to send a vessel to Copper river to bring home stranded prospectors. There are nearly 300 people who are without means to secure transportation, and many of them are suffering from scurvy.

A report comes from Dawson that a mammoth has been discovered in a claim on Dominion creek.

Victoria *Times*: There is some excitement at Independence creek, 300 miles below Circle City. This, like El Dorado creek, had been tried by prospectors and pronounced no good, but lately a newcomer had found dirt which gave $7 to the pan, and when the news got out a stampede to Independence creek set in. Men rushed from all points, the stampede resembling that which occurred three years ago to Bonanza and El Dorado in the Klondike.

ARIZONA.

On March 1st the Arizona Copper Co. at Clifton and the Detroit Copper Co. at Morenci advanced the wages of all employes 10%, thus restoring the scale of prices prevailing previous to the cut made in '91. This raise includes everybody employed by these companies, from the superintendents down to the Mexicans who shovel dirt on the surface, and also includes all employes of the Arizona & New Mexico railroad.

J. Lawler of Prescott has bonded his copper properties, five miles south of the Hillside mine and fifty-five miles west of Prescott, to Capt. DeLamar of Nevada. The mines have considerable development and show large amounts of copper ores; $20,000 has been paid on the bond. The price is not made public.

The Tucson *Citizen* declares that assays of ore from the new vertical shaft at the Vulturs mine show the average values of the 27-foot vein opened up in the new shaft at a depth of 212 feet to be: gold, $39.06; silver, $1.89; total, $40.95.

Mohave County *Miner*: J. T. Pendergast, who holds a bond on the Diamond Joe mine, is shipping ore to the Kingman sampler.——C. E. Sherman of Mineral Park has opened up a stope of 600 ounces silver ore in the Katie mine.

Mojave *Miner*: A 50-stamp mill is said to be the next step in improvement at Evan's Point, near Clifton. The recent strike in one of the mines of the company is thought to justify this expenditure.——A body of ruby silver ore has been found in the Merrimac mine at Chloride.——Brown Bros. are shipping ore from their mine on Sherman's peak, near Mineral Park.

CALIFORNIA.

Amador.

A rich strike has been made in the Central Eureka mine, near Sutter Creek. The mine joins the South Eureka on the north and the Old Eureka (Haywards), formerly known as the Con. Amador, on the south. Several years ago considerable ore was taken from each of two ore shoots. The mine was abandoned by the early operators at a depth of 700 feet. The strike was made in the shaft below the 1100 level, a contract to sink 300 feet having been let recently by Supt. W. R. Thomas.

The Old Eureka mine was abandoned at 2450 feet, the immediate cause, it is said, being due to a disastrous fire which caused the mine to cave. It is credited with having produced $2,000,000, and this strike in the Central Eureka may lead to important results.

The Defender mine near Volcano is reported to Eastern capitalists.

Amador *Dispatch*: A strike is reported to have been made at the Bruner mine, two miles south of Angels. The ledge is 8 feet wide.

Dispatch: At the Baliol mine in Sutter Supt. Porter is sinking the shaft and opening up the 300 level. The mill is running, twenty stamps dropping, water power being insufficient to run forty stamps.——At the Zella mine the shaft is being repaired and drifting prosecuted in new ground. The mill is kept running, a portion of the stamps dropping, repairs to the shaft interfering with the hoisting of ore.

Republican: The working force at the Zella, at Jackson, has been increased. Most of the ore is coming from the 1100 level.——It is rumored the Alma, at Jackson, will resume operations.——Work at the Amelia group, adjoining the Argonaut, a mile north of Jackson, has been discontinued, it is said temporarily.

Angels *Echo*: A rich body of ore has been discovered in the Demorest mine, six miles south of San Andreas, within the past few days.——Arrangements have been made to reopen the Angels mine, after an idleness of eight years. This mine will give employment to seventy-five men. The machinery will be run by electrical power, to be furnished by the California Exploration Limited.

Butte.

Oroville *Mercury*: The Oroville Water Co., which purchased the Miocene and other ditch systems, has extensively repaired and enlarged them, and 3500 miners' inches of water are now flowing through the system for use by mines, power plants and for irrigation.

Calaveras.

(Special Correspondence). — The McQuigg mine, a mile north or Murphys, is different from most mines of the district in that the vein is in a fissure crossing the black slate formation at a right angle. The fissure is also a fault plane, the throw being 55 feet, as demonstrated by an older quartz vein which runs with the slates. The mine is opened through tunnels driven on the vein and has a 5-stamp mill. The ore carries considerable iron, lead and zinc sulphides.

Murphys, March 20th, '99.

Chile gulch is filled above its former level to a depth of 40 to 60 feet with the tailings of the early hydraulic mines, all of which contains gold.

The new Ford mill at San Andreas is working smoothly and gives satisfaction. Its capacity is sixty tons per day. This is a large tonnage, but the character of the rock permits it. Perforated tin screens are used. The gold is coarse. The mine is developed to the 700 level through a two-compartment inclined shaft. There are levels opened at 300, 400 and 700 feet. Taken as a whole the mine is low-grade, but there are places where quartz seams a fraction of an inch to 4 inches wide cut the slates which are rich in free gold and the variety of telluride ore known as petzite. The battery is supplied with water from the mine. The mine lies in the zone of amphibolite schist east of the main "mother lode," but approximately parallel with it.

Chronicle: The Petticoat M. Co. at Railroad Flat has leased the Loftus mill and will crush ore at once. The company has out 3000 tons of ore. The rock will have to be hauled one mile. C. W. Laidsay is Supt.——The reservoir at the Green Mountain hydraulic in Chile gulch broke recently, and the rush of water carried away about 100 feet of flume. Operations were suspended to repair damages.

Del Norte.

Record: H. Nicholas is working placers on Mill creek with success.

El Dorado.

Placerville *Democrat*: Wm. Craddock has his shaft down 70 feet and will start his stamp mill.

Inyo.

The Electric Gold Extraction Co., with its object the extraction of gold from ore, headquarters at Bishop, has filed incorporation papers. W. W. Waterson, J. C. Unthank, P. Somerville, P. P. Keough, T. E. Leece.

Kern.

The supervisors of Kern and San Bernardino counties are considering the advisability of making a survey to establish the line dividing the two counties. Randsburg is close to the line and a new survey may make important changes.

Randsburg *Miner*: At the Trilby mine twenty-two men furnish 130 tons of ore daily to the Yellow Aster mill. The Trilby and Rand tunnels, 114 feet feet apart, have been connected. The shaft is being sunk to the level of the Hercules tunnel.——It is rumored the Little Butte Co. has a bond and lease on the Butte mine for ninety days.——Work is being pushed on the new gravel diggings and twenty tons more will be worked at the Red Dog mill in Johannesburg. The car milled last week at Barstow gave satisfactory results. A number of men are at work, but the dry washing process is held back on account of the rain and snow.——M. P. Minor made a test of nine and one-quarter tons of Golden Glame ore at the Red Dog mill, Johannesburg, which gave $25 per ton. The ore was taken from several veins. Mica schist and decomposed granite, which showed hornings were put into the test.

Los Angeles.

(Special Correspondence).—There is an extensive placer field in western and northern Los Angeles county, in the region of Soledad canyon and its tributaries, and extending to the Santa Clara river and its tributaries. The gold is found in the beds of the streams and on high bars along these streams and in the region near Newhall. On both sides of the Southern Pacific Railway gravel deposits are found wherever erosion has not removed them. The entire country, consisting of rolling brush-covered hills, is covered with gravel containing gold. These gravels exhibit some curious features. The material composing them is largely foreign, consisting mostly of rhyolite pebbles and cobbles and other hard rocks not found in the vicinity. The surface of these deposits is usually richer than the underlying portions, due, probably, to the removal of a portion of the material constituting the upper portion of the stratum by winds and rain. These agencies being unable to move the gold, the deposit became enriched. Clay appears at a depth of 1 to 2 feet, solidly cementing the gravel into a species of "hardpan," and beneath this little gold is found. The origin of the gold in these deposits may possibly be traced to the large beds of conglomerate which lie along the upper Soledad canyon near Lang's station and about Ravenna. The material composing these conglomerates also forms a large portion of the gravels, and it seems quite reasonable to look to the conglomerate as a source of the gold, though originally derived from veins elsewhere. The placers in and tributary to San Francisquito, Texas, and Dead Man's canyons probably derived their gold mostly from the large number of small veins in the neighboring hills.

Los Angeles, March 20th, '99.

Madera.

(Special Correspondence).—One of the largest gold-bearing veins in the State extends from the vicinity of Grub Gulch southward across Fresno river and beyond, a distance of nearly 15,000 feet. It is located throughout its entire length, and has at various points a large amount of development, particularly in the Mammoth, Starlight-Riverside and Savannah mines. The formation is mica slate, and the vein occurs as a silification of this slate. A vein of granite of varying texture accompanies the vein throughout its length, waving back and forth in a sinuous line cutting the vein at a number of points, always appearing as of later origin.

Grub Gulch, March 20th, '99.

Marin.

An unconfirmed report from Bolinas asserts that the Golden Crown copper mine has been sold to Philadelphia men for $150,000.

Mariposa.

(Special Correspondence). — The Golden Crown Co. have decided not to erect on the Big Betsey mine the stamp mill purchased last fall, as the free gold contents of the ore are said not to be such as to require it. Instead Cornish rolls, with a new boiler, are being installed. The ore, however, will not be chlorinated as assays do not show such values in the sulphurets as to justify such treatment. The crushed ore will be handled by a secret process for which the plant is now building. Laboratory tests of this process are reported to have shown a saving of the gold contents as determined by fire assay and the management is convinced that this method is peculiarly adapted to their ore. All the treasury stock is reported to be sold. The report that Rev. Mr. Jernagan of North Lubec, Me., has secured an option on the property seems to be premature.

Coulterville, Cal., March 22nd, '99.

Mono.

A strike in the Mono-Glen mine is reported to show ore of an assay value of over $30 per ton.

Nevada.

A mining deal is pending at Grass Valley. It is the sale of the Union Hill group of mines, recently acquired by E. Creller from the McLean estate, and which he proposed to reopen. He incorporated a company with 200,000 shares of capital stock and rapidly disposed of much of the stock. Further transactions in this line are in abeyance, owing to the desire of Capt. Thos. Mein to purchase the property.

At the North Bloomfield mine, North Bloomfield, an illustration of which appears on the first page of this issue, crosscuts are being made from the bedrock tunnel which is now in 600 feet and upraises are being made. When work was stopped the tunnel was in 600 feet. The contractors struck ground so hard that they quit. Then the company took it and put in two Ingersoll drills. After a few days they got into soft ground again and the drills were discarded. Meantime the bedrock had pitched downward into a "pothole." It is believed if the tunnel is extended the pothole will be crossed and the bedrock will be found pitching upward again, when the tunnel will be a success.

Tidings-Telegraph: The Phœnix mine is shipping ore.

Grass Valley *Union*: J. R. Ritchie is running the Huntington mill on his quartz claim at Omega.——The Tully Bros. have started drifting on their gravel mine at Omega.

Orange.

E. J. Kimball and J. M. Turner are prospecting the quicksilver deposits four and one-half miles east of Santa Ana. Two shafts are being sunk, the deeper one being down 60 feet. The ore occurs on a low hill and has been known for many years. Considerable superficial development has been done in past years, but no systematic effort made to develop the deposit. On the west side of the hill a long tunnel has been run in, but did not reach the ore zone. Specimens of the ore are high grade. It is chiefly meta-cumabarite.

There are copper prospects in the Trabucco canyon, several miles back of Santa Ana, some of which have superficial development.

Placer.

Pay gravel is being taken from the Wesley mine, near Iowa Hill.

The Boston News Bureau hears that the capital stock of the Pioneer M. Co. will be increased from 100,000 to 150,000 shares. The new stock will be sold for working capital, as the electrical equipment recently installed cost more than at first anticipated.

Plumas.

(Special Correspondence).—Taylorville and its vicinity are attracting attention on account of the work being done on their copper prospects. Parties are here prospecting and developing several groups of copper claims. The Ajax group, comprising three claims, has a vein said to be 60 to 70 feet wide. The Pittinger group has a vein 15 feet, of carbonate ore. The same parties are negotiating for the Reward, the Engels and the Sullivan groups. They have secured the Mountain Meadow group and the Starks boys' claims, all within a radius of ten miles of Taylorville. They have secured 6000 inches of water and right of way for ditch and railroad. A. B. Somers is representing the parties.

Taylorville, Cal., March 14th, '99.

Work has been resumed on the Whitney & Duncan mine near Genesee.

Plumas *Independent*: A. B. Somers has located the site for his smelter below Arlington and will begin building electric power works.——The Mineral Point mine, back of the Genesee mine, recently relocated by C. Adams, proves to have good ore. One hundred pounds sent to Selby went $210 per ton.——A. B. Somers has four crews at work on his new mines—Taylorville, North Arm and Genesee—and next week will send a crew to Mt. Meadows on the Fant & Gee property.

San Bernardino.

Fifty men are employed in the Rose mine, sixty miles east of Victor. The mine is situated at an altitude of 7200 feet, in the San Bernardino mountains, and has recently been equipped with a new plant. The vein occurs in limestone and mica schist following a granite dike. The ore is calcareous and contains considerable hematite, usually disseminated but sometimes massive segregations of high-grade copper ore occur, rich in gold. In its early history the ores of this mine gave considerable trouble in their treatment, but of late a high percentage is being saved. There are many other claims in this district, but the Rose is the the principal vein.

Rich gold and silver ores occur in limestone at Silver Reef, forty-five miles east of Victor, near Old Woman's Springs, but thus far the ore deposits have proven small and spotted.

San Diego.

T. J. Vandergrift of Pittsburg, who, with several other Eastern capitalists, holds the bond on the Bay Horse mine, near Glamis, in San Diego Co., is considering a proposition th pipe water from the Colorado river, eighteen miles, and will do so if the investigations he is now making prove its advisability. This mine is near the old Paymaster mine, to which water was pumped a distance of seventeen miles from the river.

Moreland Camp is six miles northeast of Glamis station on the S. P. Railroad. It has always been a favorite resort for dry placer miners. The ledges were covered by a mass of decomposed rock that capped the entire region. L. C. Moreland has sunk a shaft 200 feet and uncovered gold-bearing ledges.

In the early days of California many thousands of dollars in nuggets were picked up on the surface at a place called Pipendero, at the eastern base of the Cargo Muchacho mountains, but no ledges of consequence have been found as yet.

Shasta.

The development work on the Bryan & Sisk cinnabar discovery on Clover creek shows the ore to be continuous as the shaft is sunk.

Shasta *Courier*: It is reported that the Distlehorsts will put a dredge on Clear creek near Muletown.

Searchlight: A strike has been made in the Mammoth mine in a tunnel started a year ago and now in 900 feet, which cut a rich ledge. Thirty men are employed.

Shasta *Democrat*: J. Sallee has resumed shipping ore from Bully Hill at Copper City.——The main working shaft on the Mt. Shasta mine is now down about 300 feet. This company has nearly 100 men on the payroll.——The 5-stamp mill on the old Spanish mine at Lower Springs is running night and day.

Redding *Free Press*: A new mine is being developed near Copper City. W. Arps recently located four claims on a lode which he discovered. A drift was run on the lead and ore yielding $80 per ton in gold besides silver and copper was developed. The new discovery adjoins the Bully Hill mine. The owners of the four claims have located sixteen additional claims along the lode.——A rich strike in the Mammoth mine near Kennett is reported. The strike was made in the lowest tunnel. The tunnel was driven 900 feet before the ledge was finally cut and as far as they have gone through it is richer and larger than anything that has yet been found in that district. Twenty-five men are at work and the ore will be shipped to Keswick. There are 250 feet of backs.

Mountain Miner: The ledge which made the Uncle Sam mine has again been found and ore is being taken out. It is expected over 200 men will soon be employed at the Uncle Sam.

Siskiyou.

The Greenhorn Blue Gravel mine, one and one-half miles south of Yreka, has been yielding big returns in reopening the ground where the cave occurred over two weeks ago. There seems to be no doubt that the pay extends out into Shasta valley as well as up Greenhorn creek.——The Hazel M. Co. at Henley is still taking out paying quartz from the California Queen mine. There is talk of putting ten more stamps in the mill.——The American Bar Co. at Klamath river, in the Ash Creek section below Hornbrook, is now working day and night with a large force.

News: The Commodore mine, at the head of Barkhouse creek, has struck a rich body of ore. The tunnel on the lower level is in 476 feet and should strike the ledge soon.——Silvera Bros. are ground-sluicing their claim on Main Greenhorn. —— The Beaudery placer mine, on South Fork of Scott river, is about to start up.——H. Finley is running two arrastras on the Lanky Bob, in White's gulch.

News: At the North Fork hydraulic mine

on Greenhorn four men are employed on full time with one giant.——The tunnel at the Spencer mine is in about 800 feet.——Placer mines are all doing well. The water supply is abundant and the placer miners are taking advantage of the opportunity.

Yreka *Journal*: Several quartz claims have been located on the east fork of Callahans on the ridge between Shasta and Scott valleys, near the wagon road between Gazelle and Callahans. There are numerous ledges on the east fork above Callahans, and also in the Willow Creek section along the Gazelle side of this ridge.——The Cottonwood Creek company has steam boring apparatus and will sink to bedrock at different points along the creek bed and banks to test the gravel from the surface down. Operations are to commence in a few days.——The Commodore quartz mine on Barkhouse creek, Klamath river, is paying, four pounds of amalgam being taken from the plates of the mill on a twenty-four hours' run.

Trinity.

Five large hydraulic mining companies have united in an attempt to set aside the action of the County Board of Equalization in raising the Assessor's figures on their property valuations.

A placer claim on Indian creek, near Minersville, owned by Bergin & O'Neil is reported to have recently produced over $2500 in a sixty-hours' run, the water following the last rain creating the first opportunity in years to work the property.

Redding *Searchlight*: The improvements on the Bloss & McClary hydraulic mine, near Trinity Center, are about complete and a full force of men employed.

Tuolumne.

A rich strike is reported in the Pennsylvania-Carlotta at Cherokee, one mile from Summersville. The ore carries a heavy percentage of galena, pyrite and chalcopyrite, and is rich in gold, though little is visible. D. Nagle is Supt.

E. E. Bartlett was killed by a cave at the face of the north drift of the 900 level of the Rawhide mine last week.

The Scanovina mine, near Arrastraville, is said to be looking well. The ore is high-grade and the formation granite.

The Shawmut-Eagle mine, near Jacksonville, has a new safety cage for inclined shaft. A test was made a few days ago by loading the cage with 4000 pounds. The cage was allowed to drop but stopped in 3 inches. Without a load the cage stopped in 1½ inches.

An abundance of rain and snow in the higher mountains has fallen throughout the county. Several properties, idle owing to scarcity of water, will now be able to start at once.

Work has been resumed on the Bystander mine at Yankee Hill, near Columbia.

Contractors grading on the line of the Sierra railroad near Jamestown struck a vein of gold rock reported to be rich.——The ten stamps which have lately been added to the Black Oak mine are running.

At the Arrastraville mine, Arrastraville, J. L. Tonkins, Supt., after pumping out the water, retimbering and clearing out debris, a winze is being sunk in the lower level, 135 feet from the main incline, in which they have a vein 20 inches wide, heavy in galena and iron sulphurets. The quartz shows free gold.

The Black Oak M. Co. will supply the village of Soulsbyville with electric light. The line is about completed.

The Dead Horse mill is closed down because ore could not be extracted fast enough to supply it. Twenty men have been laid off. Drifting goes on.

The company organized to work the remnants of placer ground on Columbia, Independence and Shaw's Flat, having sunk a number of bore holes, now contemplate driving a tunnel under the ground from the canyon of the Stanislaus.

Independent: A 30-stamp mill on the Trio mine, near Jamestown, is contemplated.——The mill at the Dead Horse mine, near Carters, was closed down last week temporarily. Taking out ore is continued.——Geo. Mapes, who is operating a hydraulic mine at Yankee Hill, has found a nugget containing $500 in gold.——A 40-stamp mill at the Golden Rule mine at Stent is an improvement talked of by the owners.——An additional twenty stamps will be added to the mill of the Santa Ysabel mine at Stent, which will make a total of forty stamps. A new hoist at one of the shafts will also be erected.

Democrat: A 6-foot vein has been discovered in Mustang gulch, near Arrastraville, which assays $37 in gold and $9 in silver per ton.——Seventy-five men are on the payroll of the Golden Gate, with the probability that the number will be increased as a result of the rain.

Jamestown *Magnet*: E. T. Hale, Supt. Rawhide mine near Jamestown, will make some changes in the plant. A canvas plant to handle the slimes has been decided upon, and a rotary mill for regrinding the tailings is to be put in. This will increase the capacity of the mill 25%.

Yuba.

The Victor Gold Mines Co. is developing the old Pennsylvania mine, it is reported, with good results. A new ore shoot is receiving particular attention, being reached by a system of crosscuts on the 600, 700 and 800 levels of the old workings.

COLORADO.

BOULDER COUNTY.

The Delano mill, at Boulder, is about to start up again under new management.

W. Rose, operating in the Cashier tunnel at Salina, last week found a 3-inch streak of tellurium which will run about $8 a pound.

A strike was made in the No. 2 shaft of the Victoria recently by Lampshire & Co. The ore was discovered in the 300-foot level.

The Grand Republic, on Four-mile, has been purchased by Colorado Springs parties and started up. A shafthouse and dwelling house have been erected.

The Typhenie, worked by Herival & Billemin, is producing tellurium. The last shipment of high-grade stuff ran nineteen ounces.

Boulder *News*: A strike of gray copper was made by leasers in the Evans tunnel, near Salina, recently.——The Ingram is working fifteen men, using five machine drills. The production last month was sixty tons.——The Little Johnny, at Salina, owned by F. Vand, is being worked under lease and bond by D. G. Peabody of Denver.——Twenty-six men are at work on the Emancipation, at Salina.

Ward *Miner*: At the Silent Friend, at Sunnyside, work has been commenced on a station in the tunnel, 300 feet from the mouth, in which to install a steam hoist for further sinking the shaft started there.——A good strike was made in the west lower level of the Ruby mine recently, where 5 feet of ore was opened up, the larger portion being milling ore, although there is a wide streak of solid smelting ore.

CLEAR CREEK COUNTY.

Denver *Mining Record*: Mining for zinc ore is a new and profitable industry near Silver Plume. Mr. Colley, a Leadville miner, lately leased the Mendota mine, from which shipments of zinc ore to Upland, Indiana, have been made that carry 50% zinc.

Denver *Republican*: A large electric plant is to be put in near Dumont to furnish light and power to mines in this county. The first plant erected will have a capacity of 2000 H. P. This is being contracted for at $100 per H. P. per year, a saving of one-half the cost with steam. Water from Clear creek will be used in driving the machinery and the minimum power at Dumont will be 2500 H. P. When the reservoir at Empire is completed it will be much heavier. The company has rights below Idaho Springs which will add 3500 H. P. for an auxiliary plant.

CUSTER COUNTY.

The Bassick mine has been unwatered to the 500 level through the new shaft. The old workings have been found badly caved.

EL PASO COUNTY.

The value of the output of the mines of Cripple Creek and vicinity for February was $1,283,750, which was about a quarter of a million less than the output of January, due to a short month and snow blockades.

Victor *Record*: S. N. Simmons and associates have been granted a twelve months' extension of their lease on the Zenobia, at Cripple Creek. This week's shipment from the mine consists of twenty-two tons of $30 ore; a shipment of high-grade is being prepared.——The Lillie is producing thirty tons a day from the upper levels of the mine, while sinking is in progress. The shaft is to be sunk to the 600 level.——Lessee F. O. Wood is sinking with air drills on the new Mineral Rock shaft. The output is steadily increasing and last month reached 300 tons. An average of all shipments is better than $90 to the ton.——The $85,000 bond on the Silver Tip claim of the Enola Co., Cripple Creek district, held by Chicago capitalists, was taken up. It will be developed by either the company or lessees.

GUNNISON COUNTY.

(Special Correspondence).—Messrs. Webb & Knox have been working on a property called the Sadie D., about three miles east of Iris. They now have the shaft down 40 feet on a good vein 6 feet wide. The vein at the surface only ran from $2 to $3 in gold. Samples from the bottom of the shaft show an average value across the vein of $20 per ton in gold. Webb & Knox represent Eastern people, who will push the sinking as soon as spring opens.

O. H. Knight has just arrived from Leadville and expects to start up the Raymond mine, which has been idle for some time, but in times past has produced considerable good ore. Mr. Knight expects to soon put it in line for regular shipments.

The Grafiin property has been closed down for a few weeks till Mr. Grafiin returns from Chicago, where he has gone to attend a meeting of his company. His men working near Volcano are still at work and will push development as fast as possible.

Work has been commenced on the Gunnison mine on the 100-foot contract of sinking. A contract has also been let to same parties to run a crosscut to the vein when the sinking is done, which will be about 60 feet in length. The force is at present unwatering the mine. A boarding-house has been started for the accommodation of the men.

A strike is reported near Marble, in the northern part of the county, in what has always been considered a silver, lead and copper camp. But the returns from Leadville show $14,000 in gold from a flinty or schist-like quartz. Prospectors will pay more attention to gold values in the future on Crystal river.

Another strike in gold ore is reported from near the same place, but the figures are fabulous. When the present 10 feet of snow is gone we shall know more about it.

Gunnison, Colo., March 18th, '99.

(Special Correspondence).—It is said the purest copper produced in Colorado comes from the Lead King mine at Crystal.

The following mines have received returns from the smelters and reduction works on copper values: Lead King, North Pole, South Pole, Catalpa, Carbonate, Lulu, Daisy, Prospect and Agatha. In the four first named copper predominates, and in their shipments the silver, lead and other values have been the side product, the ore being mined for its copper value.

A promising property that has been opened up in this district is the Burt, where development work has been done since June of last year, and in which large bodies of ore are exposed in three tunnels, carrying a high percentage in copper, with good values in lead and silver and a small return in gold. By June 1st the company will have a tramway to convey the ore from the mine to a point on the roadway, where it can be loaded for shipment.

Copper shipped from this district has been principally chalcopyrite, a sulphide of iron and copper, and carbonate (malachite). In most instances development has shown the copper values to improve with depth.

Crystal, March 18th, '99.

HINSDALE COUNTY.

The strike at the Ute and Ulay mines at Lake City is over, and both mines are again in operation.

LAKE COUNTY.

G. W. Cook of Leadville has a contract with the Illinois Steel Works at Chicago by which it is expected that Leadville will ship 60,000 tons of manganese ore between now and Jan. 1, 1900. The contract calls for the delivery of 30,000 tons at the Illinois Steel Works. In addition, the Colorado Fuel & Iron Co. is being supplied with manganese from that point. The ore comes from the Catalpa-Crescent and Garden City properties. The output will average 200 tons a day. Many of the steel works in the East get their manganese from foreign countries, and Mr. Cook had a hard fight to get that contract for Leadville. Last year the output of manganese iron was 20,000 tons. This year the new contract will treble this, which means that these manganiferous properties will give employment to double the number of men they have in the past.

Leadville *Miner*: The President shaft, on the north end of Breece hill, is opening a fine body of silicious gold ore. Silicious ores are in demand at the smelters.

Leadville *Chronicle*: The smelters are returning to their normal condition. During the most severe weather the Arkansas Valley smelter was only able to keep four of its furnaces running, but has now seven in blast.——G. W. Cook has a force of men on the Garden City shaft in California gulch. A new plant is being put in. It is the intention to make it a large manganese producer. The Eastern steel works will take all of this ore which Leadville can furnish.——Mgr. Horner of the Catalpa-Crescent is preparing for a large increase in shipments,——At the A. Y. and Minnie, Leadville, the average shipment is 1500 tons per month. This property has developed into one of the great lead mines of the camp, about 350 tons of lead being supplied each month to the smelters.——The McAllister lease on the Mike and Starr will soon be shipping forty to fifty tons of copper sulphide, a considerable quantity of which will go to the smelter at Buena Vista.——The scarcity of timber continues and has interfered with mining operations. Several shafts have been temporarily stopped on account of the inability of the lumber dealers to furnish the necessary supply.——The Midland has from twenty-five to thirty cars on the side tracks along the Frying Pan and these will be rushed in the first thing.——Mgr. Schlessinger of the Weldon at Leadville is at present putting the new shaft, east of the big plant, in condition to be operated. A drift connects the two shafts, and the object is to reach the connecting drift, clean it out and secure air.——The Moyer has sent out this month 3000 tons. There are at present about 100 men on the Moyer payroll, and the tonnage can be raised to 300 tons per day just as soon as the conditions will permit of such an output.

Miner: The Fortune, Penfield and Judge Bowen group on Little Ellen hill, Leadville, are shipping gold ore to Pueblo.——The All Right shaft of the Crysolite mine on Fryer hill, Leadville, is producing manganese-iron ore.

LOS ANIMAS COUNTY.

A Boston syndicate, represented by C. H. Venner & Co., has secured control of the Copper King smelting plant at Trinidad, and purpose operating it independently of the recently formed smelting trust. A working capital of $300,000 will be provided.

MONTROSE COUNTY.

Denver *Mining Record*: Teams are hauling ore from the new copper mines in Paradox valley. J. N. McBride owns a controlling interest. Smelter returns have been received on the first eleven carloads. The ore will run about $1000 to the car of ten tons. In exact figures, $10,155.67 was received from 112.890 tons, or $89.96 to the ton as average.

SAN JUAN COUNTY.

Silverton *Standard*: The Gold King mill at Gladstone will again be enlarged. Twenty stamps, shaking tables, etc., will soon be put in, making fifty stamps. The extent of the ore bodies has never been demonstrated.——A foot of gray copper and lead was recently found in the shaft of the Pride of the West at Silverton, picked samples from which assays 400 ounces silver and 52% lead.

Silverton *Standard*: The rich ore discovered by McPhillips at Bear creek, in the Grape Vine, is in a fissure, between lime and slate.

SAN MIGUEL COUNTY.

San Miguel *Examiner*: The Liberty Bell mill at Telluride is dropping twenty stamps, treating sixty tons of ore every twenty-four hours. The additional twenty stamps being added to the mill will be dropping before a great while. The mine is in shape to supply the ore needed.——The Philadelphia mine at Saw Pit is in operation again and is sending out a good shipment at a profit from the smelter. The shipment from the camp is gradually increasing.——The Bessie mill at Telluride is now making two test runs of 100 tons each—one from the Montezuma vein and one from the Baldy. One-fifth of the ore is taken as samples as it leaves the rolls, and samples will be taken from the tailings which are to go to the Argall works at Florence for treatment by that process.

SUMMIT COUNTY.

Summit *Journal*: A strike of rich ore has been made in the Uncle Sam mine, at Swandyke, in a tunnel 205 feet from the mouth. The vein is 4 feet wide.

IDAHO.

The Trade Dollar Con. M. & M. Co. has absorbed the Trade Dollar and Florida Mountain companies, taking over all the mines, mills and other property at Dewey.

Buffalo Hump, the mining camp, is the Mecca of hundreds of people. There are about 100 in camp and more going in. There are absolutely no accommodations and only a little grub for those who are there. The snow is 12 feet deep, and it is impossible to do anything. Many locations are being made and sold at Grangeville at good prices; but when the snow is gone, purchasers will find the ground belongs to some one else.

A mining deal involving $200,000 in the Seven Devils is pending. The properties have been bonded to L. A. Hall and associates of Minneapolis and Duluth. The property consists of twelve claims lying east and west of the Peacock mine.

Spokane *Chronicle*: Jno. O'Neill of Central City, with several partners, has drained a small sheet of water known as Buffalo lake, near the Buffalo Hump mines, and located a number of quartz claims on the area formerly covered by water. The lake was nearly round and about 2000 feet in diameter. The water was 4 feet deep. It is claimed that the Buffalo Hump lead strikes directly into the lake.

Mullan *Mirror*: The capacity of the Morning mill at Mullan has been increased seventy-five tons per day by the addition of new machinery. In '98 the Morning mill produced in six months 16,280 tons of ore.

MICHIGAN.

The American Steel & Wire Co. has about completed the purchase of one of the Clarke & Sauntry iron mining properties in the Lake Superior region for $1,000,000.

MONTANA.

It is reported that the increased activity of the mines of Butte City will give employment to 2000 additional men.

The Parrot Co. will hereafter declare monthly dividends of 30 cents per share, or at the rate of 36% per year.

An explosion was caused last Friday at the smelter of the Montana Ore Purchasing Co., at Butte, by an icicle being thrown into a pot of boiling slag, just drawn from the furnace, Considerable damage to the machinery and men resulted and the building caught fire.

Philipsburg *Mail*: Both the Granite and Bi-Metallic mines are working and men are daily being added to the force; 100 stamps are now dropping. It is probable the Granite concentrator will be enlarged.——Several feet of copper ore is said to have been struck on the main fork of Boulder, five miles east of Princeton.

Clancy *Miner*: A strike was made in Lump gulch recently in the Sailor, owned by McKenzie, Nelson and others. The find was made in a short crosscut tunnel driven to strike the lode, and the face of which is not more than 15 feet under the surface. From 4 to 6 inches of high-grade ore is exposed in crossing the vein, resembling that from the Little Alma.——The leasers on the 150-foot level at the Legal Tender, near Clancy, are reported to be working in good ore.

NEVADA.

A 10-stamp mill is to be erected at the Golden Eagle mine in Humboldt county.

Comstock tunnel stock is reported in present demand in New York since the installation of the Risdon pump plant, shares appreciating from 4 to 10 cents.

Following is a copy of the weekly letter of Supt. G. McM. Ross to the Comstock Pumping Association, containing interesting matter relating to the additions to the Risdon hydraulic plant and demonstrating that lowering of the water 500 feet below the Sutro tunnel level in the C. & C. shaft will drain a large area of the Comstock lode: During the past week no pumping has been done. The work of the association being for and on account of the various mining companies as appear in their weekly letters. The Hale & Norcross Co. are repairing their connecting drift with the tunnel south lateral and their station on this level so that the action of the pump may be noted. The movement of the water in the Chollar combination shaft is such as to prove that a large area of the Comstock will be drained when the water in the C. & C. shaft has been lowered 500 feet, and for this reason it is important that the lowering of the water should be noted at as many points as possible. The Risdon Works, through their engineers now here, report that they are confident of being able to carry out their contract of providing machinery that will lower the water at the C. & C. shaft for 500 feet below the Sutro tunnel. They regard the present work as being experimental only in so far as they have to deal with greater pressure of water than has been used before in an elevator. The general principles governing the operation of such a system were well enough understood by them when they entered into their present contract. The machinery for the rearranged elevator has arrived and consists of a new tapered discharge made of phosphor-bronze and iron in sections, in all 23 feet long, as against 10 feet, the length of the first tapered piece used; a new suction piece, providing a much more liberal clearance, decreasing the velocity of the incoming or suction water to about one-tenth of what it was in the first suction used. Provision has also been made for moving the jet or nozzle a much greater distance from the throat, thereby securing a more thorough entraining of the incoming or suction water with the jet power water. They have also sent bolts and rods enough to permit of a submergence of 200 feet. All of the new work seems to be first-class in material and workmanship, and if there is no interruption we are likely to be pumping again within three or four days.

Under date of the 23rd it is learned that the machinery is expected to re-

sume unwatering to-morrow or Monday. All the old attachments have been taken out of the shaft, and the new elevator was yesterday lowered into place.

On the Comstock the Justice mine reports that on the 370-foot level they have drifted north from the top of No. 1 upraise. The face is in ore assaying gold $10.85, silver six ounces; total, $14.63 per ton. During the week they hoisted twenty-six tons of ore from No. 1 upraise, car samples averaging gold $20.69, silver five ounces; total, $23.71 per ton.

Silver State: Five or six miles south of Silver Peak are the Sand Hills, known to contain gold from 50 cents to $2 per ton; there are millions of tons of it.——It is reported that the 70-foot ledge at the Drinkwater mine, in Silver Peak district, averages $15 per ton in gold. Before striking the ledge the mine was offered for $500,000, but after they found this ledge they raised to $1,000,000.

Tracy & Mulhall of Salt Lake City have gone to Galena with a load of mining supplies to begin work on mines in Galena under the management of the Nevada M. Co., recently incorporated in Salt Lake.

White Pine *News*: The Chainman mine is making some interesting development. Recently a caved drift was cleared out and in a crosscut it was discovered that what had been taken for a footwall by former workers was only a clay seam a few inches in thickness back of which lay an 8-foot vein of good ore. The mine has lain idle for some time. It has a 75-stamp mill.

Enterprise: The Obiston shaft on the Comstock is to be reopened.——In the Con. Cal. & Va., the work of reopening the 1400 level is progressing. There is considerable unprospected ground on this level which will be explored. The 1650 and 1750 levels are also being placed in good condition.

Salt Lake *Tribune*: A few months ago Pease, Johnson & Bradbury took a group of claims, supposed to be low-grade, at Battle Mountain. They began work and had gone but a short distance when lead was noticed coming in. This was followed, and assays demonstrated that it had developed into a high-grade silver proposition. The ore is now being shipped at a profit.

NEW MEXICO.

An addition of thirty stamps is being made to the Aztec mill, near Elizabethtown.——The shaft of the Confidence is still in ore.

Santa Fe *New Mexican*: Forty men are leasing in the second and third levels of the Snake at Hillsboro.——A strike of high-grade ore is reported in the Mastodon at Hillsboro. The vein is 1 foot wide assaying $70 in gold and $20 in copper per ton.——The mines of Hillsboro are increasing their working forces and output. During the week the Opportunity mine put on ten new leasers; the Richmond has seventy-eight men employed, the Trippe eighty, Golden Era group fifty-five and the Woolsey thirty-five men.——Keller & Gallee have purchased the American mine for $11,000; J. A. Kruse of Chicago has purchased the Prosper for $10,000, and Postmaster Miller has sold the property he has been developing for $6000.——E. D. Baker made a shipment from his mine at Silver City which returned 15% to 30% copper.—— Noble & Miller of Paschal, have made a shipment of high-grade copper ore to the Deming sampler.——On Legal Tender hill, Silver City, C. Sellman has a prospect. The ore runs $6 in gold, seventeen ounces in silver and 4½% lead per ton.——The smelter at Silver City has closed a contract with a Crittenden, Ariz., concern for twenty tons of copper pyrite ore daily for one year.——At Chloride Flat, three miles from Silver City, fifteen miners are working old properties under lease. The ore is iron-lead and averages forty ounces in silver per ton.

Silver City *Enterprise*: Ashton, Roach & Williams have made a shipment of copper ore to the Silver City Reduction Works.——Ashton & Roach have resumed operations upon their Wildcat mine, which lies southwest of the Santa Rita C. & I. Co.'s mines.——A small force has been put to work upon the Little Fannie mine, at Mogollon.——H. Dawson still continues development work upon the Ivanhoe mine, near San Jose. He has about ten tons of copper sulphide ore upon the dump ready for shipment.

White Oak *Eagle*: Quartz leads have been discovered in the Jicarillas during February and March. Placer mining has heretofore had the entire attention of mining men in the Jicarillas, but now a number of parties are sinking on veins.

Silver City *Enterprise*: Jones & Dawson have sunk a new shaft to the level of the ore bodies on the Rita and are drifting east tocut the ore. The old shaft became unsafe and had to be abandoned.——H. Dawson has eight miners at work upon the Romero and is shipping high-grade ore.

OREGON.

(Special Correspondence). — Goodspeed & Fuller of Carson have bonded their placer property on Pine creek, Union Co., to Denver, Colo., men for $35,000, comprising eleven claims (220 acres) and water rights.

Baker City, Or., March 18th, '99.

The Collateral mine, adjoining the Virtue, near Baker City, Or., has 1800 feet of development work and has exposed a body of ore.

The Badger M. & M. Co. at Susanville is running the new 10-stamp mill on good ore and shipping carbonate ore from the Badger mine, also several carloads of high-grade concentrates from the mill.

Baker City *Epigram*: The development of the Denny group of mines near Baker City is to be commenced at once, with W. C. Nelson as Supt.——The Baisley-Elkhorn mine has made a cleanup of $6000.——The old Virtue mine, east of Baker City, is to be unwatered and water pipe is being shipped in.——Compson & O'Donnell have a bond and option on the Jay Gould mines near the Bonanza. J. F. Cupid of Sumpter is Supt.——A strike of copper ore worth $60 per ton is reported in the Vaughn mine on the Oregon side of Snake river. The vein is said to be 130 feet in width.

Idaho *Statesman*: The Cable Cove district is on the head of Silver creek, four miles west of Cracker creek, in Baker county, ten miles from the Sumpter Valley railroad. Timber is abundant, also water, except for power. The country rock is granite, traversed by numerous fissure veins, the longest of which has been traced and located for a distance of five miles. The strike of these veins is north, and shoots of ore come to the surface in many places. The ledges vary in width from 1 foot to 50 feet and carry very long ore shoots.

SOUTH DAKOTA.

The new Deadwood & Delaware smelter at Deadwood handles 400 tons of ore, 200 tons of limestone and a large quantity of coal and fluxes daily. The former plant burned about a year ago, but the new one is constructed of iron and steel. There are four blast and one reverberatory furnaces in operation and a second reverberatory has been completed.

The Montazuma mines, three miles north of Rockford, have been bonded to C. Cadmus.

The Portland, Clinton, Trojan, Empire and other mines on Green mountain are shipping again.

Pioneer-Times: The Dacy shaft, at Ragged Top, is down 455 feet and has passed from limestone into a calcareous sand rock. Pockets of ore are of frequent occurrence. The upper quartzite lies beneath the sand rock.

Black Hills *Mining Review*: The Ragged Top Co. has leased a portion of its ground to Pringle & Desmond, who are taking out ore.——The Kilpatrick shaft at Ragged Top is down 480 feet.——The Homestake Co. at Lead City contemplates making extensive improvements this year. A large amount of money will be expended in sewers and in securing additional water supply.—— Baggaley & Mauss are drifting from the bottom of the shaft in the Diamond mine on Two Bit. The vein is a fissure in rhyolite and consists chiefly of limonite ore carrying gold.——A single shift is at work on the Montana mine, near the head of Irish gulch, three miles from Rochford, driving the tunnel ahead.——The Standby, below Rochford, is in operation. The belt on which the Standby is located extends several miles south from Rapid creek, and on it are several good prospects.——Important work is about to be started in City Creek canyon, Deadwood, to determine the extent of the copper-bearing vein developed higher up on the mountain. It is said that, if the result of the contemplated exploration prove satisfactory, the Detroit & Deadwood Co. will build a large smelting plant near Deadwood for the treatment of the ore.

UTAH.

Lewisohn Bros. of Boston have bought the copper plant and its copper mines on Copper mountain, Box Elder county, for $200,000.

A Boston corporation known as the United States M. Co. has purchased the old Jordan mine, the Telegraph group, the Hamlin group and the control of the Niagara group of mines in Bingham canyon. As lead, gold and silver mines they are credited with a production of $25,000,000. Copper ore of high grade also occurs. The properties have recently been examined by Rich'd A. Parker of San Francisco, Wm. A. Farish of Denver, Wm. T. Austin of Denver and Jas. W. Neill of Salt Lake City, each of whom reported favorably. The mines are developed by twenty miles of workings and show large ore reserves. The company has also secured the site of the old Jordan smelter. The properties are already well equipped with mills, concentrator plants, cyanide works, etc., but a large reduction works will be built on the site of the old Jordan smelter. There is a canal eight miles in length which delivers a large supply of water at the smelter.

Bingham *Bulletin*: Ore is now coming from the Niagara, at Bingham, by tram at the rate of three cars per day.——At the Old Telegraph there are upwards of 500 tons of leasers' ore out.——Work on the Rough & Ready, now in new hands, is being started this week under contract by Morrissey & Hepburn.——The Yampa, opposite Highland Boy, is reported blockaded with ore.——Giant Chief hoist, idle for some time, is being repaired and will be busy this spring.

Salt Lake *Tribune*: It was reported that the properties and plant of the Sunshine M. Co. at Sunshine, Camp Floyd district, had been tied up by G. S. Peyton and others, and that a transfer of at least control would be made to them.

Mercur *Mercury*: T. B. Joseph has let a contract for running a tunnel on his Gold Flake ground in Ophir canyon. —— Considerable work is being done in the Cedar Hills group, West Dip, and the showing is good.——Work on the Kismet hoist has commenced.——A cave in the Geyser-Marion has disclosed a ledge of high-grade ore in a place where it was supposed no ore existed, as it was higher up than any ore body yet discovered in the property. —— Development work on the Wachusett group on Lion hill is progressing, the tunnel having been driven a distance of 130 feet. The vein, which was small at the start, has gradually widened to nearly 2 feet, showing values in silver and some gold.—— At the Mercur the regular four ore trains keep the mill grinding on 400 tons per day. The new refinery is almost completed, and the electric plant is expected to be in operation about April 15th.——The gold excitement on Antelope island in Great Salt Lake has reached Mercur and several miners and mill men have left for there.——At the Snowstorm, the 400-foot level has been reached and a drift started both ways on the vein, while sinking still continues on the incline.

Salt Lake *Tribune*: A strike is reported from the Century mine, in Park valley, Box Elder county. A vein 4 feet wide, containing a copper-gold ore, has been found in a new tunnel 125 feet from the surface.

Eureka *Republican*: The Illinois M. Co., at Eureka, has installed a new gasoline hoisting plant.——The Silver Bullion, at Diamond, is being developed with an increased force under the management of S. K. King.——The Superior M. Co., Tintic district, is putting down a shaft under contract and also erecting necessary buildings.

WASHINGTON.

Washington's new mining law may be briefly summarized as follows: Discoverer must file notice of location within ninety days from date of discovery; "before filing such notice for record the discoverer shall locate his claim by first sinking a discovery shaft upon the lode to the depth of 10 feet from the lowest part of the rim of such shaft at the surface," besides marking the surface boundaries as usual, and, if there is underbrush, blazing around claim; an open cut or tunnel 10 feet in length shall hold a as shaft; in case of previous filing being defective relocation must be made, as above; within thirty days after expiration of time for assessment work sworn statement must be filed with county recorder, giving nature of labor performed and cost, which shall be prima facie evidence of the facts; "the provisions herein relating to discovery shafts shall not apply to any mining location west of the summit of the Cascade mountains;" any mining district shall have the power to make road building to mining claims within such district applicable as assessment work or improvement upon such claims.

The Republic mine at Republic has been sold to Montreal, Canada, capitalists. The company will be reorganized.

The new company which purchased the Republic mine will be known as the Republic Con. G. M. Co. The incorporators are P. Clark, C. S. Eltinge and W. J. C. Wakefield. The capitalization is to be $3,500,000, in shares of a par value of $1 each. The office will be in Spokane.

In a new shaft on the Mary Ann mine, at Republic, at a depth of 12 feet they came upon a cone of solid copper-gold ore similar to the Rossland ores. It is a solid body of ore stretching across the shaft and extends for some distance on either side with no wall in sight. Assays show $3.80 to $14.60 in gold. The working force will be doubled and a tunnel started to tap the vein at a depth of 240 feet.

The Mountain Lion, at Republic, has put in a compressor plant, comprising an 80 H. P. boiler, a 42-inch by 10-foot compressor capable of running twelve drills. The equipment includes three Little Giant drills, Nos. 1, 2 and 3. The first work will be to continue the tunnel to cross the ledge which lies farther east. Drifting on the vein already opened will also be done. The Mountain Lion will soon be ready for a mill. It is the intention of the management to erect one this season.

The vertical shaft on the Dora at Republic is now down 45 feet. At 20 feet the shaft passed through the pay streak at an angle of 60°. Where it was first struck it was composed of stringers of quartz, but before it had all passed out it had become a solid ore body. The pay streak was about 4 feet wide where it was cut by the shaft.

The shaft on the Delta is down 25 feet in solid quartz. A crosscut has been made at the bottom, showing the ledge 10 feet wide. The average value of the ore in the Delta will run $10.

The vein on the Kate Hayward has straightened up and the shaft is now being run straight down. A tunnel is being run on the Kate Hayward to tap the shaft.

The Flag Hill has some rich ore. The vein ranges from 10 inches to a foot in width.

A shaft is being sunk by the El Caliph upon the line between that property and the Morning Glory which is down about 25 feet. The crosscut tunnel is now in 100 feet.

Rossland *Miner*: The report of a strike comes from near the mouth of Gold creek about sixteen miles south of Republic. It is gold and assays are reported high. As yet the snow is quite deep and details are meager.——The Snow Drop shaft is down 50 feet, and has 4 feet of quartz, which assays $14.40. Drifts will be started from the 75-foot level.—— Supt. Donan of the Nevada claim has struck a seam of 8 inches of ore. The tunnel will cut the ledge at a depth of 250 feet. The surface ledge is wide and assays fairly good

WYOMING.

Salt Lake *Tribune*: The record of a forty hours' run at the Carissa mill is $3600 worth of gold bullion. The average output of the mill is about fifty ounces of gold per day.——T. H. Neff is hauling ore from the Mormon Crevice, and is preparing to start his mill in Atlantic gulch.

Grand Encampment *Herald*: The Meta mine, near Grand Encampment, has a vein of 18 inches of shipping ore. The workings are down 75 feet and a body of high-grade ore is at the bottom of the shaft. The water level was reached at 65 feet, and the company will put in pumps, hoists, etc. There is on the dump three carloads of high-grade silver, copper and lead ores ready for shipment. This property is owned by the Carbon County Copper Co.

FOREIGN.

AUSTRALIA.

The Western Australian International Mining and Industrial Exposition was opened at Coolgardie last Tuesday and will continue for three months.

The output of the Western Australia gold fields for December, '98, was 95,316½ ounces. The production of that section has steadily risen from 302 ounces in '86 to 1,050,180 ounces in '98. The total output for thirteen years was 2,692,793 ounces, valued at $50,000,000. In '98 New South Wales produced 341,722 ounces, Queensland 918,000 ounces and Victoria 837,258 ounces.

BRITISH COLUMBIA.

Work on the Fontenoy mine at Camp McKinney has been commenced under direction of P. L. Egan. The Fontenoy carries two ledges, which cross each other at right angles. One of these is a base ore vein and the other is the Cariboo ledge, which runs through the Wiarton and Waterloo into the Fontenoy.

The lower tunnel on the ledge of the Hamilton group on Twelve-mile, near Silverton, is in over 100 feet. This property, opened by the owners, has over 200 feet of tunnel driven.

The Emily Edith mine, on Slocan lake, will probably build a 200-ton concentrator the coming season. The Wakefield Co., Slocan, are considering the building of an aerial tramway.

The Snowshoe mine at Greenwood is reported bonded to J. W. Astley for $70,000. The mine is developed by an incline shaft 170 feet, several crosscuts and drifts. The ore is copper pyrites in calc spar.

The Canadian Pacific Exploration Co., owning the Porto Rico mine, near Ymir, has shut down the mill on that property owing to lack of water.

On the Treasure Vault, just below the Last Chance mine, in the Slocan, a strike of 2½ feet of clean galena has been made, and on the Vulture, beyond the Reco, a drift has been run 20 feet on 18 inches of clean galena and 2 feet of concentrating ore.

Rossland *Miner*: The Oro Fino Mines, Ltd., located near Fairview, is to have a mill. The No. 2 tunnel on the Oro Fino ledge, which was on Feb. 9th in a distance of 86 feet, and proved the ledge to be 4 feet wide at that point, assaying $47.50 per ton, has now (the 16th inst.), at 118 feet, shown the ledge to be 8 feet wide. The ore is high grade and free milling.

Spokesman-Review: At the Golden Wedge property, near Nelson, a strike has been made in the lower tunnel, which is being driven at a depth of 400 feet below the upper workings, where a ledge of quartz carrying galena and free gold was found. The new 10-stamp mill on the property is now complete, the equipment including three vanners.

Ymir *Miner*: A strike has been made on the Monarch group, near Ymir. The ledge on this property is 50 feet wide, and the shaft sunk in the center of the ledge has struck the footwall at a depth of 60 feet, where a chute of ore showing a high percentage in copper has been fcund.——A large force is working in the Dundee mine, near Ymir, and the concentrator is now running. A contract has been let for 100 feet of drift from the 200 level.——The contract for sinking a shaft 100 feet on the Evening Star has been completed. It is owned by the Fairmont G. M. Co. and is an extension of the Dundee.

SOUTH AFRICA.

RAND DISTRICT.

At the Crown Deep, in the Rand district, in February: Number of stamps working, 200; number of days working 200 stamps, 24 days 12 hours; tons crushed by 200 stamps, 25,541; yield in fine gold from mill, 6777 ounces; tons of sands and concentrates treated by cyanide works, 20,406; yield in fine gold from sands and concentrates, 5116 ounces; tons of slimes treated, 4300; yield in fine gold from slimes, 460 ounces; total yield in bullion ounces, 14,175, equal to 12,353 ounces fine gold; estimated profit, £23,550.

South African *Mining Journal*: In the first quarter of '98 the Simmer & Jack yielded £23,329; the second quarter, £52,174; the third quarter, £73,833, and the fourth quarter, £87,818. The estate revenue provided an additional sum of £12,934, and the total net profit on the year's operations was £246,531. This steady advance in yield and profits is to some extent accounted for by the appreciable advance in grade. In the first quarter the yield per ton was 7.688 dwts.; for the second, 8.928 dwts.; for the third, 9.613 dwts., and for the fourth, 10.01 dwts. per ton. Working expenses over the year average 19s 8.87d per ton, with a profit of 14s 4.62 per ton treated. During the last quarter the ore reserves were depreciated by 28,330 tons.

Standard and Diggers' News: In the Randfontein Estates Co. two new reefs have been discovered. In continuing the crosscuts from the second reef lately discovered on the Randfontein Estates property, the South Randfontein struck a third reef assaying 37 dwts. per ton. In a borehole put down on another portion of the Randfontein Estates property a fourth reef has been struck 6 feet wide assaying 12 dwts fine gold over the whole width. The footwall of this reef assays nearly 3 ozs. to the ton.

MEXICO.

The Esperanza mine at El Oro is reported bonded to an English syndicate, which puts up $100,000. The price of the mine is locally stated to be $3,000,000 gold; the option expires April 25th.

An unauthenticated statment comes from Mexico that the Candelaria mine, in the district of San Dimas, State of Durango, had been sold for a million dollars in Mexican silver. The property is owned by D. M. Burns and others of San Francisco, Cal., and was discovered over 100 years ago and has been worked, with the exception of short intervals, ever since. During its early history it was worked in a desultory manner, until in 1783 it came into the hands of Don Juan Zanbrano, who developed it extensively and worked it until the time of his death in 1807. and it is said that during this time he paid in royalty to the Spanish Government $11,000,000. As the duty was presumed to represent one-fifth of the gross output, it is probable that Don Juan took out $55,000,000 in silver from the mine.

But little is known of the mine from the date of the death of the Don until 1863, though it was worked by heirs of Don Juan in a small way. The workings caved and for some time it lay idle altogether. In the fall of 1863 the property was purchased by Americans, who made repeated but unsuccessful efforts to unwater the mine. In 1883 D. M. Burns and associates bought the mine and modern methods being applied the mine was soon cleared of water, and it soon commenced to pay handsomely.

The ore is milled to about 85% of its assay

value, which is said to be over $70 per ton. The gold constitutes about one-third of the value. The property has been extensively and systematically developed, and in recent years has been worked through adit levels, the lowest of which reaches a depth of 3500 feet under the mountain in which the vein occurs. No pumping is necessary and all power for operating machinery is supplied by a stream in the neighboring canyon.

El Paso Times: The new proprietors of the Dos Cabezas mine, in the Sierra Madre mountains, have started the Huntington mill at the mine, which is turning out a quantity of high-grade concentrates, and as soon as they can increase their motive power the 5-stamp mill will be started.

Two Republics: The titles to the following mines have been declared forfeited, under the law of June 2nd, '92, for failure to comply with the requirements of the law:

Montenegro, Huajuapam, Oaxaca.....Silver
El Corazon de Jesus, Nazas, Durango..... "
Guadalupe, S. Juan del Rio, " ..... "
Las Tres Caldas, Mapimi, " ..... "
Cantinela, S. Juan de Guadalupe, Durango.. "
La Gazuma, " " "
Lucrecia, S. Juan del Rio, Durango..Silver & gold
Don Jose, " " "
Las Tablas, Inde, " Silver
La Fe, Mapimi, Durango.....Silver & gold
El Grano Lucero, Inde, Durango.....Silver
La Union, S. Juan del Rio, " .....
La Satillera No. 2, Mapimi, " ..Silver & gold
La Aurora, Mapimi, " ..Silver & lead
San Luis, Inde, " ..Silver & gold
El Coyote, Mapimi, " ..Silver & lead
El Carmen, Cuencame, " "
Florencia, " " Silver & copper
La Constancia, S. Juan de Guadalupe, Durango..... .....Silver
Catolica del Norte, El Fuerte, Sinaloa.....Gold
El Pabellon, Zacatecas, Zacatecas.....Silver
Santa Rita, Pinos, " .... "
El Aguila, Zacatecas, " ..... "
Demasias, Ojocaliente, " ... . "
Santa Clara, Pinos, " ..... "
Ampliacion de Santa Rita, " Zacatecas..... ..... "
San Martin, Ojocaliente, Zacatecas..... "
Ampliacion de San Francisco del Morro, Zacatecas, Zacatecas..... "
Ampliacion N. de los Campos, Zacatecas, Zacatecas..... "
Esperanza, Zacatecas, Zacatecas..... "
Guadalupe, " " ..... "
Monaco, " " ..... "
Evangelina, " " Silver and gold
La Condesa, " " .....Silver
El Refugio del Cerro, " Zacatecas. "
El Monometalico, Zacatecas, Zacatecas.....Silver and gold
Concordia, Zacatecas, Zacatecas.....Silver
Robert E. Lee, " " ..... "
El Refugio del Panuco, " Zacatecas. "
1897, Zacatecas, " ..... "
El Capricho, Zacatecas, " ..... "
El Capitan, " " ..... "
Ampliacion, " " ..... "
San Pedro, " " ..... "
Amplicacion de Purisima de la Escondido, Zacatecas, Zacatecas..... "
Flor de Maria, Zacatecas, Zacatecas.....Silver and gold
Hidalgo, Zacatecas, Zacatecas .... "
El Patrocinio, " " .....Silver
Gladalupe, " " .....
Chapultepec, " " ....Silver and gold
San Antonio, " " .....Silver
Ampliacion N. de Asturiana, Zacatecas, Zacatecas..... "
Cuauhtemoc, Zacatecas, Zacatecas.Silver and gold

Two Republics: In the Hacienda de Jicorica, Joaquin Martes has discovered a mine of gold and silver. This mine is said to have been known for many years, but has been hidden till now.

Two Republics: S. H. Parson, from the Sierra Madre country, reports the discovery of a rich placer mine on a tributary to the Aros river. The Aros flows into the Yaqui river, and the placer diggings are in the State of Sonora, about sixty miles southwest of Nacori and 180 miles in the same direction from Casas Grandes. The placers are in the bed of an old river and two miles from the stream, to which the dirt was packed by the discoverers on burros, who claim to have washed out $6.50 from 100 pounds of dirt.

THE KLONDIKE.

A letter from Dawson says: This winter's work has far enough advanced with many holes to bedrock on all the creeks to show that there will not be any new strikes with the exception of Sulphur, and that will be very small, as it is very spotted and a light pay streak. There is no question but that more gold will be shipped out this year, but not one ounce will come from new creeks, excepting Sulphur. Last year the output, according to official reports, was $3,500,000 and this year may possibly reach $6,000,000. The richest claims will be about worked out, for they have a full force of men working this winter. Last year they were at a disadvantage as they could only work a limited number of men, owing to the scarcity of provisions. There are some very rich claims in El Dorado and Bonanza, but at the same time the richness did not justify the immense rush in here last spring. People imagined that this whole country was covered with gold, from the way they staked every creek, gulch, bench and hill, and even on the Dome, the highest mountain range here, dividing the Klondike and Indian rivers.

Up the river is the Stewart River district, where a good many are now prospecting. A great rush of stampeders went up to stake Thistle creek and is many tributaries; but it has proved to be a fake. White river is another tributary to the Yukon which has been stampeded and staked the entire length. Down the river, two miles from Dawson, is Moose Hide, which was stampeded in 1897 and re-stampeded again last year, although they have yet the first pan of pay dirt to show. Further down are Twelve Mile, Kentucky and Colorado creeks, all fake stampedes. There are a lot of men here who are always on the alert, and will chase off during the night to stake on the slightest rumor; then there is another lot here who want as many claims as possible, so they can unload in the spring to the "cheekakos," for they expect another big rush of gold seekers in the spring. The gold which is in this country does not justify any rush, for right here in Dawson there are 15,000 more than the camp can support; in fact any man coming to this country should have enough money and grub to last him at least three years, for a man cannot depend upon working for wages, for work is scarce and the seasons are short, in fact a working man is better off in the States. It looks well in print to read about $1.50 an hour in this country, but this winter wages are as low as $5 per day. On the rich claims they pay $1 per hour, but during these short days a man does not work over six to eight hours a day; then again one must take in consideration that he must sled his grub and outfit, which is all the way from 1000 pounds up, to where he is working, which may be from twenty-five to sixty miles, depending on where he happens to get a job; if he does not want to "mush" himself he can have it freighted for 15 cents a pound, or it may cost him as high as 40 cents a pound in winter, depending on the distance; in summer it runs up to 65 cents a pound. You can figure on about three to four months' work, but a man will not average ten hours a day.

A laboring man is better off outside than here, for living is very expensive. Luxuries, such as fresh potatoes, are $1 a pound; fresh onions, frozen solid, 50 cents a pound; turkeys, $1.50 a pound; oysters, $5 a can; sugar, 50 cents a pound; coffee, $1 a pound; condensed milk, 75 cents a can; fresh meat, 50 cents a pound; butter, $1 a pound. All kinds of canned goods are plentiful. Meals at restaurants have come down to $1.50 and $1. Drinks and cigars are 50 cents; a few 25-cent houses have opened lately, but you can taste the Yukon water in the whisky and the cabbage flavor in the cigars. Smoking tobacco is $2 a pound, chewing $3 a pound; all other goods at proportionate prices. There are several articles which are very cheap, but they do not come under the head of luxuries but of burden, namely, a hand sled and a pack strap. I have come to the conclusion that they were never intended for men, so I have wisely resolved not to make a beast of myself again, for life is too short. I have seen big, husky Swedes pack 100 pounds from here to Dominion, forty miles, not a mile of which is dry trail in summer, it being over moss, nigger heads and swamp, so you can imagine the load it is. Many a hardy man broke down in health last summer; they packed their heavy burden to the hospital and died. The hospitals are always crowded and at the present time most of the patients have the scurvy, but several have frozen feet. In many of these latter cases amputation was necessary. These patients are stampeders, for they rush off on these fake discoveries in the coldest weather, and we have mighty cold spells here.

Dawson City has the reputation of being a very lively camp and it was for a short time last spring after the gold cleanup of the creeks, but to-day it is very slow. Saloons, gambling joints and dance halls are almost deserted, which is not strange, as nine out of every ten men are broke and no work in sight, as the mines employ only a small number each, at most twenty men, and there are not more than twenty-five mines employing that number. It is sad to see the misery that is here: nine out of every ten want to go back to civilization, but have no means, many being destitute. The leading American citizens held a meeting some time ago and sent out a man with a petition to Congress for the relief of Americans. Dawson is very orderly for a mining camp. I admire the mounted police system; they are a gentlemanly body of men who enforce the letter. All the "bad" men with records, and many are here, keep very quiet and few gun-plays are made. There have been three suicides, two women and one man. Dawson has had her biggest boom and is rapidly on the decline; a year from now it will be a very small $5-a-day camp. Companies will work out the remaining gold in the creeks, and even now some are applying for bedrock concessions. Dawson has seen her best days and will never rise again, as mining is the only resource and placer mines are quickly worked out. If we had quartz mines the camp would become permanent, but with all the prospecting done here nothing has been found. There are men here who will still boom it—they are either in business or have a good many wildcat claims which they want to unload. I would not advise anyone to come here, for it is a country of hardship.

Industrial Notes.

—Congressional appropriations for Pacific coast improvements at the last session aggregate $3,806,963.

—It is conservatively calculated that the recent California rains are worth $20,000,000 to that State's industries.

—A telegraph line from Lake Bennett to Dawson, N. W. T., is being built. It will extend to Skaguay, B. C., by cable.

—A Rothschild bank in San Francisco, with $5,000,000 capital, is the latest financial report, but, probably, an unlikely one.

—The Pacific Iron & Nail Co. have conveyed to the Balfour-Guthrie Investment Co. the old Pacific Iron & Nail Works' property.

—E. C. Kelsey, city engineer, Salt Lake City, Utah, proposes to spend $25,000 in betterment of that city's water system.

—The San Francisco Savings Union is about to build a reservoir and a canal 10 feet wide, 4 feet deep, 27 miles long, at Elsinore, Cal.

—A phenomenal oil flow of 1000 barrels per day is reported from Coalinga, Cal., and considerable adjacent property is being bought.

—The Pacific and International Exposition at San Francisco was given a $250,000 appropriation by the California Legislature before adjournment.

—The surveyors who have been looking for a route to build a railroad from Jerome, Arizona, to some point on the Santa Fe Pacific, have been "called in" by W. A. Clark.

—The Consolidated Kansas City Smelting & Refining Co. has the '99 contract for furnishing the Western Union Telegraph Co. with blue vitriol.

—At Nanaimo, B. C., Dunsmuir's Alexandria coal mines are again working with a limited number of pushers, who have resumed work at the old wage of $2 a day.

—An American electric company will install a plant on the Atoyac river, twelve miles from Puebla, Mexico, to utilize water power from the canal constructed by S. de Mier at a cost of half a million dollars, and will transmit current to Puebla. The machinery will be of 2000 H. P.

—A contract for a 500-barrel flour mill in Shanghai, China—the first contract ever given a United States firm for a flour mill in China—has been received by the Edward P. Allis Co., Milwaukee. The milling machinery, engine, etc., complete will be shipped next month.

—The Pittsburg Iron Co. is to establish a branch at Seattle, Wash., for the manufacture of iron and steel for the Orient. Seattle reports that "extensive iron mines in Lower California have contracted to furnish the raw material, and last week the company asked for a rate on 10,000 tons of iron monthly, to be shipped to Seattle."

—Boise, Idaho, reports that the contract has been let for the construction of the railroad from Weiser, Idaho, to the Seven Devils, and by May two will be racing to the great copper camp, work having already been commenced on what is known as the Huntington route, by Orman & Crook, the Colorado contractors. A hundred miles of the Weiser road has been contracted for at the average price of $11,000 a mile. In advance of the completion of either road, ore is being shipped from the Seven Devils on barges. The ore is floated to Lewiston, nearly 100 miles from the camp, there placed on cars and shipped to the smelter.

Personal.

W. H. HAMILTON of Kingman, Arizona, is in San Francisco.

W. H. HAMILTON of Kingman, Arizona, has gone to Vancouver, B. C.

A. A. BLOW of South African mines is on his way to London, England.

LOUIS H. R. VON RUECEAU of Cripple Creek, Colo., has gone to Europe.

COLIN TIMMONS, a mining man of Chloride, Arizona, is in Denver, Colo.

WILL J. SCOUTT, manager Suffolk mine at Ophir, Colo., is visiting in Denver.

L. BAUER of Berlin, Germany, has been inspecting mines in the vicinity of Nevada City, Cal.

J. J. VALENTINE of the Wells-Fargo Express Co. in San Francisco, Cal., is making a tour of Mexico.

WM. PLUMMER has resigned his engagement with the DeLamar, Idaho, M. Co. and returns to England.

W. B. STEWART is master mechanic for the Con. Gregory-Bobtail Mines Co. at Blackhawk, Colo.

DAVID SWICKHEIMER of the Japan mine, Telluride, Colo., is spending a few weeks in San Francisco.

J. F. NEWSOME has been appointed assistant professor mining and metallurgy at Stanford, Cal., University.

GEO. W. HALL, Mgr. Eagle Bird mine, at Maybert, Cal., has gone to Wilkesbarre, Pa., on official business.

P. A. H. FRANKLIN, who has been examining copper properties near Milford, Utah, has returned to the East.

E. T. HALE, formerly Supt. Keystone mine, Amador City, Cal., is now Supt. Rawhide mine, Tuolumne Co., Cal.

GEO. DOWNEY has resigned the superintendency of the Omo mine, El Dorado Co., Cal. He is succeeded by P. P. Weber.

M. C. WILKINSON, a young Los Angeles, Cal., electrical engineer, has been appointed second lieutenant in the U. S. army.

CAPT. THOS. MEIN proposes a trip to Alaska as soon as the Union Hill, Nevada Co., Cal., purchase is settled, and, subsequently, to England.

F. E. YOUNGS, Mgr. California Mines Development Co. of Barkerville, Cariboo district, B. C., is in San Francisco looking for mining machinery.

H. H. WHIPPLE is now Mgr. Columbus mine at La Plata, Colo., former Supt. Thompson having left that property to take charge of the Chihuahua M. Co.'s work at Chihuahua, Mexico.

IRWIN MAHON of Denver, Colo., is promoting a project the purpose of which is to establish a tourist scenic route on the Colorado river from the Gulf of California to a point in eastern Utah. He thinks he has a plan of light craft that will shoot rapids under perfect control by means of electricity and water power appliances.

Commercial Paragraphs.

THE Stillwell-Bierce & Smith-Vaile Co. of Dayton, Ohio, are represented in Denver, Colo., by O. G. Smith.

THE Enterprise Machine Shop, at Denver, are manufacturing twelve 6x8 steam hoisting engines, under contract.

THE American Steel and Wire Co. announces that its business center hereafter will be in New York and its executive business will be transferred to Chicago and San Francisco.

THE Link-Belt Machinery Co. of Chicago have increased their capital from $250,000 to $375,000, and have planned a new wrought-iron foundry building 200 feet square, to be built of steel.

FAIRBANKS, MORSE & Co. recently sold from their Denver branch pumping and hoisting equipment for the Albion M. Co.'s property at Big Cottonwood, Utah; also a gasoline hoisting engine to the Bingham Copper & Gold M. Co., at Bingham, Utah.

THE Simonds Saw Co. has recently placed in the Crocket beet sugar factory several Marsh steam pumps. All of the pumps used in this factory are of this make and giving entire satisfaction. This firm has also just sold to the Alameda Sugar Co. a Marsh air compressor, used in connection with an air lift, to raise water from artesian wells. They have also shipped a Marsh sinking pump to a mine near Angels Camp, which is doing good work. These sinking pumps are extensively used in Colorado and other mining centers, over 150 having been placed within two years.

THE Union Iron Works of San Francisco has the contract for two large freight steamers for the American-Hawaiian Steam Navigation Co., with headquarters at New York. The company is to ply its craft between New York, Philadelphia, San Francisco and Honolulu, with the possibility of extending the route. The first steamer is to be turned out in April, 1900, and the second one at a later date. Each will have a carrying capacity of 8500 tons. The first vessel will be 410 feet long, with 51 feet beam, and a depth of 32 feet. Her engines are to develop 2500 H. P.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MARCH 14, 1899.

621,216.—MINING CAISSON—J. Buchtel, Portland, Ogn.
620,889.—JAR CLOSURE—C. K. Cooper, Carus, Ogn.
621,041.—ARTIFICIAL FUEL—J. T. Davis, S. F.
621,045.—CANNING TABLE—F. A. Dixon, San Jose, Cal.
621,301.—NUT AND WASHER—W. C. D. Evans, Norwalk, Cal.
621,236.—BOOT BLACKING MACHINE—F. H. Farmer, Los Angeles, Cal.
620,913.—FRUIT GATHERER—H. T. Griffith, Portland, Ogn.
621,246.—GATE—C. H. Huslam, Stockton, Cal.
621,087.—FARE REGISTER—S. C. Houghton, S. F.
621,088.—SMELTING FURNACE—House & Dupea, Tacoma, Wash.
621,091.—FLOORS, SIDEWALKS, ETC.—P. H. Jackson, S. F.
621,305.—REAMER—J. B. Kaiser, Salem, Ogn.
621,264.—FRUIT CUTTER—W. Madison, Los Gatos, Cal.
621,130.—DISPLAY STAND—R. L. Peyton, Oakland, Cal.
621,281.—FRUIT GRADER—R. Powell, Myrtle Creek, Ogn.
621,149.—NON-OVERFLOW FOR VESSELS—C. L. Schalitz, S. F.
621,153.—TRUING WHEELS.—J. G. Schmidt, Portland, Ogn.
621,174.—WINDOW SASH WORKER—C. H. Strauss, Port Gamble, Wash.
621,175.—CURTAIN RING—Jennie L. Sturtevant, Gilroy, Cal.
621,062.—WATCH—F. W. Waschan, Medford, Ogn.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

NON-OVERFLOW FILLING ATTACHMENT FOR CLOSED VESSELS.—Carl L. Schalitz, San Francisco, Cal. No. 621,149. Dated March 14, 1899. This invention relates to a device which is especially designed for the filling of casks, tanks and similar closed vessels and a means whereby the supply of liquid is automatically cut off when the receptacle is full, thus preventing any overflow of the liquid and notifying the operator when the filling is completed. Such devices are especially needed in connection with the transfer of wines and liquors from one tank or cask to another, either by gravity or by pumping. It consists essentially of a curved liquid inlet passage, a supplemental air passage following the curvature of the inlet passage and the vertical tube into which the air passage discharges, said tube having the lower portion chambered or enlarged, a piston upon the stem which extends downwardly through the horizontal portion of the filling passage, said piston remaining normally in the enlarged portion of the tube so that the air can freely escape around it. A valve chamber is situated in line below the air escape pipe with a valve fixed to the lower end within the chamber, which closes upwardly against a seat between the chamber and the filling passage so that the liquid rising into the air passage after the receptacle is full will lift the piston until it closes the inlet end of the tube and the valve closes the filling passage.

DISPLAY STAND.—R. L. Peyton, Oakland, Cal. No. 621,130. Dated March 14, 1899. The object of this invention is to provide a plurality of movable interchangeable stands upon which a display of goods may be made in store windows or at other points and a great variety of positions and forms for the display obtained. It consists essentially of vertically adjustable standard with disk slidable thereon having holding screw and peripheral upturned flange with grooves in the upper edge. Holes are made through the disk in line with the grooves and arms having the inner ends bent to fit in the holes are adapted to rest in the grooves, where they extend horizontally and radially outward to form supports around

the disk. Bracket pieces are similarly fitted to the vertically adjustable standard and boards may be attached also as to be tilted in various directions to support the goods in any desired position or manner.

WASHING AND CANNING TABLE.—Frank A. Dixon, San Jose, Cal. No. 621,045. Dated March 14, 1899. In the canning of fruit it is desirable to first wash the fruit before placing it in the cans and immediately remove it to prevent soaking and discoloration. It is difficult for the operator to remove and drain it and place it in the cans, necessitating constant dipping of the hands in the water, which is apt to make the operators ill. In my invention I employ an extended framework divided into separate working spaces having a continuous tank within and beneath the framework with a horizontal shelf and vertical wall rising therefrom; a shallow tray is fitted to each compartment having a screen bottom and the upper edge of the tray is hinged in line with the shelf so that when the tray is raised its front wall is substantially continuous with the shelf, and by placing a stop to support the rear end of the tray the water will drain out rapidly and the fruit will be in a position to be easily drawn forward onto the shelf and placed in the cans or other receptacles.

FLOOR, SIDEWALK-VAULT ROOF, OR LIKE STRUCTURE.—Peter H. Jackson, San Francisco, Cal. No. 621,091. Dated March 14, 1899. This invention relates to improvements in construction of artificial stone or concrete floors, roofs, combined sidewalks and roofs of vaults, bridges and the like. It consists essentially of parallel I beams with intermediate ribs formed of a body of concrete and bent strips of metal upon which the lower part of the concrete ribs rest, while the ends abut against the webs of the beams. These strips have means for securing them in place and for regulating the tension consisting of plates or clamps with which the ends of the strips are interlocked, said plates having their lower edges supported upon the lower flanges of the beams and belts extend through the clamps and the webs or ends so that the clamps may be drawn toward the webs and the tension upon the die strips increased. Roughened bars, rods or rails are embedded in the concrete body which forms the connecting rib and a floor rests upon this concrete body consisting of a corrugated metal bottom having a superposed thickness of concrete or artificial stone.

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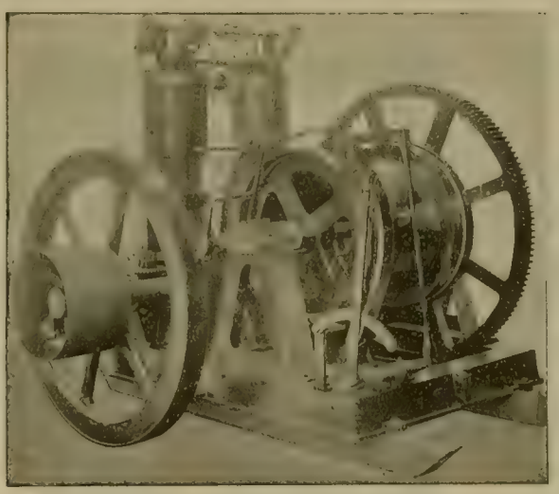

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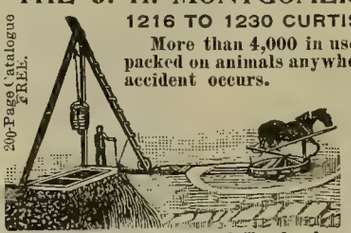

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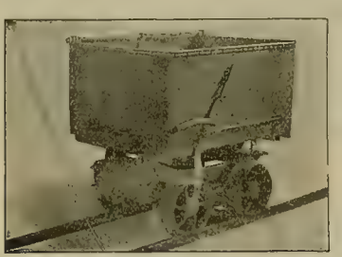

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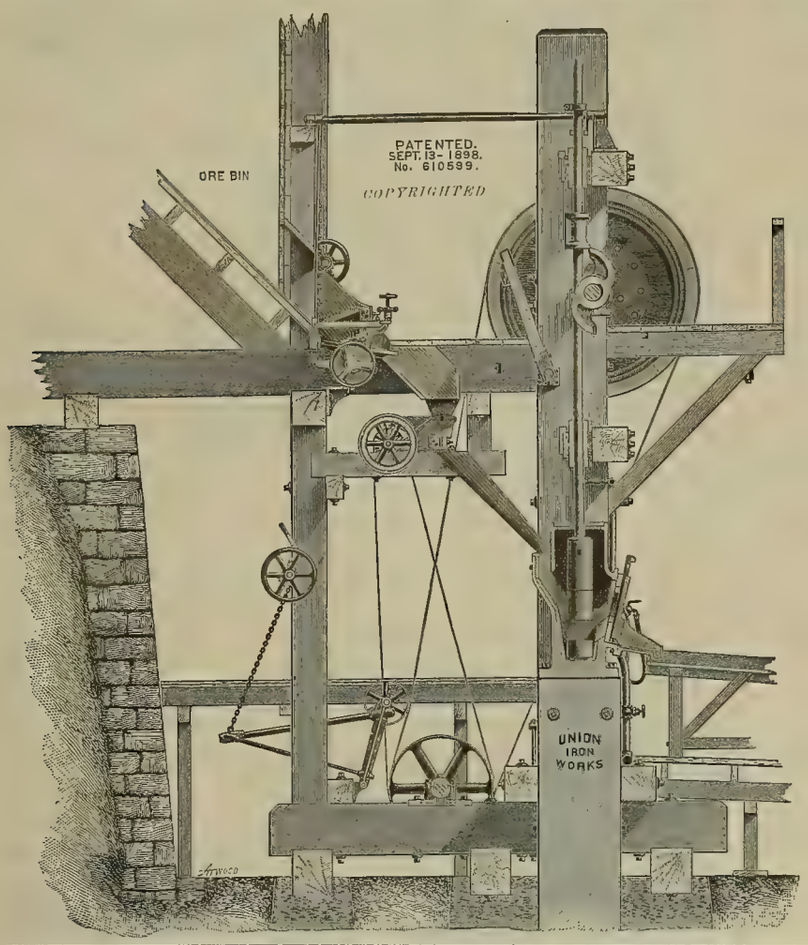

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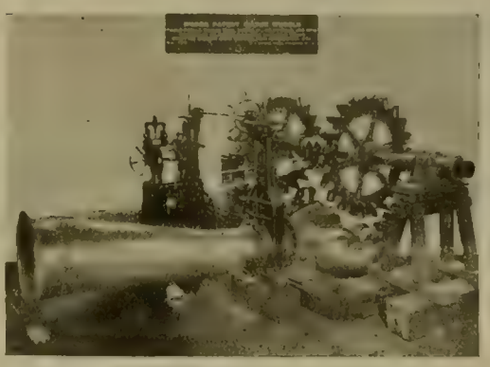

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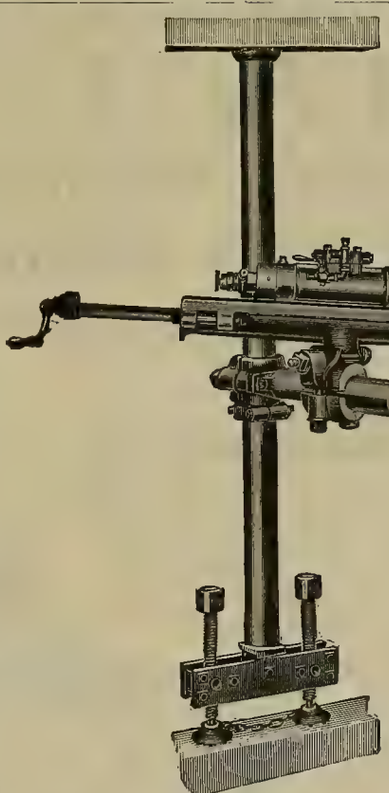

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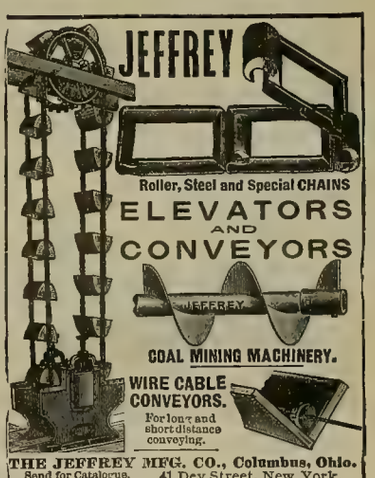

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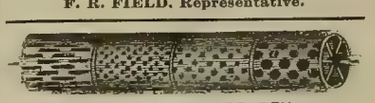

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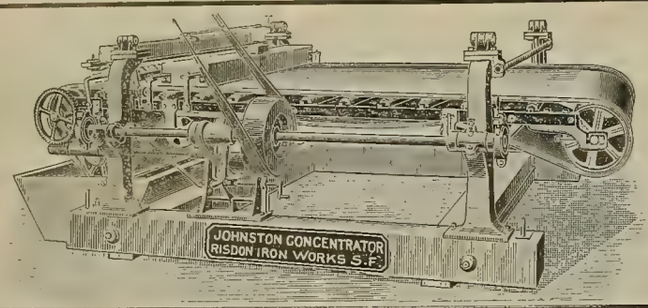

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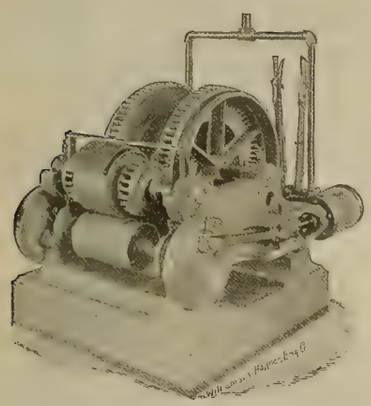

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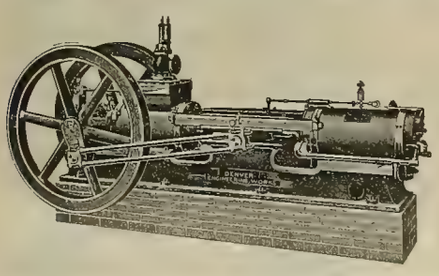

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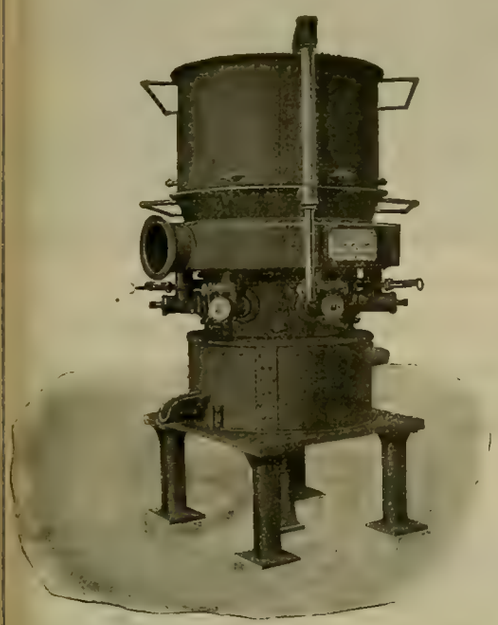

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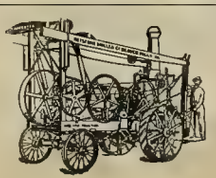

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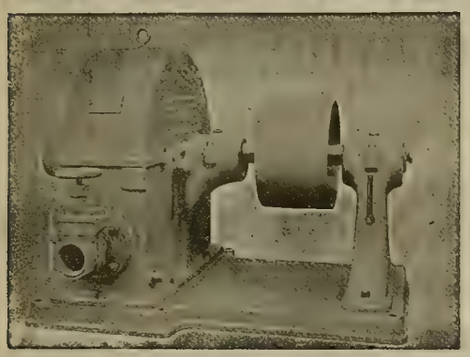

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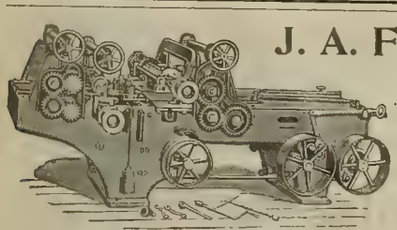

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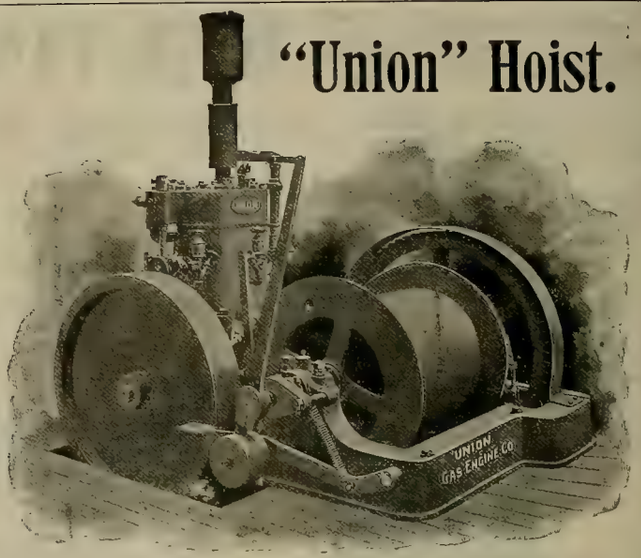

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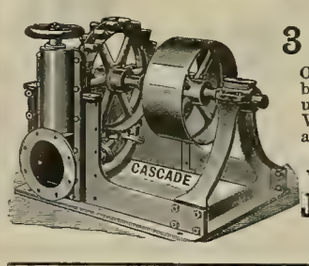

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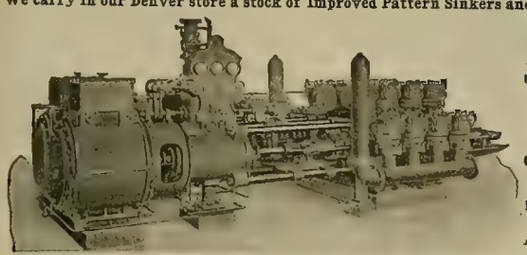

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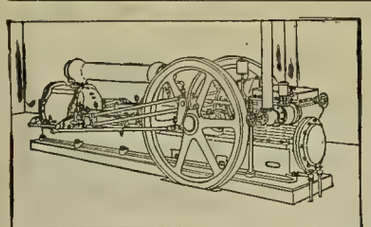

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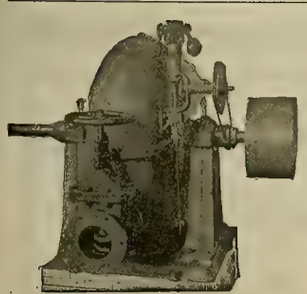

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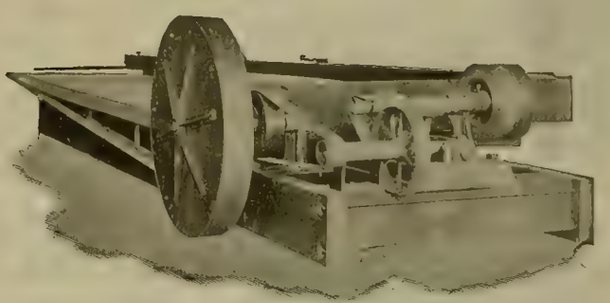

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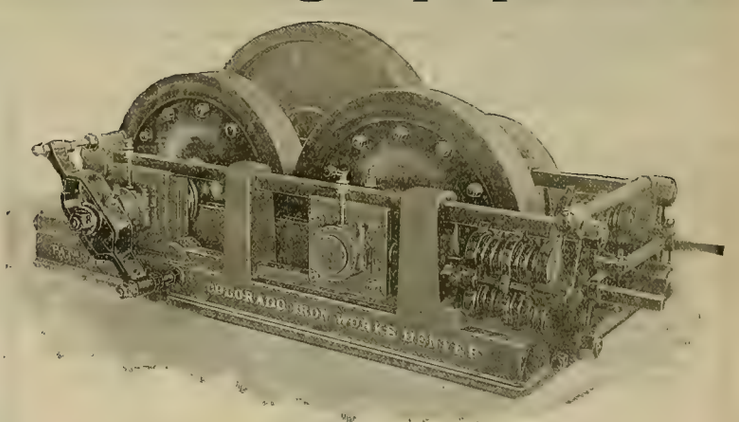

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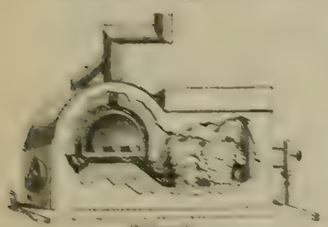

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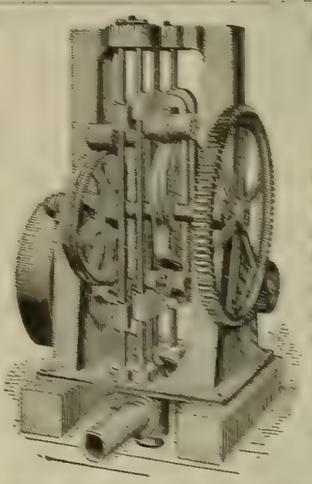

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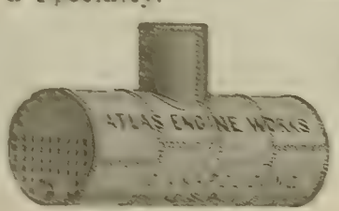

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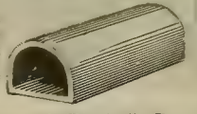

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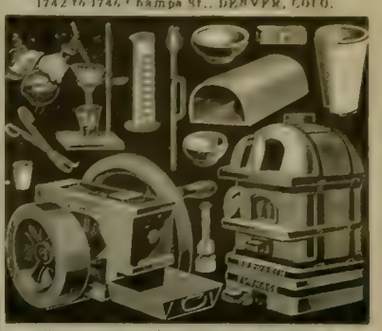

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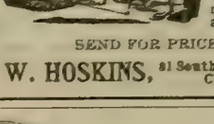

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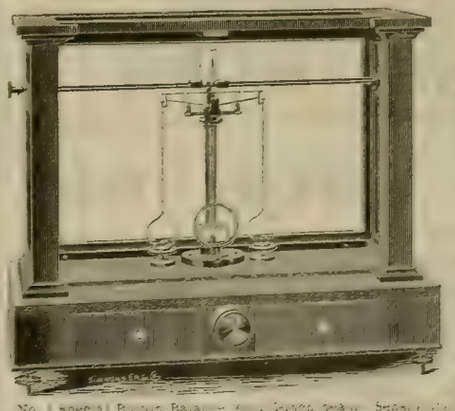

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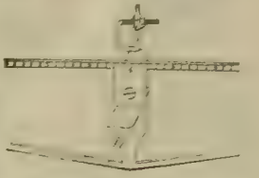

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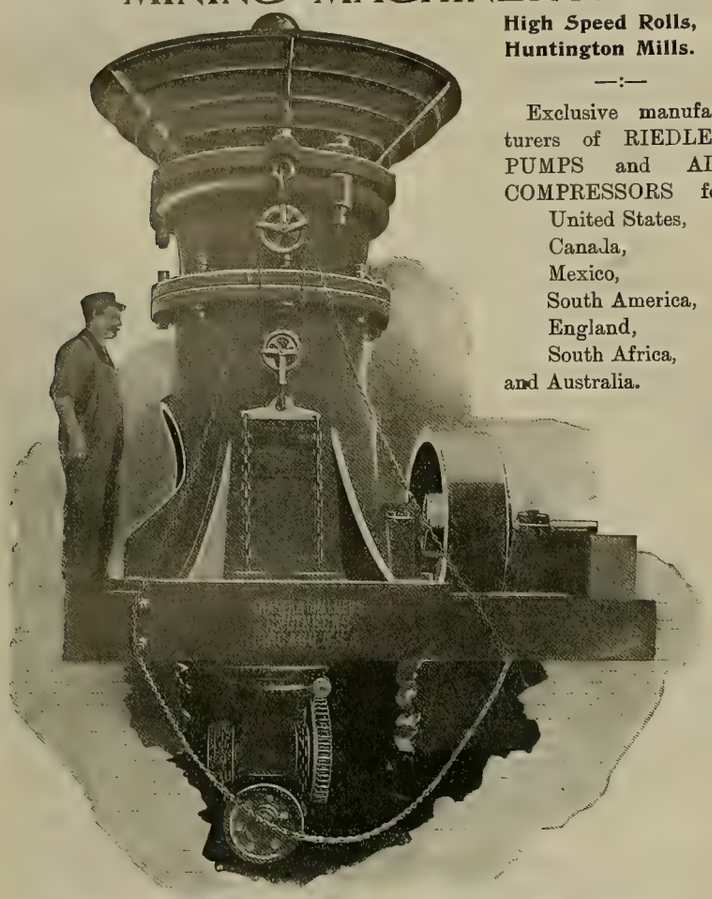

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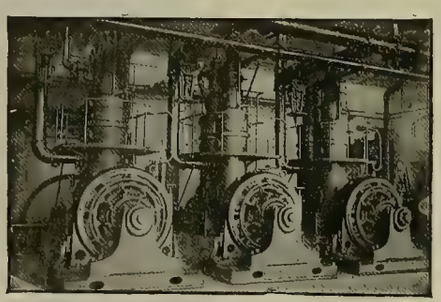

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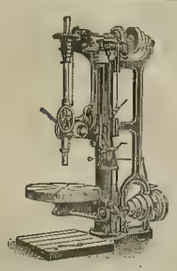

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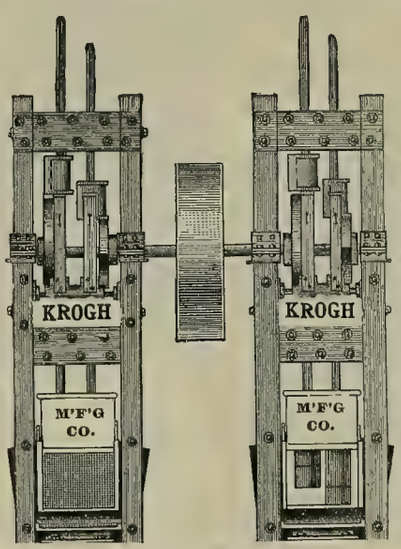

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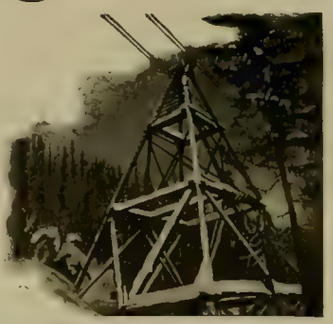

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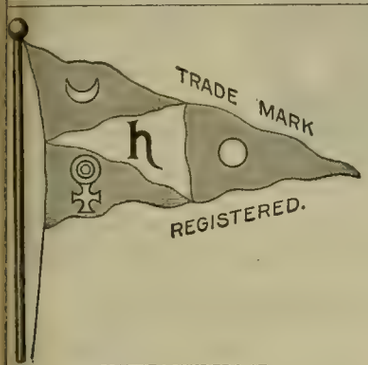

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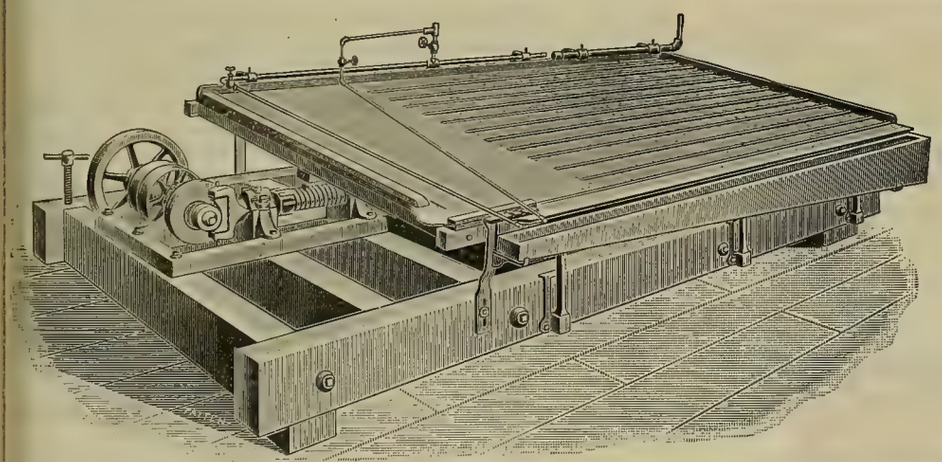

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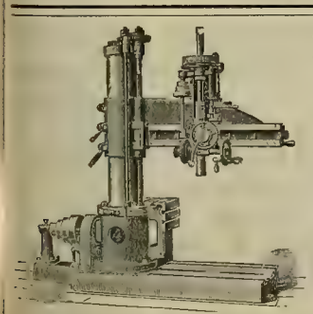

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Market Reports.

SAN FRANCISCO, March 23, 1899.

SILVER. — London, 27⅞d; New York, 59½; San Francisco, 59½; Mexican Dollars, 47⅛@48. New York exchange, sight, 12½; telegraphic, 15 cents premium.

Every steamer sailing from Australia has on board a large amount of gold for San Francisco. The amount of gold to come from Australia is estimated by bankers here at nearly $25,000,000.

LEAD. — New York reports "barely steady," $4.40 bid, $4.42½ asked; brokers' price, $4.20.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 7c; bar, 7½c.

COPPER. — New York reports Lake dull and nominal; $16.75 bid, $17.25 asked; brokers' price, $17.50. Local, bar, 24c per lb.

IRON.—American, soft, $22@24 per ton; Scotch, $27. Local bar, 2½c per lb.

TIN.—Pig, 30c per lb.; Bar, 35c. New York reports firm, $23.85 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8½c.

QUICKSILVER.—Local, $42.50@43; export, $39@39.50; carload lots, special rates.

The News Bureau, published at Boston, where the majority of the stock of the California quicksilver mining companies is held, says the companies' statements for the three months ended Feb. 28 show as follows:

	New Idria.	*Napa.*	*Ætna.*
Gross.....	$43,800	$65,700	$35,405
Op. ex.....	20,856	32,931	20,954
Net.....	22,943	32,768	14,450
Dividend....	20,000	20,000	10,000
Surplus....	2,943	12,768	4,450

"The present dividend on Napa makes a total of $1,000,000 paid to stockholders. The quicksilver market is very strong at $44 per flask. This is an advance of $10 since 1894. Consumption has been increasing while production has fallen off materially. This advance in price means additional net earnings to the Napa of $70,000 per year, Ætna $35,000 and New Idria $45,000."

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 2c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4½c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9½@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ℔ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward....	9¼	9¾
12-thread (⅜ dia ....).....	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.).....	10¼	10¾
Bale Rope (3 and 4 strand).....	9¼	9¾
Bale Rope (2, 6 and 8 strand).....	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 23, 1899.

9:30 A. M. SESSION.

100 Andes	22c	100 Ophir	$1 25
100 Belcher	38c	300 Overman	14c
300 Best & Belcher	63c	400 Savage	33c
200 Caledonia	43c	100 Sierra Nevada	$1 35
500 Con. Cal. & Va	$2 30	500 Union Con	69c
100 Confidence	$1 05	200 Utah	23c
500 Crown Point	30c	100 Yellow Jacket	31c

2:30 P. M. SESSION.

300 Ophir	$1 25	100 Belcher	40c
200 Mexican	84c	500 Sierra Nevada	$1 40
500 Gould & Curry	49c	300 Utah	25c
400 Best & Belcher	64c	500 Seg. Belcher	07c
500 C. Cal. & Va	$2 35	700 Overman	15c
900 Savage	34c	400 Union Con	70c
400 Chollar	42c	200 Caledonia	47c
600 Potosi	35c	100 Silver Hill	05c
100 H. & N.	37c	500 Challenge	50c
500 Crown Point	34c	600 Occidental	32c
600 Yellow Jacket	36c		

Recently Declared Mining Dividends.

Montana Ore Purchasing Co., extra dividend, $1 per share, $80,000; March 20.

Napa, Cal., Quicksilver Co., dividends Nos. 94 and 95, 10 cents each per share, $20,000; payable April 1.

Ætna, Cal., Quicksilver Co., 10 cents per share, $10,000; payable April 1.

New Idria, Cal., Quicksilver Co., $20,000; payable April 1.

Jamison M. Co., Plumas Co., Cal., semi-annual dividend No. 3, 3 cents per share, $11,700; payable April 15.

Recent Mining Incorporations.

Ventura Dominion Creek M. Co., San Buenaventura, Cal.; capital stock, $2500, all subscribed; C. Yager, J. M. Staire, W. A. Arneill, E. J. Dabbs, T. O. Toland, San Buenaventura.

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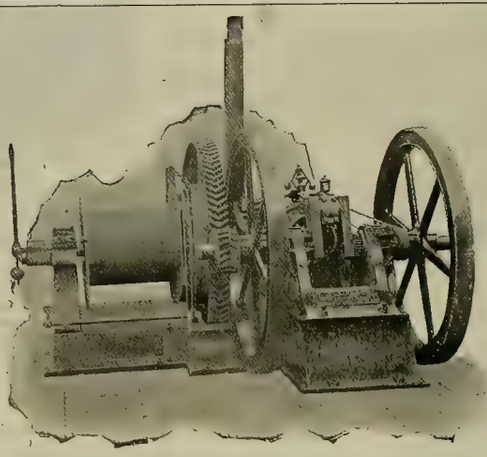

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Assessment Notices.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of March, 1899, an assessment (No. 17) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 28th day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

BEST & BELCHER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the seventh (7th) day of March, 1899, an assessment (No. 66) of ten (10c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 33 Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the tenth (10th) day of April, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the second (2nd) day of May, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33 Nevada Block, No. 309 Montgomery street, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of March, 1899, an assessment (No. 18) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of April, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1899, an assessment (No. 6) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 1st day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

G. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California. Office hours from 1 to 3 P. M.

HEAD CENTRE CONSOLIDATED MINING COMPANY.—Location of principal place of business San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th dayof March, 1899, an assessment (No. 7) of twenty (20) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of May, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

DELINQUENT SALE NOTICE.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 8, new series) levied on the 8th day of February, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Frances Pierce	226	215	$15 05
John T. Thornton	154	50	3 50

And in accordance with law, and an order from the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, room 10, No. 324 Pine street, San Francisco, California, on WEDNESDAY, the 12th day of April, 1899, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. P. THURSTON, Secretary.

Office—324 Pine St., San Francisco, California.

JAMISON MINING COMPANY, Rooms 50 and 54, No. 120 Sutter street, San Francisco, California, March 21st, 1899. SEMI-ANNUAL DIVIDEND NO. 3.

At their meeting of March 21st, 1899, it was resolved by the Board of Directors of the Jamison Mining Company to pay to the stockholders of the company from the surplus funds in the treasury, a dividend of Eleven (11) Cents on Seven Hundred Dollars ($11,700), being three (3) cents per share on the capital stock of the company.

The dividend will be payable at the office of the company on the 15th day of April, 1899, to all stockholders of record on the 5th day of April, 1899. Transfer books will be closed at the close of business on the 5th day of April and reopened on the morning of the 17th of April, 1899.

SAM. W. CHEYNEY, Secretary.

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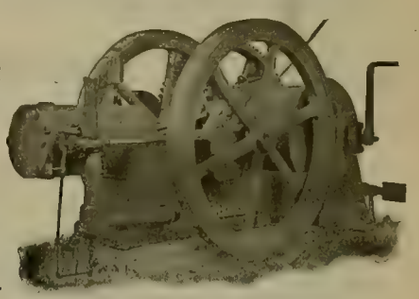

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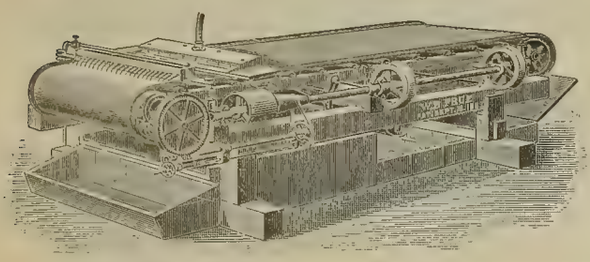

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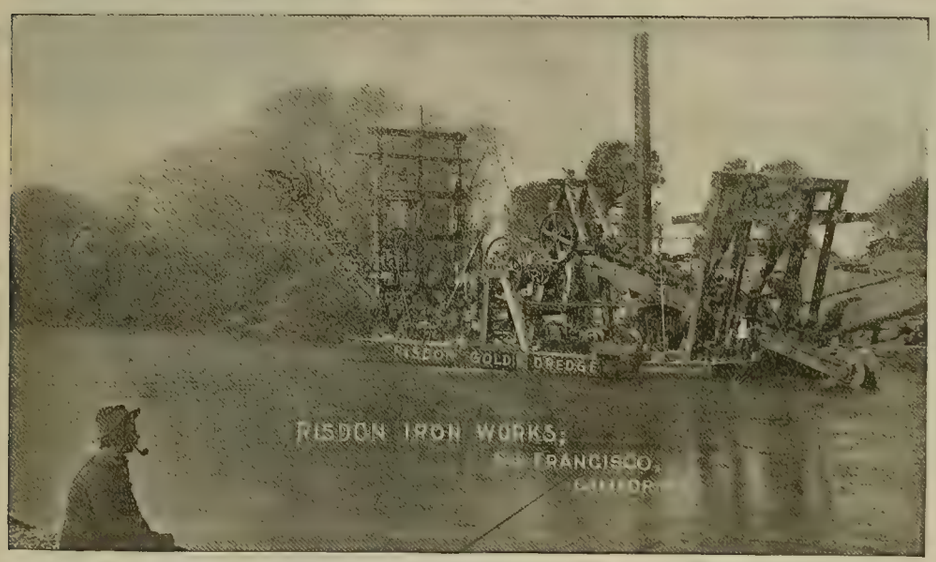

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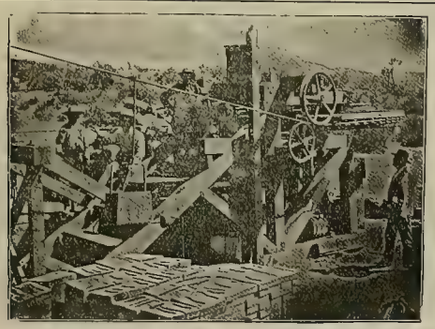

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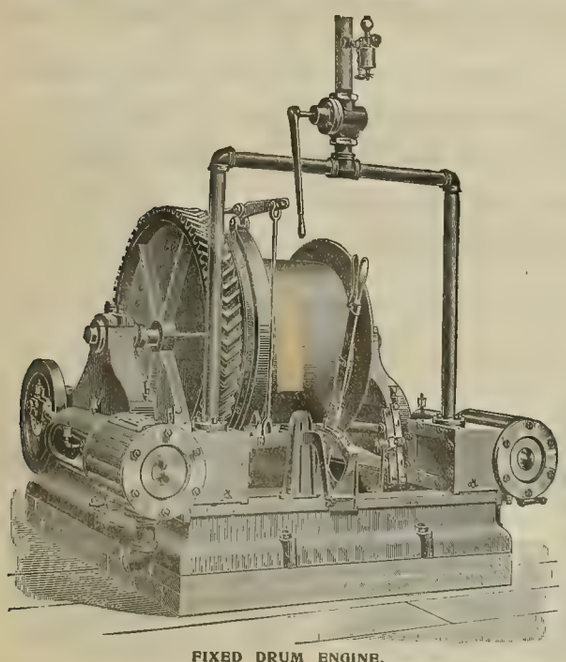

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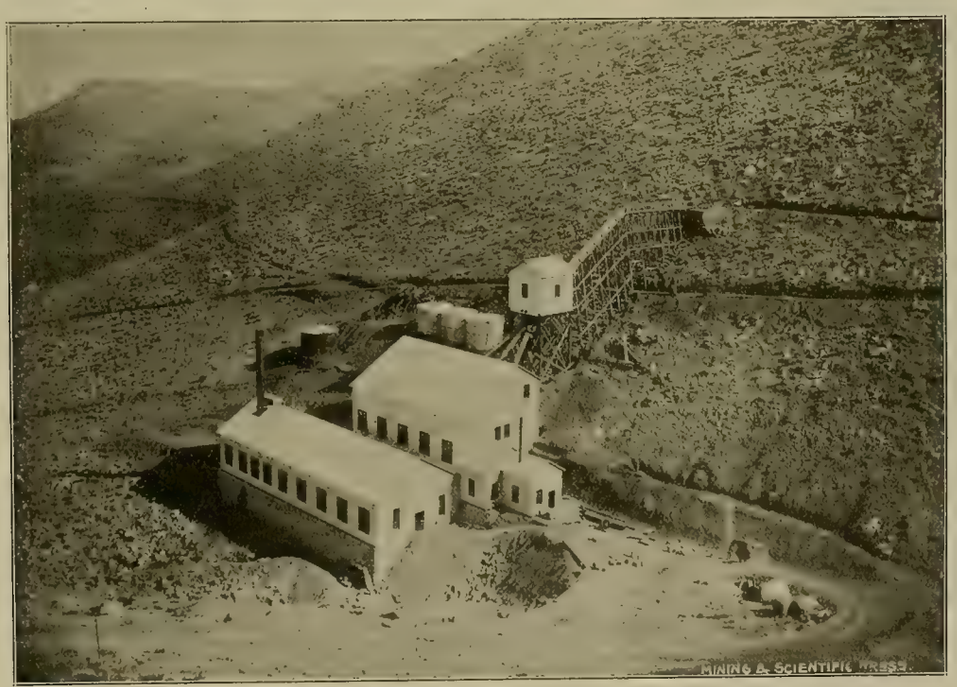
The Yellow Aster Mine, Randsburg, Cal.

As an illustration of what may be accomplished on even the deserts of California the rapid rise of the Yellow Aster mine at Randsburg, Kern county, California, from a prospect to a place in the ranks of California's producing mines is a striking and instructive example. Isolated at first from communication with the outside world; situated on a rugged hill in a treeless and waterless desert; without the backing of capital, the owners have surmounted all obstacles and shown what may be accomplished by enterprising men in the face of many obstacles. The Yellow Aster is the name covering a group of several claims lying upon the summit and sides of a ridge between the towns of Johannesburg and Randsburg, situated about one mile apart. The former place is now connected by rail with the Atlantic & Pacific railroad at Kramer. The country rock of the district is described as schistose, having a northeast strike and northwest dip. Numerous dykes traverse this formation and large veins of white, barren quartz outcrop in many places in the district. The surface of the ground is strewn with cobbles and boulders of andesite, derived probably from the large masses of this rock lying to the northward and capping the hills in that direction.

The Yellow Aster mine lies between two large dark-colored dykes, which being harder than the rocks in which they occur, stand several feet above the surface. These dykes are about 600 feet apart and may be seen crossing the ridge obliquely for several hundred feet. On the summit of this ridge is a large mass of gold-bearing rock from which veins extend in several directions. Some portions of the ridge seem to be a network of veins, the Trilby tunnel, for instance, having cut twenty-six separate veins of various sizes in a distance of 350 feet. A great amount of work has been done on the various veins, but the systematic development which must mark the mine of the future is only just being outlined.

The mine was discovered by dry-gulch prospectors who gradually worked up the gulch, and finally their work took them to the gold-bearing veins. The news spread rapidly and other prospectors came to the district, and new finds were of almost daily occurrence. Eventually custom quartz mills were built at neighboring springs, eight to sixteen miles distant, and to these the miners of the district hauled their ore in wagons and had it crushed at heavy expense, and it required a high-grade ore to pay these charges and leave a profit; but of such are these desert mines. The Yellow Aster mine sent ore to Garlock mill, several miles distant. Later, upon completion of the railroad from Kramer to Johannesburg, a large mill was built near Barstow on the Mojave river, and many of the mines of the district shipped their ores to that point by rail for treatment, making a short haul to the railroad terminus with wagons. The Yellow Aster mine for a long time shipped sixty tons of ore to Barstow daily. A few days since the Union Iron Works of San Francisco completed a modern 30-stamp gold mill which is built on the company's property in the canyon, above which the mines are located, as shown in the accompanying illustration. The construction and successful operation of a large quartz mill in this desert region necessitated the solution of two important economic problems—water and fuel, neither of which were apparently obtainable in any considerable quantity within many miles of the mines. The company purchased Skillings wells, six miles distant, sunk a shaft there and built a pumping station, laid a pipe line and are now able to furnish about 100,000 gallons of water daily to the mine and town. The water is raised from the shaft about 90 feet and pumped into a tank having a capacity of 125,000 gallons. From the tank a tandem compound duplex pump forces the water through a pipe line six miles long with a lift of 500 feet at a rate of 9000 gallons per hour. At the pump station are two men who look after the plant and run it ten to twelve hours daily. The pumping engines are 40 H. P. The water is delivered at the mine into three tanks having an aggregate capacity of about 75,000 gallons. In this manner the water question was settled. The fuel problem was equally important, and after careful inquiry crude petroleum was determined upon as the most economical fuel under the circumstances, and this is obtained from the Los Angeles wells at a cost of $1 per barrel and is of superior quality, seemingly well suited to this use. The oil is delivered at the railroad terminal in car tanks holding 6000 gallons and hauled by wagon to a tank having a capacity of over 30,000 gallons, located some distance from the mill and 30 feet above the boilers. The fuel plant is provided with two pumps, but these are found unnecessary, the pressure afforded by the tank being found sufficient to feed the fuel as required. By this means steam is generated which furnishes the motive force for all the machinery at the mill. The stamps are run by a 12″x30″ engine; a separate 8″x10″ engine runs the breaker, and a third 10″x12″ runs an electric generator which supplies light for mine, mill and other buildings.

The mill is solidly constructed on terraces formed by building substantial retaining walls along the graded excavations. The structure is covered with corrugated iron. The mortar blocks are made from 28″x28″ timbers 14 feet long, set in pairs, and resting on a concrete foundation, being filled in with concrete. The 10″x16″ jaw crusher is set on a heavy frame of 12″x12″ timbers and wholly disconnected from the mill building, being under a separate roof. The cam floor of the mill is suspended by iron rods from the roof trusses of the building, thus affording more light than is found in many mills. The feeders are suspended, and the large space back of the feeders and underneath the ore bins is used as a storeroom for many articles required about the mill. The main line shaft passes back of the batteries underneath the feeder floor. The plate area is large and the ore is thus far free milling. In front of the mortars and above the plates is arranged a steel beam from which a bucket is suspended on travelers. When the mortars are to be cleaned this bucket may be moved and their contents shoveled into it and dumped into the clean-up barrel. The concentrator building is apart from the battery building though joining it. A glance at the illustration will show the advantage this affords in lighting the batteries. The ore is delivered to a chute which discharges in a bin above the breaker. From the breaker it goes to the bin in the mill having a capacity of 200 tons. Burr slot No. 7 screens are used, the capacity being four tons per stamp; 120,000 gallons of water are used daily which is more than is usually required, but is due to the dryness of the ore. The tailings pass into a reservoir, the overflow from which is pumped back and re-used. It is estimated a saving of 40% to 50% is thus effected. The cost of fuel is about 25 cents per ton of ore, and of water about the same, showing that after the first cost of plant it is less expensive than might be imagined. For the more thorough development and systematic operation of the mines the advisability of sinking a three-compartment vertical shaft is being considered.



THIRTY-STAMP MILL AT THE YELLOW ASTER MINE, RANDSBURG, CAL.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....Publisher

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TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

JUDGING from the tone of the northern press, the Canadian alien act does not meet with universal favor in British Columbia, the merchants on the coast claiming that they have lost thousands of dollars by reason of it.

WHERE the eight-hour mine law has been introduced through legislative action mine managers have accepted the situation — and promptly reduced wages proportionately. In some cases the miners are taking steps to have the law repealed.

AMONG the U. S. troops in the Philippines are many miners, who have already organized a miners' union. When mustered out of service, doubtless some of these practiced prospectors will exploit and develop whatever mineral wealth is possessed by that region.

A NUMBER of men at Butte City, Montana, have incorporated a prospecting company with 5000 shares of a par value of $1 each, all of which has been subscribed. The stock is paid for in monthly installments. Work will be commenced under the direction of a competent manager in Idaho. This is an association organized for a definite purpose on a common sense basis, and is likely to lead to satisfactory results.

THE latest in wireless telegraphy is the stated success this week of the Marconi system in transmitting intelligence. The London *Times* of the 29th ult., printed a 100-word dispatch, the first press message of the kind, descriptive of successful sending of dispatches between England and France, thirty-two miles. Considerable technical description has appeared herein, and the method is presumably understood by our readers.

THE continued rush of Americans into the Atlin Lake country, Northwest Territory, in the face of the exclusion act, only illustrates the character of the American prospector, who is nothing if not an adventurer. He will risk a desperate chance on anything which holds the least promise of money or excitement. It is unnecessary to say that they cannot hold claims in British territory unless the law is repealed, which is scarcely to be expected, though since the passage of the law its bad effects are so apparent that many of the British Columbia papers are clamoring for its repeal.

IN this issue is concluded an interesting description of the "Alluvial Deposits of Western Australia," written by T. A. Rickard, State Geologist of Colorado, in which have been described the geological occurrence and the methods of exploiting the superficial gold-bearing deposits of that desert country. In California, Nevada and Arizona are found conditions almost, if not quite, identical with those described by Mr. Rickard, and miners who prospect in the desert regions of the Pacific coast might profit largely by a study of the conditions and methods of Australia. In California are numerous places where gold should be found under similar conditions, and there are instances of record where gold does occur under such conditions. In the Cargo Muchacho mountains gold was picked up on the surface which had been derived from veins in the vicinity without doubt. A few days ago gold was discovered in a superficial cemented gravel deposit near the St. Elmo mine, six miles south of Randsburg, Kern county, Cal., which is now being successfully worked. Gold has been picked up from the surface near Eagle mountain, in Riverside county, Cal., and in the Monte Negras hills, sixteen miles north of Eagle mountain; the gold-bearing veins run down to the edge of the desert wash and some of these veins are rich in gold. In one of these veins coarse pieces of gold, aggregating $1200, were dug out in a single day. Back of Ehrenburg, in Arizona, are local beds of gold-bearing conglomerate lying on the surface. And these conglomerates occur in so many other places that it is not unlikely that some others may be gold-bearing. The large beds of conglomerate near Goler and Red Rock, northwest of Randsburg, are not of this class—they being extensive, heavy-bedded shore deposits of a pre-existing inland sea or large lake, though these, too, are sometimes gold-bearing.

WITHIN the memory of living men no faster means of transit existed than in the days of Herodotus or the settlement of the valley of the Nile. By swift advance time and distance have practically been annihilated, and upon the heels of an announcement concerning projected advances comes the news of experiments demonstrating their practical success. The latest agent for motive power in rapid transit is compressed air. As in other lines of scientific progress improvement in one admits of advance in others. Though the utility of compressed air as a motive power has long been put into practical recognition and widely utilized, it is but recently that advances in the composition of structural material has admitted of further enlargement of its powers. Pressures heretofore impossible can now be handled with absolute safety. The result is the widening of the field for compressed air apparatus, and one of the first enlarged uses is in the building of automobiles. These "horseless carriages" are now propelled by steam, gas engine and electricity. Compressed air has further invaded this inviting field, and in several cities companies are organizing to build freight and passenger conveyances in which the motive power shall be compressed air. Already in New York city, for freight traffic, steel trucks weighing 8000 pounds and capable of carrying 20,000 pounds are building, the builders claiming that they can be run at an expense not exceeding half a cent per mile for power, and, by instantaneous changing at sub-stations, made available for any desired distance. The same company asserts its ability to run compressed air passenger cars from twenty-five to fifty miles without recharging.

ANNUAL catalogues from the principal colleges, universities and scientific schools of the country are frequently received and their favorable features observed. In several much is to be noted favorably, this being particularly so in the case of Cornell College, the Michigan Mining College at Houghton, Mich., and the Massachusetts Institute of Technology at Boston. The latter institution has a particularly noticeable feature that commends itself strongly to the practical man. In the thirty-fourth annual catalogue to hand is a register of graduates, occupying 100 pages, giving the names of those who graduated from 1868, and, if alive, their present occupation. To our mind that is the most interesting part of the 350 pages. According to the 100 pages of names and occupations, about 1900 who have graduated from that institution now fill positions of honor, trust or profit in nearly every walk of life, being more particularly prominent in mining engineering, mechanics and applied sciences, scattered all over the United States. This roll of renown adds dignity to the institution and sheds luster on its honorable record. It is a feature worthy of observation and reproduction elsewhere.

MANY statements are gravely made regarding miners and believed in by general readers. One is now traveling through the press regarding a new form of dissipation developed in the Klondike, viz., eating snow. It seems that when the Klondike miner has a well-developed thirst ordinary liquor fails to satisfy, and nothing but a riotous round of snow-eating satisfies him. From Eastern papers which would not under any circumstances vary from the frozen facts, it is learned that in the Yukon region "the snow is saturated with mineral vapor," which has a fatal fascination for the unhappy miner who yields to its insidious delights, and once having tasted of this mineralized snow nothing else will quench the inward desire for such strange and unhallowed stimulant. Deprived of his potations "he lies moaning for a mouthful of snow," and, when momentarily overlooked by his companions, seizes upon the fleecy covering of the adjacent landscape, "and gulps it down in huge handfuls." Further information is vouchsafed to the effect that after returning to lands less favored with snowfall the victim of this new form of Klondicitis yearns with an unutterable yearn for the scenes of his former wild debauches, and would fain return once more to indulge in his former orgies of consuming snow. It seems that a "red snow" which falls near Point Barrow is the favorite tipple of those depraved inebriates. These saddening statements will be read with regret by many who had hoped that the high price of ordinary intoxicants in that region would tend to diminish inebriety. From all accounts snow is plenty there and within reach of all, and in the general interests of temperance it is hoped that the assertions of the Eastern papers regarding the prevalence of the snow habit may not be wholly corroborated by the facts.

SUCCESSFUL business men feel a certain pride in their achievements, as they have a perfect right to, and with this success comes confidence and self-reliance, and it is doubtless this feeling of ability to "take in a situation" that leads men who have been successful in merchandizing or industrial pursuits to feel, when they determine to branch out into mining, that they are fully competent to handle the business without outside assistance. How many fortunes have been dissipated by unfortunate investments, which any professional mining engineer or practical miner would have "turned down" without hesitation! Even where ultimate success results, often serious errors have been made in the early career of the new-made mining man. The business of mining is not to be learned in a day. There are a thousand and one things to be investigated and considered, and when in successful operation contingencies often arise of the most perplexing character, which only experience can meet. Of course, all those who are new in the business do not undervalue the services of competent and experienced men, but there are monuments of folly all through the mining regions, which show that such mistakes are of very common occurrence. A large manufacturer or merchant would never think of engaging a mining engineer to conduct his own business. Why, then, should men reared to commercial life assume to take the place of the man who has spent the best part of his life in learning what he knows of his business?

SOME of the water is being squeezed out of Boston's inflated copper stocks. A contrast between the high prices of February and the lower prices of last month shows a shrinkage in selling value of over $60,000,000. The biggest reported drop was in Calumet & Hecla, from 895 to 705. Of course, the street and the mine have nothing in common, and the Calumet & Hecla property is as gilt-edged as ever.

Concentrates.

HUNGARIAN riffles lie lengthwise in the sluice box.

THE longest tunnel in the world is the Simplon, through the Alps—12¼ miles. The deepest artesian well is at Budapest—3140 feet.

WAGES in the Boise, Idaho, placer mines are $2.50 and $3 per day for miners; laborers, $2 and $2.25; board is $4.50 and $5 per week.

IN the States of California and Oregon about 1000 tons of "blue vitriol" are annually consumed. The trade price is about 4 cents per pound.

A 9 COLUMN description of the power plant of the Electrical Power Co. of Ogden, Utah, with seven illustrations, appeared in the issue of July 24th, '97.

THE mine salting case at Baker City, Or., resulted in a Scotch verdict, "not proven," though one of the men implicated—Griffin—made a written confession.

ELECTROPION fluid for putting in batteries is composed of water, 100 parts by weight; potassium bichromate, 16 ditto; sulphuric acid, 66°, 37 ditto; not to be used till cold.

ARTIFICIAL stone or concrete can not be made with silicate of soda. That silicate is sometimes used for drying the surface, but does not ordinarily enter into its composition.

THE meter is 39.37 inches in length. To reduce meters to yards, multiply by 1.094; to reduce kilometers to miles, divide by 1.6093; to reduce liters to gallons, divide by 3 78.

IN Arizona wages of employes at Clifton and Morenci, the two copper camps of Graham county, have been raised 10%; at Bisbee miners' wages have been raised to $4 per day.

SOUTHERN California miners are asked to meet at the Los Angeles Chamber of Commerce on the 29th inst. to form a southern California branch of the California State Miners' Association.

THE Arizona Legislature did not pass the proposed bullion tax. Governor Gage of California signed the bill repealing the Act of March 26th, '97, prescribing the manner of locating mining claims.

THE Arizona Legislature has passed a law exempting reservoirs and canals, and all other property used in the development of water for mining, manufacturing and development purposes, for fifteen years.

AT Slough Creek, near Barkerville, Cariboo, B. C., Mr. Hopp, the former manager, says that F. C. Laird, the present manager, is not able to get all the experienced miners he wants, though paying $5 per day of eight hours.

IT is not possible to state at present exactly what gold mine in California produced the most in '98, though it is believed that the total outputs of the Utica, in Calaveras Co., and the Golden Cross, in San Diego Co., did not differ greatly.

THE Central Pacific Co. has, after mature deliberation, decided to publish a chart showing fifty years rainfall in California. On Jan. 1st, '99, this paper published such a chart, a copy of which will be sent postpaid to any one asking for it.

WHILE rich deposits attract the most attention, it is the low-grade ore that ordinarily pays the best if in sufficient quantity to justify its treatment on a large scale—quantity, not quality, being the main requisite and the surest proposition.

AN unusual phenomenon is noted at the furnaces of the Mountain Copper Co. at Keswick, Cal., where, it is stated, while the sulphurets are being roasted swarms of flies live and breed in the smoking, burning piles, to such an extent as to annoy the workmen.

AT Denver, Colo., this week, in the U. S. District Court, Judge Hallett rendered a decision to the effect that aliens are not, under the laws of this country, entitled to recover damages from a corporation, company or employer for injuries sustained while in the employ thereof.

ELECTRICAL SIGNAL BELLS are no novelty in mines. In many mines in California and other gold mining States they are in use. If "Elex" has any improvement susceptible of patent and worthy of adoption he should go ahead. The requisite is to overcome friction and preserve necessary insulation.

TINSTONE, or cassiterite, is 79% tin and 21% oxygen, brown or black, and of brilliant luster when crystallized. It is usually found in grains or bean-shaped lumps, in both lode veins and placer deposits. The latter is the chief source of the Malay tin. No tin is mined in the United States at present.

WHERE tattooing on the skin has been done with some carbonaceous matter, the marks can be caused to go away by being first thoroughly rubbed with a salve of pure acetic acid and lard, then with a solution of potash, and finally with hydrochloric acid. Usually it is better to let the tattooing alone.

CRIPPLE CREEK, Colo., reports this week that W. S. Stratton has sold his Independence mine to Englishmen for a sum based on an examination of the property last December, when it was estimated that the ore in sight was worth $6,000,000. Mr. Stratton is reported to have taken over $5,000,000 out of the Independence.

ROASTING always precedes chlorination. The barrel process originated with Mears and has been much improved by J. E. Rothwell. A full illustrated technical description of the barrel process appeared in the issue of Dec. 4th, '97. Under ordinary circumstances, barrel chlorination should cost about $3 per ton as a minimum.

IT has been figured that while in '70 one horse power in a 1000 H. P. steam plant cost $38.14 per year, on a consumption of 10 lbs. of steam per H. P. per hour, such a plant should now be run at a cost of $16.31 per year per H. P., though on that basis $20 per year is the accepted figure, in this regard much depending on the locality.

RECENT British Columbia legislation makes it illegal for miners to be employed underground more than eight hours in the twenty-four. This meets with great objection from miners and mine owners. Ainsworth miners have been getting $3 for a ten-hour day; under the new law the employers say they can pay but $2.40. Slocan miners who find their wages cut from $3.50 to $2.80 per day by the enforcement of the new law also object, and have petitioned for repeal.

THE Transmississippi Congress meets in Omaha, Neb., May 31st, '99. The Mining Congress meets in Milwaukee, Wis., in September. The American Institute Mining Engineers meets in San Francisco in October. The California State Miners' Association meets in San Francisco after the mining engineers have had their convention.

THE Denver & Rio Grande Railroad Co. preserves among its records a canceled check for $75,000 which it paid to the Colorado Coal & Iron Co. in '82 for 1000 tons of rail. To-day the price of steel rails at Chicago is $21 per ton, and the Colorado Fuel & Iron Co. is delivering about 15,000 tons per month, and meeting the demands of competition.

IN Belgian mines whenever men are being hoisted in a shaft a capable assistant must be near the engineer in charge of the hoist to replace him if from any reason the latter fails to promptly and properly attend to the work, and, like his principal, the assistant must give close attention to the signals, the indicator and the working of the engine.

A CALIFORNIA dam has been built of rough stone without mortar, founded on rock. Its height is 70 feet, base 50 feet, top 6 feet. The inside slope is secured by 3-inch plank secured to 12x12-inch timbers let into the stone work. The core of the dam—about one-fifth of the whole—consists of stone roughly thrown in; the balance of the stone work was carefully laid by hand.

NITRO POWDER which is frozen or too cold to "shoot" effectively may be safely thawed by placing it in a double vessel, as two tin cans one within the other, the outer can being filled with water, which should be heated gradually. This will thaw the powder slowly and safely. It is always extremely dangerous to thaw powder by placing in a stove oven, under a stove or near an open fire.

THE heaviest metal is osmium, specific gravity 22.5. Platinum's sp. g. is 21.5. The latter fuses at 3255° F. The ordinary composition of platinum ore in Russia is: Platinum, 78.90%; iridium, 5%; osmium, 1.9%; rhodium, .9%; palladium, .3%; copper, .7%; iron, 11%. In California it is found only in connection with placer gold. It is rarer than gold; its present price is about $17 per oz. to the consumer.

IF A by mistake does assessment work on B's claim, A supposing it was on his own claim, the loss is A's and the advantage B's. The law requires that the work shall be done, and does not require how or by whom. Still, under the circumstances B would be "a mighty mean man" if he didn't make it all right with A, if it was evident that it really was a mistake and that A did the work in good faith.

THE point of greatest economy in the transmission of the electric current is reached when the interest on the amount of money invested in the transmission wire is equal to the cost of generating the power lost in the transmission. It is not practicable to give absolute or unvarying figures as to the percentage of copper loss in current transmission, though it is ordinary to thus figure on a 10% loss in the transmission.

AT Carson, Nev., on the 27th ult., Judge Hawley rendered a decision in the case of Hanchett vs. Blair, denying petition for rehearing. Each claimed valuable mining property in Silver Peak, Esmeralda Co., Nev. The decision was in favor of Blair; judgment was entered in the case for $573,978.71. Local opinion greatly favored Hanchett, as he had ordered some machinery and was going to spend considerable money.

THE Western Federation of Miners now proposes to build and maintain a home for old and disabled miners. The idea is to secure a suitable site and levy an annual assessment on the members. Three sites have already been offered, one in Colorado, one in Utah and one in Nevada. The idea has been favorably discussed at various times. The California Legislature some years ago passed a law creating a State hospital for sick and indigent miners, but made no provision for the necessary funds.

SAMPLES of mica continue to be received from all parts of California, from Utah, Colorado, Oregon and Idaho. The best sent recently are from Bakersfield, Cal., and Cornucopia, Or. As heretofore stated, the value is in direct proportion to the size of the sheets, quality being equal. Scrap mica, or that produced in sheets less than 3 inches square, is not considered worth getting to market. White mica scrap is used for "silvering" wall paper, and scrap mica of any color is utilized for fire proofing, but the supply of "scrap" being usually 70% of the total product makes its price proportionate to its plenteousness.

THE flouring of quicksilver in an arrastra is unusual, and when it does occur may be due to any one of a number of causes. The pulp may be too thick, or grease may have gotten into the arrastra basin in some manner. Black oxide of manganese in ore has a tendency to cause "sickening," as also arsenic. Mercury which has become so finely divided from any cause that the particles refuse to reunite, may be collected by slowly adding sodium, which forms an amalgam. Cyanide of potassium may also be used with good effect in an arrastra, if no copper plates are used. Should black oxide of manganese be the cause of "flouring," quicklime added to the charge will have a beneficial effect.

AMONG the amusing notes of the week is one concerning "a carload of lead ore on the way from Maine to Denver, where there will be no smelting charges." That is from a Boston paper. San Diego chronicles the perfection of a process to extract gold from sea water, thus bringing up that old familiar fraud. The Boston prospectus of a California copper mine "on the same range as the United Verde of Arizona" where a smelter is "going" to be built, seems sufficiently alluring to the early Boston investor. California rains have produced the usual number of overlooked nuggets on forgotten dumps, and the annual Josephine county, Oregon, chicken has been heard from with gold in its gizzard, the amount this time being $1.25—a more than average yield. Olympia, Wash., is again to the fore with the perennial pine, which, when burned, disclosed gold in the ashes of the bark thereof, and the Colorado tin and Yuma white gold is also in evidence.

IN liquid air, as produced by C. E. Tripler of New York City, an india-rubber ball becomes as brittle as glass when immersed therein, and a piece of copper assumes the consistency of wax. Hard steel tubing breaks like an eggshell when placed in it, alcohol soon freezes to a solid mass and quicksilver, solidified, may be used as a hammer. The nitrogen of the liquid air boils off first, and there remains liquid oxygen of great purity. A diamond burns with brilliant scintillation in the liquid oxygen, while iron is rapidly consumed. Liquid air, on account of its contained liquid oxygen, is strongly magnetic and leaps up between the poles of an electro-magnet, assuming the general shape of an hour-glass. The latest developments in the manufacture of liquid air make it evident that all matter is subject to cohesive attraction and the state in which a body exists is dependent only upon temperature and pressure. It is proposed to use liquid air as a source of energy, and already the industrial world has set about the task of putting the new force into harness.

NEW trial has been refused in the case of the Matoa, Colorado, Co. against the Chicago-Cripple Creek Tunnel Co., and it is now thought that the case will go to the U. S. Supreme Court. The final decision of this cause celebre would settle some very interesting questions. First, whether a tunnel may be driven across a previously located claim. Second, whether a patent on a junior claim located across the line of a tunnel which was discovered and the discovery shaft sunk on the line of the tunnel, junior to the tunnel, and which was not adversed by the tunnel, the tunnel bore not having reached the claim, can claim all ore apexing within the boundary lines of junior claim. Third, whether a settlement made between a junior claim and a senior claim for a patent, and a senior claim, instead of adversing, takes a deed for the ground in conflict, whether such deed will relate back and give title to conflicting ground as of the date of the original location. The more recent suit brought in the United States District Court in Colorado by Cone & Robinson, owners of the Doctor mine at Cripple Creek, against the Roxana Gold Mining and Tunnel Co., in which plaintiff asks Judge Hallett to enjoin the Roxana Co. from running their tunnel through ground owned by the plaintiff, has practically been determined by the above decision.

LAST Saturday at Washington, D. C., the acting Secretary of the Interior rendered a decision of some importance to miners. The U. S. statutes require that notice of an application for patent for a mining claim shall be published for sixty days, and also that all adverse claims shall be filed during the sixty days of publication. Heretofore the mining regulations have provided that when notice is published in a weekly newspaper ten consecutive insertions are necessary. Under this rule the tenth insertion always occurs on the sixty-fourth day, which is after the expiration of the period required. In the decision rendered last Saturday the Secretary holds that the time fixed by the statutes for publication and for the filing of adverse claims is sixty days, and that the existing regulation undertakes to enlarge this period and is for that reason inconsistent with the statutes and of no effect. In effect it is said that the land department cannot by regulation change the statutes. The Secretary therefore approves the publication in this case, which included nine insertions in a weekly newspaper. In another case, on the same day, the Secretary holds that an adverse claim filed after the publication has been running for sixty days cannot be recognized, even though it was filed before the tenth insertion in a weekly newspaper. The two cases were Davidson vs. Elias G. M. Co., from the Pueblo district, Colorado, and Lizzie Elderson vs. United States, from the Salt Lake district, Utah.

ORDINARILY it is believed by many miners that where a candle will burn the air can with safety be breathed. That this is not always so has been repeatedly shown, and the lighted-candle test is not an absolutely safe one. At a recent inquest on the death of two Australian miners, who lost their lives from foul air in a shaft into which a lighted candle had remained burning, the fact was given such prominence that the Secretary of Mines took it up and secured expert opinion, with the result, as in similar investigations, of a statement to the effect that foul gases destructive to human life, yet permitting a candle to remain lighted, may exist in underground workings. An interesting paper, going into this whole subject in detail, was read at one of the recent meetings of the American Institute of Mining Engineers. The tests, though conclusive, were, however, too extended and elaborate to be of immediate practical value to those ordinarily desirous of knowing whether they might, with safety, enter a shaft or tunnel. Where is present 10% of carbon dioxide a living being will experience severe distress while a candle will burn dimly. In the case of "blackdamp" (87% nitrogen and 13% carbon-dioxide) the light of the candle goes out when 16% is present, while human life is not endangered unless a percentage of 28 is reached. Even 1% of carbon monoxide is fatal to life, but does not extinguish the candle flame. Hence it is manifest that the lighted candle test is not wholly a safe or sure one wherever enters in the element of danger.

SINCE Jan. 1st, '99, this paper has received the names of 371 new subscribers, which, for ninety days, is not bad, when it is considered that none but intelligent and progressive men are likely to subscribe for such a journal, which does not cater to the tastes of the many. Some time ago the leading authority on the subject in this country made the authoritative statements that appear on the opposite page of this issue. It is believed that since then the merits of this paper have been so further cordially recognized by increased subscriptions as to justify a still more favorable statement from the same source. The constant accession of new names to the lists of men who everywhere throughout this west half of America realize the weekly need of such a publication calls to mind that some time ago the statement was made in this column that the names of 179 new subscribers had been received in this office in one month. The accuracy of this statement was questioned, whereupon was published the name and address of each of the 179 new subscribers received in thirty consecutive days, with a request that any one who doubted the truth of the statement write any one of the 179. During the succeeding months several of the 179 wrote stating that the gratuitous publicity given their names had resulted in their receiving sundry free copies of "mining journals," and in the case of one of these "journals" it would seem as though the whole 179 were since in constant receipt of that publication. So that it has not since been deemed advisable to repeat the publication of such a list, the sole idea in the one instance mentioned being to afford exact and sufficient proof of the accuracy of the statement made regarding the receipt of the names of new subscribers.

The Genesis of Petroleum and Asphaltum in California.

NUMBER IX.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

Veins of asphaltum, being rents, seams and fissures filled with asphaltum, occur usually vertical or not far from vertical. An innumerable number of small faults, contortions and breaks occur in the formation in which these veins of asphaltum exist. These veins of asphaltum occur in the vicinity of red shales or shales that have been burned and contracted by chemical heat; the contraction of the shales opened and open cracks and seams in the adjoining formation permitted the ascent of the asphaltum. These cracks and seams extend to such depths as to reach deposits of petroleum oil.

From observations made at Asphalto, Mount Solomon, La Patera and other places, it would appear that these fissures and rents and faults are filled with bitumen in the following manner: Heavy petroleum oil at various depths below the surface of the earth in porous or seamed strata is urged upwards principally by rock pressure. The subsidence of the formation in which the asphalt veins occur is caused by the contraction of the shales by heat. In consequence of the subsidence the shales and sandstones are very much broken and contorted. Around the edges of these subsidences these veins of asphaltum are found.

The specific gravity of the asphaltum is too great for it to be buoyed up by water and the formation in which the veins exist is too broken for gas to exert a pressure, but hydrostatic and gas pressure do in some instances urge the bitumen upwards. When ascending in porous or seamed strata the petroleum oil is partly evaporated, the evaporated portion forming gas, which reaches the surface through passages which are closed to the viscous oil. The oil is readily oxidized on account of its divided state, and if sulphuretted hydrogen or sulphur dioxide is present the oil is resinified, forming asphaltum. By sulphuration, oxidation and evaporation the petroleum oil is finally hardened. When nearing the surface it is indurated to such an extent that it rarely ever shows itself. Polymerization of the bitumen by the photochemical action of the light also assists in the induration of the bitumen when nearing the surface.

Adjoining the selvage of the veins when near the surface of the earth the asphaltum is brown and friable, fully two-thirds of which is asphaltene. In the interior of the vein it is black and shining and when cold breaking with a conchoidal fracture, fully two-thirds of which is petrolene. The proportional amount of petrolene and asphaltene existing in the asphaltum is very variable. When at a sufficient depth so as to be removed to a considerable degree from atmospheric influences the brown margin of asphaltum does not exist. As a general rule, the farther from the atmospheric influences the more liquid the asphaltum will be. Bivalvular shells filled with petroleum are frequently found in these asphalt veins, the bitumen on the shells being much more liquid than the surrounding asphalt and of a lighter color. The asphalt veins are rudely parallel to the periphery of the red shale deposits and exist along the margin of the subsidences, the seams for the reception of the asphalt having been opened by the movement of the formation towards the contracting shales, permitting the ascent of the asphalt forced up by rock pressure. The parallelism of the veins to the periphery of the burnt shales is frequently changed by the varying hardness of different strata or by orogenic contortions.

When the hanging wall consists of hard and close-grained strata the bitumen will accumulate below the same, which on account of its being conformable with the plane of bedding of the adjoining strata give it the appearance of having been deposited at the same time as the other strata. When these shales are burning large amounts of sulphur vapors are disengaged. It is reasonable to believe that these vapors sulphurized the bitumen in their neighhood, forming asphaltum. Mineral waters containing sulphuretted hydrogen in large quantities usually accompany the ascent of the asphaltum. The earth adjoining the veins is usually charged with mineral matter deposited from infiltrated mineral water. If these openings and sulphur vapors had not been made and generated through the contraction and burning of the shales by chemical heat the asphaltum would not have been formed, nor could it have reached the surface of the earth.

The physical characteristics of the asphaltum filling these veins are extremely variable. In consistency it gradates from a hard rock to a viscous condition. The asphaltum contains intimately mixed from 1% to 70% of impurities. The impurities hardly ever exceed 75%. The presence of more than 75% of impurities makes the bitumen so stiff that it cannot be forced through the cracks and seams. In the vicinity of the injected veins there are beds of shales containing from 10% to 15% of bitumen, but existing rock pressure is unable to move them.

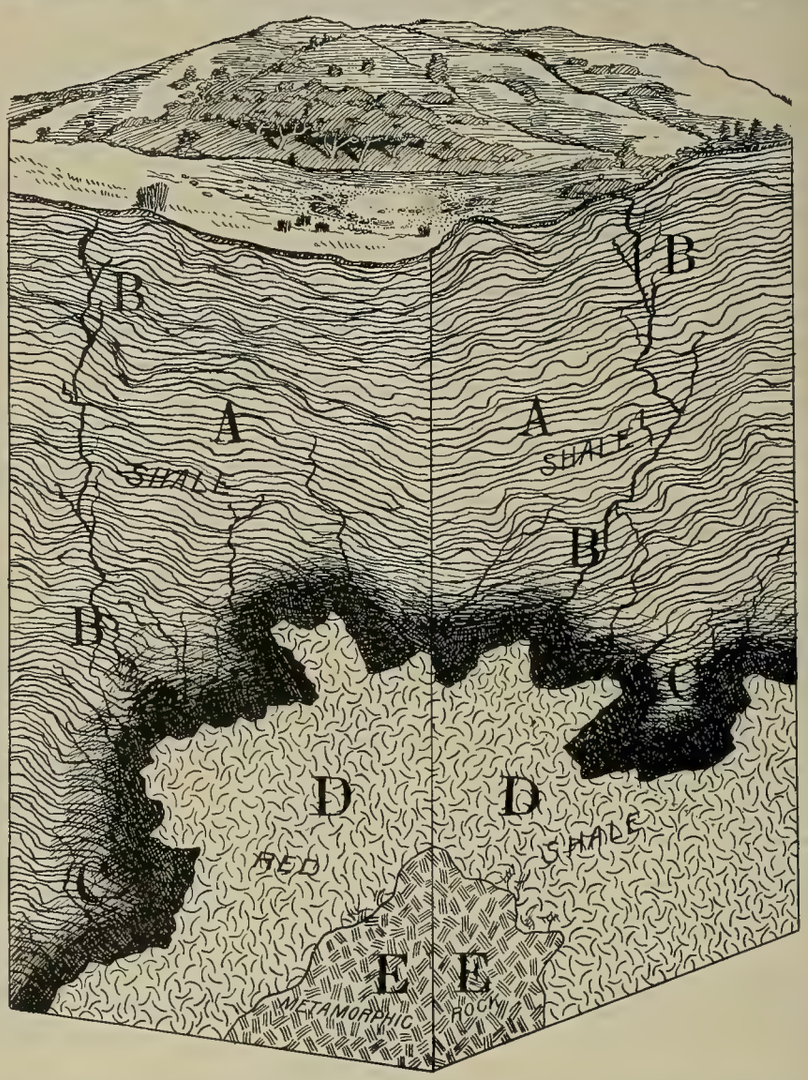
The impurity in some of these asphalts is infusorial earth, in others sand, while in others finely ground shales and angular fragments of shales and fossil shells or all of these impurities may be present in the same deposit. Shale preponderates as an impurity, in fact the impurities are derived from the rock which the asphaltum encountered during its ascent. Most of the time the impurities are very fine and light, making the refining of the asphalt by any known process difficult.

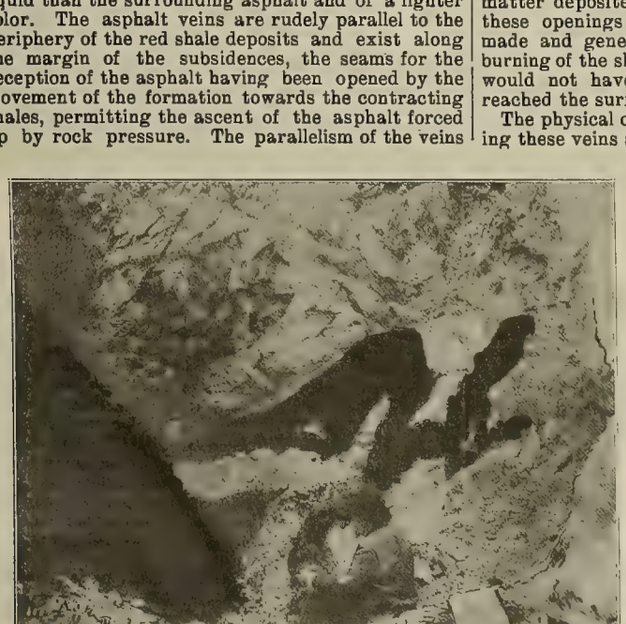
The thickness of these veins of asphaltum are variable; sometimes they are 20 feet in thickness, decreasing until they become the thickness of a knife blade. In exploring for asphalts these small seams are followed and often lead to thicker parts. The asphaltum breaks with a conchoidal fracture, some of these conchiform pieces being 10 feet in diameter. The viscous asphaltum cannot enter the interstices or pores of the rocks of the formation; especially is this true where the pores or interstices of the rocks are filled with quarry water, consequently when it is urged upward and forward by rock hydrostatic or gas pressure it exerts a pressure in all directions (similar in action to a hydraulic press) and through this pressure pushes the rocks asunder, making room for itself.

The pressure required is not great when the shale is contracted on one or both sides, the asphaltum being constantly alert to take advantage of any movement of the earth. Next to these bituminous veins the formation is of a bluish color, owing to the presence of a slight amount of bitumen. These veins entered the formation subsequent to its subsidence, as the veins are not faulted; although frequently very tortuous they are continuous. These veins sometimes bisect the brown bituminized sand, showing that they were injected subsequently to the filling of these sands with bitumen and even after they had become brown and indurated through long exposure. These veins of asphaltum frequently contain fossil shells and shark's teeth which must have been brought up from lower strata, as no similar fossils occur in the adjoining walls of the vein. These fossil shells are filled with bitumen mixed with the silt and sand that entered them when they died.

The bitumen in the shells must have been much more liquid when it entered them than at the present time. At the present them the bitumen is too stiff to enter the shells. Sometimes the bitumen in the shells is much softer than that in the veins and sometimes it is of a yellow color. Slickensides on both sides of these bituminous veins show that the material has moved upwards. Fossil shells imbedded in the hanging wall of these veins have plowed grooves in the asphaltum as it ascended. At the Waldorf mine a groove was formed in this manner 10 feet in length.

These veins of asphaltum in several instances are found injected into the detritus which has descended from the adjoining hills. Tunnels and shafts excavated in the formation containing these veins have been partly filled with the ascending bitumen. At the La Patera mine, in sinking upon some asphaltum, it was discovered that the excavation was being made in an old shaft, which, outside of the earth that had fallen into it, was filled with asphaltum. At a depth of 15 feet an old-fashioned pick and sledge hammer were found, which must have been buried for a long number of years. Enquiries were made, but it could not be ascertained who sunk the shaft.





ASPHALT MINE, SANTA MARIA, CAL., ASPHALT CO.

At the La Patera limpid sea water is inclosed in cavities in the asphaltum, its limpidity showing that sea water has no effect upon it. In the Santa Barbara channel, below high-water mark, near the La Patera mine, veins of this mineral occur. Owing to the plastic nature of this character of asphalt and the broken condition of the formation in which it usually occurs, it is very difficult to mine. When inclines, tunnels, shafts and other excavations are made in asphalt, or near it, they are hard to maintain, as the asphaltum lying above or near the excavations, even below them, commence to move through rock pressure, so that the excavations are soon destroyed.

Deposits near excavations give evidence of their existence by the earth bulging into the excavation. Wedges, picks ond other tools used in mining the asphaltum become sharp, instead of dulling.

When mined and relieved from pressure, occluded gas expands in the asphaltum, making it very vesicular.

In the map on the opposite page, *A A* portrays unaltered shale, greatly distorted by subsidence caused by the contraction of the red shale, *D D*. *B B B B*, veins of asphaltum squeezed and forced up by rock pressure exerted by the shale *A A*, owing to their broken and contorted condition.

C C, shales filled with condensed hydrocarbons, which were vaporized by hydrothermal heat in the red shales.

Near or adjoining the red shales the shales are filled with liquid asphaltum; in some places the shale and the liquid asphaltum have formed a mud, which is forced outwards and upwards by the weight of the superincumbent shale through cracks and seams to the surface of the earth. Further away from the periphery of the red shale the shale has a smoky appearance, owing to the condensation of different vapors generated by hydrothermal heat in the red shales, *D D*. *D D*, red shales which have contracted through the action of hydrothermal heat, such contraction causing subsidences in the overlying shales, *A A*—such subsidences opening fissures and cracks, *B B B B*, permitting the ascent of the bituminous mud urged upwards by rock pressure and, maybe, gas and hydrostatic pressure. Underlying the red shales is serpentine, being shales metamorphosed to a greater extent than the red shales. The half-tone engraving on the opposite page gives a view of a formation into which veins of asphaltum have been injected.

(*To be Continued.*)

A New Method for the Determination of Zinc.*

By A. C. LANGMUIR.

Practically two methods only are in general use for the gravimetric determination of zinc. Of these, the carbonate method, with its many imperfections, is being displaced by the phosphated method, at least in America.

With care the latter will yield excellent results. In our practice it is customary to use ammonium phosphate in place of the usual sodium salt, and after the precipitation of the phosphate to destroy the slight excess of ammonia remaining after heating on the water-bath, by the cautious addition of dilute acetic acid. Under these conditions the filtrate is free from zinc.

Directly igniting the sulphide and filter, and weighing as oxide or sulphide, has been used, but is open to serious objection if the amount of zinc is at all large.

As far as we are aware no one has proposed the solution of the sulphide in nitric acid, the evaporation of the solution so obtained and the conversion of the residue to oxide by ignition. As a second precipitation and washing is avoided it is quicker than the carbonate or phosphate methods, and is preferable to the latter in that the impurities almost invariably present in the zinc precipitate may be easily determined and allowed for.

The sample of ore for analysis (one-half to one gramme according to its zinc content) is dissolved and the metals precipitated by hydrogen sulphide separated by the usual methods. After expelling hydrogen sulphide, the solution is colored by bromine water, and the iron and any manganese present are separated by ammonia. The precipitate is dissolved in hydrochloric acid, and the precipitation is repeated a second or third time if necessary.

If the ore is one which is known to be free from lime and magnesia the combined filtrates may be boiled down immediately with the addition of an excess of nitric acid to destroy chlorides and ammonium salts. After the removal of the chlorine, the solution is transferred to a weighed platinum dish, evaporated to dryness, ignited and weighed as oxide.

The troublesome filtration and washing of the zinc sulphide should be avoided if possible. In our opinion better results are obtained by the ferrocyanide titration of the solution of the unwashed sulphide than by any gravimetric method involving the filtration and washing of this precipitate.

The zinc is best precipitated as follows: Acidulate the warm ammoniacal filtrate from the iron with hydrochloric acid, add a few drops of sulphurous acid to neutralize the bromine set free, then three or four drops of methyl orange. Neutralize with ammonia carefully, and add ammonium sulphide drop by drop with constant stirring until a drop of the solution gives a dark coloration with a drop of dilute ferric chloride solution on a porcelain plate, showing a slight excess only of ammonium sulphide. The liquid is now warmed on the water-bath until the sulphide has settled, and is filtered through a double ribbed filter. Under these conditions a clear filtrate is invariably obtained, but if washing is attempted the filtrate is frequently cloudy.

We therefore dissolve directly, without washing, in hot nitric acid (1:3) or in dilute hydrochloric acid if cobalt or nickel are present, and correct the weight of the oxide subsequently found for the small amounts of lime or magnesia present. It is well to make a qualitative test for these elements in the filtrate from the sulphide. If absent or in small amount the correction in the weight of the oxide may be omitted.

The solution is boiled down rapidly in a casserole with the addition of nitric acid to expel chlorides. When almost dry the contents are rinsed into a weighed platinum dish or crucible. The evaporation is continued on the water-bath or hot-plate until dry, when the nitrate is ignited at the full heat of the Bunsen burner. As some zinc sulphate, which is always present, is not decomposed at this temperature, it is necessary to break up this compound by intense ignition over the blast-lamp. Any lumps should be first broken up by a blunt glass rod. Ammonium carbonate may be used but is liable to occasion some loss.

It may be possible, by igniting at a low heat, to weigh the zinc as sulphate, after evaporating with sulphuric acid. We are working on this now.

After weighing, the oxide is dissolved in hydrochloric acid and the small amount of iron always present thrown down with ammonia, ignited, brushed into the tared watch-glass in the balance and weighed directly. The filtrate is acidulated with hydrochloric acid, heated to boiling, and tested for sulphates with barium chloride. A slight precipitate will usually form, but this may, in general, be neglected if the ignition has been properly performed. If in weighable amount it may be treated as in the case of the iron, calculated to sulphur trioxide, and together with the ferric oxide deducted from the weight of the impure oxide.

If lime or magnesia were present the filtrate from the iron should be divided into equal parts, one of which is tested for sulphates and the other for lime and magnesia by throwing out the zinc as sulphide, and testing the filtrate by the ordinary methods. As a rule this is unnecessary unless the lime or magnesia is present in large amounts, for the sulphide is precipitated in dilute solution and the amount of lime remaining in the unwashed sulphide would usually be very small.

The correction for impurities may seem tedious but in reality it is quickly carried out. Richards has found that zinc oxide obtained by the ignition of the nitrate contains a little occluded nitrogen. This would only amount to a few tenths of a milligramme and may be neglected unless unusually accurate work is called for.

For the determination of zinc in alloys containing copper, tin, lead, iron and zinc, dissolve in nitric acid, evaporate to dryness, and take up with nitric acid if tin be present. Filter and separate copper and lead simultaneously by electrolysis. The solution should contain 5 cc. to 10 cc. concentrated nitric acid in 150 cc. to 200 cc. water. After removing and washing the electrodes carrying copper and lead the solution is evaporated to dryness in a weighed platinum dish and the residue ignited and weighed. Dissolve in hydrochloric acid and separate the usually small amount of iron present by ammonia. Ignite, weigh, and deduct from the weight of the zinc oxide. If nickel be present the weight of the combined oxides may be taken and the nickel afterwards determined, when the zinc may be found by difference.

Zinc in pure spelters is best determined by difference. In impure samples it is sometimes more convenient and equally accurate to determine zinc directly. Dissolve one-half gramme in nitric acid and separate the lead electrolytically in a solution carrying 10% nitric acid. Use the platinum cylinder in this case to collect the lead peroxide. Evaporate the solution to dryness in a weighed dish, ignite, and weigh. Dissolve in a little hydrochloric acid, reduce with two or three grammes granulated zinc, add sulphuric acid to complete the reaction, dilute with ice water to one litre, and titrate with permanganate. Correct for the amount of iron found. If cadmium, arsenic, or other impurities were present in more than traces the above method would be inapplicable unless modified to include treatment by hydrogen sulphide.

We have not found time to make an extended series of tests of this method, but, in numerous analyses of ores and the complete analysis of alloys in which in duplicate analyses the zinc was determined by the well-known methods, the author has convinced himself of the accuracy of the method.

*American Chemical Society.

Experiences of a Working Miner.

NUMBER VIII.

Written for the MINING AND SCIENTIFIC PRESS.

The R—— Company had a most unfortunate experience for some time after starting in business. The purchase price of the mine was so ridiculously small that I will not mention it, but it was only a drop in the bucket. The first investment called for more and for two or three years it was all outlay and no income. At last the mill was completed and the return of the tide was looked for, but it did not return—at least not at once. The mill man had some ideas of his own, and put them into practice. The mill was supplied with stamps, pans and settlers, the ore being worked by the Washoe process. This first mill man used so much water in the pans that the quicksilver would not mix with the pulp, and as a result very little amalgam resulted. Finally a new man was engaged. He was told of the extreme ideas of his predecessor and evidently determined to pursue a different course. He used so little water that the quicksilver floured and nothing could re-collect it, and it floated out of the mill and down the canyon, until restraining dams were built and the tailings saved. Mr. A——, who had been about the mill all this time — covering a period of several months—concluded that there might exist a medium between these two extremes, and made a proposition to the company to work for a percentage of the net proceeds. His offer was accepted, probably because prior to that such a thing as net results were an unknown quantity to them. A—— started in and the first ten days sent away $8000 in bullion, which was more than had been produced in two years. That year he shipped over $600,000 to the home office and made a fortune for himself. This experience is given to show that rigid adherence to any set plan or method is not productive of the best results unless, indeed, the best results have already been attained and then it is probably well enough to let it go at that.

Hearing of the rich mines at L—— I went there to have a look at them and, if possible, get a job. The place was described to me as a mountain of silver. Arrived at L—— I found a company actively engaged in driving a tunnel in mica schist, and pretty hard ground, too. The snow was about 2 feet deep, so I didn't have much of a chance to see the geology of the place except underground, which was not satisfactory. After a few days most of the snow had disappeared and my opportunity had come. On inspection of the "mountain of silver" I found a sheet of quartzite dipping about 15° and lying upon the upturned edges of an older formation. The silver was there but it was all in the flat sheet of quartzite and did not extend down into the schists. A shaft had been sunk through the quartzite and the tunnel was being run to connect with the shaft, at the bottom of which crosscuts radiated in three directions and the tunnel connection would make the fourth. This concern failed. The superintendent was an unapproachable, conceited individual, who knew nothing, but thought he "knew it all." I kept my own counsel, and the mine lies idle yet.

A few days ago I saw in the papers the statement that a California miner had attempted to thaw nitro powder by placing it under the stove in his cabin. It recalled to my mind an incident in my own experience. It was at Leadville, and the weather was cold. There was a good-sized cook stove in the office of the hotel (boarding-house) and a number of miners and others were sitting and standing about it. A man opened the door and asked: "Jerry, is that powder thawed out?" Jerry responded he did not know, and opened the oven door of the stove. Inside was a dinner-bucket with a dozen sticks of powder in it. I could not say whether the powder had thawed or not —didn't wait to see. It did not explode in this instance, providentially.

It is not only the managers of mines who make mistakes, but miners and prospectors owning claims who "get off wrong" often. When R—— was a booming camp, the C—— mine was looked upon as one of the best prospects in the country. About $1500 worth of work had been done on it and it did look fairly well. Then a new cut and shaft were started and they struck it rich. The gold could be seen in the rock 15 feet away. The boys were millionaires at once. The representatives of monied men were on the ground shortly after. The first offered $60,000 cash—that is to say, he would go and get his money and be back within four days. No agreement was signed, but it was understood that it was "a go." This individual had scarcely left camp when No. 2 came along, and, after a brief inspection of the mine workings and a longer inspection of the bunch of rich rock, offered $200,000, payable in two weeks. He only wanted to go to San Francisco to get the money. Fearing he might back out, the owners of the claim put this latter proposition in writing. Four days later No. 1 returned with a well-filled valise; but the boys could do no business with him. They told him if he would raise the price they would throw the other fellow off. He would not raise, but left in disgust, and, sad to say, the other

man never came back. The boys did a little more work, dug out their pocket, realized about $1600 on it, and then the property remained idle for a long time and was finally jumped by outsiders. Another similar instance I remember, where four partners were offered $90,000 for a prospect, but they insisted on $100,000. The capitalist was firm, however, and no transfer was made. Four years later, after a great deal of development, the claims were sold for $14,000. These are what I call serious mistakes for practical miners to make, and there are many such. Still they will smile grimly at the mistakes made by their superintendents.

I knew an aged prospector who owned several claims. The ore was not free, and he could not afford to have his ore assayed. The superintendent of a mine near by had a little talk with him one day and purchased one of his claims for $250. The old man was overjoyed. He went to the town a few miles away and bought a good large bill of provisions and mine supplies, determined to do more work on his remaining claims. When he returned, three days later, he was surprised to see that a road had already been graded up to the dump of the claim he had lately sold and a long mule train was loading up the ore. He had sense enough to know that the man who had bought the claim was shipping high-grade ore. To him a "wink was as good as a nod," and inside of ten days he, too, was shipping high-grade ore at a profit, and a little later sold out all his holdings and returned to a comfortable home. There are few who think he made a mistake in selling what appeared to be his best claim for a song. MINER.

Dredge Mining in California.

Written for the MINING AND SCIENTIFIC PRESS.

Dredge mining is undoubtedly likely in the near future to take a place as one of the important industries of the State of California.

Vast areas of placer ground were mined in the early '50's "to the water line," and as far below the water line as China pumps and current wheels rendered feasible. It is known that good values lay in the substrata which primitive methods could not reach; and many efforts have been made to evolve a machine that should render them available. The history of these machines so far, until quite recently, has been a chronicle of failures and disappointments; but it looks now as though the problem was in process of solution.

Between Biggs and Oroville there are now three large dredging machines working regularly in the Feather river, and two others are about finished and are expected to be at work within a few days. There are, so far, two distinct types of dredge working; three of them are endless-chain and bucket machines and two are of the shovel type, virtually large steam shovels, set on hulls, and fitted with gold washing apparatus.

The process of both types is practically the same. The gravel is lifted into a hopper, from which it is fed into a revolving screen or "grizzly," which separates the cobbles from the gold-bearing sands. The cobbles are carried by endless chain and buckets, or by a belt conveyor, aft the dredge hull, and stacked up so as not to interfere with the floatage of the dredge.

The fine sands, screened from the dredged mass are variously treated. Generally they are passed over tables covered with cocoa matting, which proves an excellent medium for abstracting the gold from the sand; running from these into sluices having the ordinary form of riffle, and from these dumped overboard at the stern of the boat.

The gold is of a flaky character, the pieces in size resembling bran. The gravel through the neighborhood where the dredges are working is about 30 feet deep and contains gold to the extent of about 20 cents a cubic yard. The dredges working at present are handling about 500 yards each per day of twenty-four hours, and the owners hope to gradually attain the best results as the work becomes more familiar. One owner says that, figuring the standing charges of interest and depreciation at fair rates, his daily expense was over $100, so that 500 yards per day at 20 cents per cubic yard was just about paying expenses, and more gravel must be got through the machines to afford a profit. When asked if some of the stories in circulation that the dredges were cleaning up $200 or $300 a day were correct, he replied that he believed that his dredge had handled more gravel in the month of February than any other dredge in the river and that his balance sheet for the month showed a net loss of $218.94.

However, at so early a stage in the game the machines are doing well to be paying expenses; and in the hands of the class of men who are operating them they are certain to gradually evolve a practicable and reliable machine.

Enquiries have been heard of damage being done the navigable rivers by the work of the dredges. Those working in the river are merely raising gravel from the river at one end of the boat and redepositing it at the other. At the ordinary stage of the river the water is not discolored a greater distance than a few feet from the boat by the operation, as the material is too heavy to remain in suspension in the water; and at high water stages, when the current might take hold of the newly moved material, the dredges are unable to work on account of the strong current. The dredges intended to operate in the lands adjoining the river are launched in excavations previously dug for them. In digging out of the river bank they only deposit new material in the river for the few days they are cutting through the river bank to the lands adjoining.

San Francisco, March 27th, '99.

Saving Fine Gold in Sluices.

TO THE EDITOR:—For some time I have been experimenting with various methods of saving fine gold in sluices, and thinking the result of my experiments may interest and possibly benefit others, I offer it through the medium of the MINING AND SCIENTIFIC PRESS:

I have discarded all riffles and have substituted grain sacks in the bottom of my sluice boxes. They are secured in place by the use of tacks at the upper end of each sack, the sacks having been cut to fit the boxes. I lay a sack at the lower end of the box first, allowing the next above to overlap it 5 or 6 inches, and so on to the upper end. I then tack a thin strip of wood along each side of the box on top of the sack to hold them in place. I have found a single 12-foot box sufficient, but below this first box I have arranged an undercurrent, set at a right angle, and this is also laid with sacks, as a precautionary measure. I rarely find anything in it, however, unless I run six or eight days without cleaning up, and then I find a little, so it shows it is just as well to have it, but it does not pay to clean up frequently. I have found that by this means all of the fine gold may be saved, provided I give the boxes the proper grade. In my experience I have found 5 or 6 inches fall to a 12-foot box gives the best results, with a stream of water about 1 inch deep running in the box. I do not shovel in the large boulders, but cobbles the size of a man's fist go through all right. In cleaning up I take up the sack at the upper end first, handling it carefully, and wash it by dipping and shaking in a tub of clean water. I wring it out and lay it aside, treating each piece in like manner. In laying these sacks in the box, I use only one thickness. When the several pieces of sack have been removed, I sweep the sluice box down toward and into the undercurrent, admitting only enough water at the head of the sluice box to accomplish this. The undercurrent is cleaned in similar manner. All the sweepings are put in the tub with that from the sacks, and the whole carefully panned with quicksilver, not taking too large a quantity of sweepings at a time. When all has been amalgamated, I squeeze out the excess quicksilver and retort. Where there is coarse gold in the gravel I put a few riffles across the lower end of my lowest sluice box. My boxes are 16 inches wide and 10 inches deep. The undercurrent is made by cutting a slot ⅝-inch wide across the entire width of the upper box near its lower end. I find considerable "rusty" gold in the black sand and suggest that miners treat their black sand with nitric acid, which removes the coating of iron oxide and permits the gold to amalgamate. J. W. MOORE.

Bragdon, Cal., March 22d, '99.

The suggestions made above will doubtless prove valuable to those having fine gold in their placers, which is saved with difficulty. It is evident, however, that sluice boxes set on a 5 or 6-inch grade and using a sluice head of water only 1 inch deep will not permit the handling of a very large quantity of gravel. It would probably be found to operate very satisfactorily as an auxiliary to regular sluicing methods which employ a heavier fall and a full sluice head of water, and setting an undercurrent as suggested, in the same manner, with two lengths of box instead of one, or with the second undercurrent if it seemed necessary, providing the boxes above with riffles as usual, and making his upper box with sacks, etc., the undercurrent. Others having had experience in saving the fine gold found in placers are invited to contribute any information they may have on the subject.

Results to Advertisers.

The following unsolicited testimonial is received. These indorsements of this paper as a trade producer are never asked for by the paper nor any of its representatives, but are often received and always cordially appreciated:

Publisher Mining and Scientific Press: Permit me to compliment you upon the returns received by us from a small "ad" recently inserted in your columns. We received over one hundred responses to same, covering every State west of the Rocky mountains, about ten Eastern States, including New York and Massachusetts, and from Mexico, Australia and the Hawaiian Islands.

PACIFIC ACETYLENE GAS CO.,
115 New Montgomery street.
San Francisco, Cal., March 29th, '99.

The Crosshead and Trip Rope.

TO THE EDITOR:—I would like to know about the latest improved plan of crosshead over shaft bucket, also the best plan for dumping the bucket at surface into car—shaft to be 4½x5.
Rossland, B. C. W. S. H.

An answer to the above, in so far as it relates to the crosshead, will be found on page 350, this issue. A very convenient method of dumping a bucket so that its contents will fall into a car is by means of a trip rope, the upper end being secured to the gallows frame, or, in case of a two-post frame, to a frame projecting from the gallows itself. The shaft should be carried up above its collar by 6x6-inch timbers and enclosed on all sides except the back, which should remain open to the collar for the purpose of landing the bucket with tools, etc., and for sending down timbers and for other purposes. This curb-like structure should be higher at the back than in front and should be provided with an inclined door, which extends over the shaft, thus protecting miners working below. The door may be made of 2 inch plank and covered with an iron plate, the weight being equalized by a counterweight. It should be securely hinged at its lower end, and a lip should project far enough forward to deliver ore or waste into the car standing on the track in front of the shaft. When the bucket is to be hoisted, the top man goes to the shaft; and when the bucket has cleared the door, the door is lowered into place, the hook of the trip rope caught in the ring beneath the bucket and the bucket lowered by the engineer. It tips forward, the top man keeping it from swinging sideways, and its contents are discharged into the car and on the iron plate of the door, from which it slides into the car. Where it is desirable to wash dirty ore for rough sorting, a platform should be built about the collar of the shaft high enough for a car to pass under it. The ore is dumped on the floor of the platform by means of a trip rope, as above described, but at a greater distance from the shaft, by having the trip rope secured to an arm projecting from the gallows-frame. Having washed the ore, and thrown either the ore or the waste into a separate pile, the balance may be quickly shoveled through a trap in the platform into the car beneath. The shaft should be covered by trap doors for the safety of men in this case also, but the ore need not be dumped on the door, as in the former case.

Loss of Gold.

Cyanide managers will be interested in the results obtained from tests of the material taken from the chimney and flue of the Boatman's cyanide plant at Reefton, N. Z. The tests were directed to the examination of the furnace chimney as to the loss of gold in smelting. A sample of the incrustation was composed for the most part of brick, owing to the strong adherence of the coating of zinc oxide, which was not readily detached: The incrustation under the microscope presented the appearance of a yellowish white efflorescence, but showed no metallic gold. The sample taken weighed 20 lbs. This was crushed roughly and separated into two portions on a 30-mesh screen: Pass 30-mesh screen, 13 lbs.; refuse 30-mesh screen, 7 lbs. The two samples were then assayed separately as follows: Fine sample, 8.416 grs. pure gold per lb.; coarse sample, 3.263 grs., which shows the 20-lb. sample to contain 5 dwts. 12¼ grs. gold. By carefully panning the finely crusted material a yellow film or tail was seen, having the appearance of a stain or coloring. The microscope showed this to be finely divided particles of metallic gold, rich in color, of spherical form and of very even size. In this furnace only a little over £1000 worth of bullion was smelted, and as only a small portion of the fume would deposit itself upon the walls of the chimney the loss may have been very considerable. Whether the gold was carried away by the draught as fine slimes or by volatilization of the bullion there is nothing to show. The furnace used to draw well and had a stack of about 15 feet. In smelting, where the slimes are well oxidized and properly fluxed the loss of zinc must be extremely small, as nearly all the zinc goes into the slag, excepting that portion reduced in the smelting, which partly enters the bullion and partly escapes escapes as fume. It is evident, however, that the portion which does volatilize, and also the fine particles carried away by the draught, must be rich in gold and worth saving. The experiments thus recorded call for extension in other localities.—South African Mining Journal.

A Correction.

TO THE EDITOR:—In "That First California Mining Electric Plant," in issue of March 25th, the word "removed" should be "rewound." All moving and removing was done by our own employes, while rewinding of armatures was done at San Francisco by the California Electrical Works and Prof. Keith.

Oakland, Cal. A. K. BEATSON.

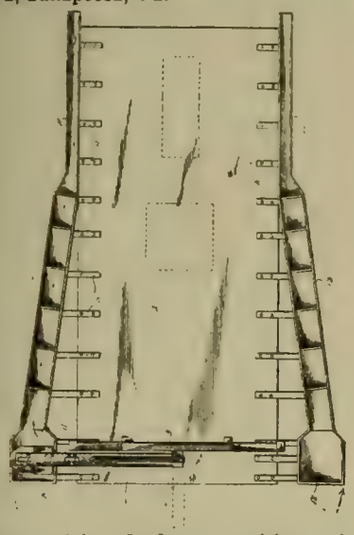
FIFTY casks of peculiar construction are to be set adrift in the Arctic ocean the coming summer by whaling vessels going through Bering straits, to determine if possible the currents of the Arctic and the theory of an open passage around the pole.

Latest Mining and Metallurgical Patents.

Patents Issued March 21, 1899.

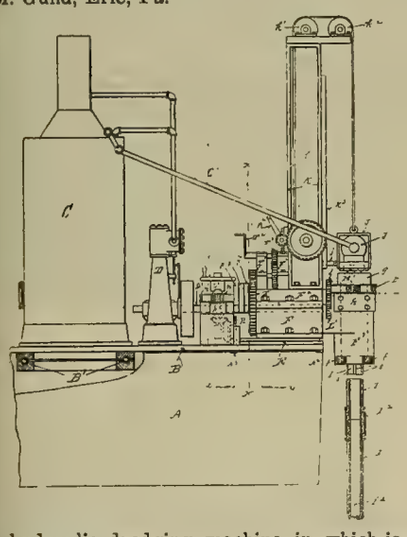
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

PLACER MINING DREDGE.—No. 621,377; G. W. Shepard, Tallapoosa, Ga.



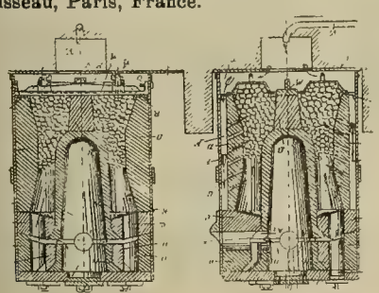
A placer mining dredge comprising a barge or scow, hoppers supported at one end of the barge exterior to side line and gunwales and at opposite sides at points equidistant from longitudinal axis; sluices communicating with the hopper on opposite sides and outside the barge above the plane of the deck, inclined downward from the hoppers and inwardly into close relation with the barge tailings sluices at opposite sides, a swinging crane near the hoppers, an excavator bucket carried by the crane, and means for swinging the crane in opposite directions to discharge the contents of the buckets into the oppositely-placed hoppers alternately.

HYDRAULIC DREDGING MACHINE.—No. 621,408; H. M. Guild, Erie, Pa.



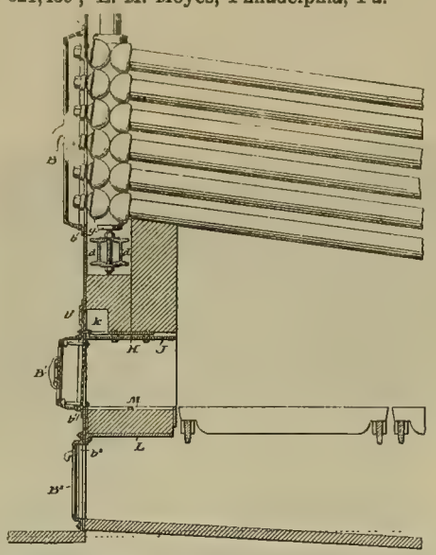
A hydraulic dredging machine in which is combined a bed plate pivoted at one end on the deck of a boat, tracks on which the free end of bed plate travel back and forth, an engine and boiler mounted on bed plate, rack and gear mechanism for moving the free end of the bed plate back and forth, a turntable mounted on the outer end of the bed plate, a hollow trunnion mounted on turntable, sleeve mechanism mounted on the outer end of trunnion and adapted to be rotated, a vertically moving tube supported in and rotated by sleeve mechanism, a pump mechanism communicating with the upper end of tube, worm and spur gear mechanism for rotating the sleeve and tube therein, and ribs on the periphery of the tube.

FURNACE FOR SMELTING METALS.—No. 621,715; L. Rousseau, Paris, France.



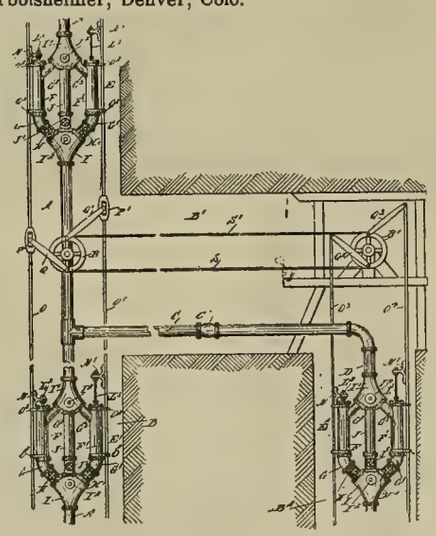
In a smelting furnace, the combination with a hearth, of suitable means for supplying fuel from above, a crucible pot arranged and suitably mounted in the hearth, a casing surrounding and adapted to carry the hearth or combustion chamber, a fire bridge or crown supporting the crucible at its upper end, channels connecting the hearth and crucible pot; means associated with the crucible pot for the escape of gases of combustion and suitable means for its oscillation, a pit contiguous to and below the combustion chamber, vertical flues formed between the casing and the wall of the combustion chamber and communicating with the pit, the wall being provided with downwardly inclined channels adapted to admit air to the combustion chamber, whereby an intimate mixture occurs and the combustion of gases is completed and suitable means for supplying air under forced draft to the pit.

FURNACE CONSTRUCTION FOR STEAM BOILERS.—No. 621,459; L. M. Moyes, Philadelphia, Pa.



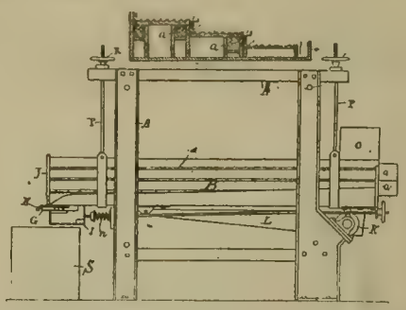
In a boiler furnace, a dead plate formed of a course of brickwork or fireclay cement covered by an iron grating, a combination of the coupled I beams *d*, bolts *e*, passing between coupled I beams, and a swinging support for the upper end of bolts, a series of seats *g*, supported between I beams whereby the alternate short manifolds of the forward end of the boiler tubes are supported; the combination of two upright beams at the front corners; a cross plate mounted between upright beams upon which the arch of the firing door is supported; a second plate a short distance below the supporting plate supported thereby, and which forms the top wall of the firing door; an air space between the two; an air chamber formed in the brickwork of the arch immediately in front of air space, and a register through which that chamber opens in front of the furnace.

DEEP MINE OR RELAY PUMP.—No. 621,667; Geo. Herbolsheimer, Denver, Colo.



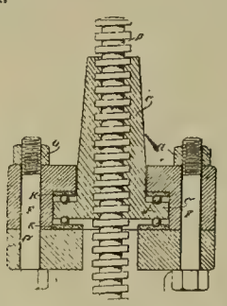
A deep-mine relay pump comprising a series of pumps arranged in successive pairs at different elevations, a common water main, each pair of pumps comprising two cylinders having suction and discharge connection with the water main; a cut-off valve in each suction connection, a by-pass for the main pipe having a cut-off valve therein; a piston in each cylinder having a rod extending through a stuffing-box in the upper end of the cylinder, two power-transmitting rods extending alongside of the corresponding cylinder of each set; connections from rods to piston rods and means for giving the power-transmitting rods alternate or opposite reciprocations.

ORE CONCENTRATING TABLE.—No. 621,515; F. L. Bartlett, Canyon, Colo.



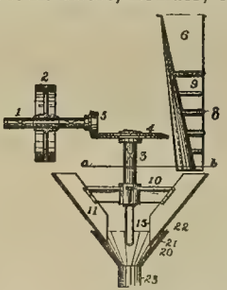
An ore concentrator, longitudinally reciprocating shaking table, with a series of laterally inclined shelves provided with longitudinal riffles extending to the concentrates discharge end thereof, whereby the concentrated material is discharged at the end of each shelf, a separate water supply for each shelf and means for conveying the unconcentrated material from each shelf except the last to the next shelf in the series. The series of laterally inclined shelves are arranged at descending levels. There is a spout extending along the lower side of each of the upper shelves except the last two for delivering the unconcentrated material to the upper side of the next shelf below. The shaking table has longitudinal riffles adapted to discharge fine material over the end of the table and coarse material over the side, and a series of sliding conductors under the discharge end of the table.

ANTIFRICTIONAL ATTACHMENT FOR WATER OR OTHER GATES.—No. 621,566; John H. Hendy, San Francisco, Cal.



A gate movable transversely across the passage which it controls; a screw-threaded non-turnable stem connected therewith; an elongated nut, through which the threaded part of the stem passes; a hand wheel by which the nut is turnable, an outwardly projecting annular flange around the periphery of the lower end of the nut, a chambered cap within which the flange is turnable and balls disposed between the opposite sides of the flange and the adjacent sides of the chamber. There are annular removable disks grooved or channeled to coincide with the grooves or channels on the flange of the nut, fitting the upper and lower parts of the chamber and a series of balls fitting the grooves and forming a bearing for the flange.

ORE SAMPLER.—No. 612,771; C. A. Snyder, D. J. Cheesman and J. A. Moore, Boulder, Colo.



An ore sampler, combination with a shaft rotating on an upright axis, a series of buckets carried thereby and having open mouths at their upper ends and a hopper into which they deliver; of a chute delivering a stream of material substantially parallel with the shaft, its delivery end standing above the path of the bucket mouths and being curved to conform with their movement, and a series of irregularly arranged bolts across the chute. The upright chute has converging side walls, its delivery end being curved in a horizontal line; the upright rotary shaft stands concentric with the curvature of the end of the chute, a spider on the shaft, a series of buckets carried thereby and each having a substantially U-shaped cutting edge at its upper end which latter stands below the delivery end of the chute, the length of such delivery end being such that as one bucket passes from beneath it another enters at the other side thereof, and a hopper for receiving the samples taken by the buckets.

What a Mile a Minute Means to the Locomotive Making It.

At sixty miles an hour the resistance of a train is four times as great as it is at thirty miles—that is, the fuel must be four times as great in the one case as it is in the other. But at sixty miles an hour this fuel must be exerted for a given distance in half the time that it is at thirty miles, so that the amount of power exerted and steam generated in a given period of time must be eight times as great at the faster speed. This means that the capacity of the boiler, cylinders and the other parts must be greater, with a corresponding addition to the weight of the machine. Obviously, therefore, if the weight per wheel, on account of the limit of weight that the rails will carry, is limited, a point is soon reached where the driving wheels and other parts cannot be further enlarged, and then the maximum of speed is reached. The nice adjustment necessary in the various parts of these immense engines may be indicated by some figures as to the work performed by these parts when the locomotive is worked at high speed.

Take a passenger engine on any of the big lines. At sixty miles an hour a driving wheel 5½ feet in diameter revolves five times every second, so that the reciprocating parts of each cylinder, including one piston, piston rod, crosshead and connecting rod, weighing about 650 pounds, must move back and forth a distance equal to the stroke (usually 2 feet) every time the wheel revolves, or in the fifth of a second. This weight starts from a state of rest at the end of each stroke of the piston and must acquire a velocity of 32 feet per second in one-twentieth of a second, and must be brought to a state of rest in the same period of time.

A piston 18 inches in diameter has an area of 254½ square inches. Steam of 150 pounds pressure per square inch would therefore exert a force on the piston equal to 38,175 pounds. This force is applied alternately on each side of the piston ten times in a second.

The Mule Must Go.

In the anthracite coal regions of Pennsylvania the edict has gone forth that the mule must go. The Philadelphia & Reading Coal & Iron Co. is preparing to introduce the air compressor locomotive as a means to haul the cars underground at Shenandoah City colliery. Ever since the first coal hole was sunk the mule has been the favorite means of locomotion in moving the coal. He turned the gin at the top of the slope; he pulled the cars of dirt and rock out into the dump, and he felt his way along the narrow gangway at the head of a string of cars. It was about a year ago that the company first began to make preparations for this change. Alaska colliery near Mount Carmel was selected as the place for making the experiment. The necessary changes were made and the machinery secured. The air compressor engine has been working there for some months, and has been a success. The new method of hauling is used in only one part of the mine. The distance is one mile, and the new engines draw twenty-five cars on each trip. Seventeen mules have been thrown out of employment. It is not only that the company expects to save in the cost of mules and their maintenance, but the cost of feed, the smithwork and other expenses are also saved, while at the same time the mine cars are moved with greater speed, adding in that way to the capacity of the colliery. For some years the coal regions have been the most extensive markets for the mule dealers. The soft coal districts also use mules. Over 15,000 mules are at work in the hard coal mines. The price of mules runs from $90 to $125 a head. Averaging the cost at $100 gives a total investment of $1,500,000 in mule flesh in the anthracite coal region.

In a recent lecture at the Royal Institute, Sir Robert Ball, the eminent astronomer, stated that we now know the existence of 30,000,000 of stars or suns, many of them much more magnificent than the one which gives light to our system. The majority of them are not visible to the eye or even recognizable by the telescope, but sensitized photographic plates have revealed their existence beyond all doubt or question, though most of them are inconceivably distant, thousands or tens of thousands of times as far off as our sun. A telegraphic message, for example, which would reach the sun in eight minutes, would not reach some of these stars in 1800 years. An average of only ten planets to each sun indicates the existence within the narrow range to which human observation is still confined of at least 30,000,000 of separate worlds, many of them doubtless of gigantic size, and it is nearly inconceivable that those worlds can be wholly devoid of living and sentient beings upon them, probably mortal in our sense, illustrating the insignificance of mankind.

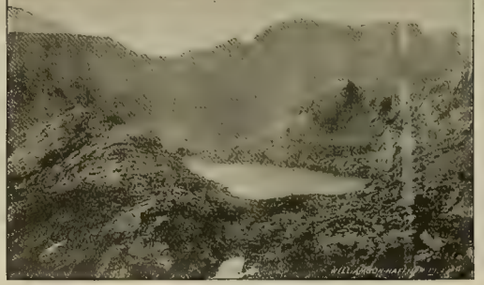
The introduction of a bill in the recent U. S. Congress brings to mind a singular omission in the Patent Laws. Heretofore, if an applicant entered his application and chanced to become deranged between that time and official action on the claim, he was left to the mercy of his malady, and no patent could be issued. The bill referred to provides that in cases of this kind the legal representative of the applicant may prosecute the case to final decision.

Irrigation in Wyoming.

Irrigation is a pleasant subject: the longings of mankind naturally turn to lakes, reservoirs and streams, and desire burns strongly for water supplies which shall insure independence of fickle seasons in this west half of America. Elwood Mead, State Engineer of Wyoming, sends a copy of his Fourth Biennial Report, covering the years 1897-8, a business-like document with records of what is actually being done in the extension of irrigation in that State. Some idea of the exactness of the report as a record of business done in the office of the State Engineer can be had from the fact that there are 2009 permits to appropriate water recorded, each with the name of the appropriator, the stream or other source, the dimensions of the ditch, the cost and the number of acres to be irrigated. There are also records of several hundred applications to enlarge earlier appropriations. These facts show that the use of water in Wyoming is proceeding rapidly and that it is proceeding under State regulation which befits the interest of small irrigators as well as large, as the records show permits issued to very large numbers of men with comparatively small holdings of land.

Lake on Ten Sleep Creek Wyoming.

Lake on Prairie Dog Creek, Wyoming.



Lake on Clear Creek, Wyoming.

Kearney Lake, Wyoming.

IRRIGATION SCENES IN WYOMING.

Wyoming seems in the van of the movement for reservoir construction by the United States. Surveys have been fully made and reports showing the facts about construction are in the possession of the Government, affording a place to begin the reclamation of the great waste region of the West and a vantage which is being strongly urged by those who support the contention that the general Government should do something for the improvement of the interior as well as for the harbors and navigable watercourses. This matter has been forcibly brought to the attention of Congress during the present winter by the efforts of G. H. Maxwell and others representing the National Irrigation Congress, and if it wins its way ere long it will mean the extension of the same policy to the whole arid and semi-arid region of the country. This general proposition is also receiving the most earnest promotion of Mr. Mead of Wyoming and his work commends him.

Mr. Mead's report is finely illustrated. Herewith is reproduced four of his plates which show a number of the sites in the State of Wyoming available for reservoirs, of which the report shows a large number, with maps and details of value to the practical developer of irrigation facilities, for mining and other purposes in which water supply is needful.

The New Nernst Lamp.

What has been termed "the greatest invention in electric lighting for many years" is the new electric incandescent lamp known as the Nernst lamp. The inventor uses highly refractory oxides as his material, heating the rods so as to make them conduct and then heating them electrically. The material is worked up into little white rods, and each mounted on two platinum wires and in a holder which fits ordinary electric-light fittings. An increase of current produces a decrease of resistance, since the rods fall in resistance as the temperature increases, after the manner of electrolytes. A series resistance, however, corrects this instability in running in parallel on supply circuits. This resistance is made up of exceedingly fine wire, having from 10% to 12% of the whole resistance of the lamp. The consumption per candle for large lamps is 1 5 watts and for small lamps or low pressures is 1.6 watts. Since the rod is an insulator when cold, this lamp will not light of itself and the simplest way to start it is to warm it up first with a match, or better still, with a small spirit lamp. This lamp is not only cheap as regards first cost, but is economical in running. At an efficiency of two-thirds of a candle per watt, including the resistance, the life of the rods is more than 500 hours in good specimens. When a rod is worn out, a new rod with its wire mounts is all that is replaced. In lamps of from 20 to 200 c. p. in which it would pay to have automatic ignition, the first cost will be higher than the first cost of incandescents, but as the rods only have to be replaced, the higher first cost is of minor importance. These lamps may be worked at a pressure of 500 or, by using double rods, even 1000 volts if desired. In regard to cheapness, renewals, high efficiency, better colored light and high pressures, the Nernst lamp is said to far excel the carbon incandescent lamp.—The Engineer.

One lesson which the Spanish-American war has thoroughly taught is the vital importance to a nation which would have an efficient navy of the fostering of the mechanical instinct. Americans may be proud of being a nation of mechanics and I attribute the overwhelming victories over the Spaniards largely to this fact and the absolute lack of any mechanical aptitude on the part of the opponents. The utter failure of Cervera's fast armored cruisers, which had trial speeds of twenty knots, to escape from the United States vessels at Santiago, none of which were making seventeen, shows the disastrous results of discouragement of the mechanic. As we know, the condition of the two fastest ships at Santiago—the New York and Brooklyn—was such that only half-power could be used immediately, and it seems almost certain that, had Cervera's ships been able to make their maximum speeds, they would have escaped.—Engineer-in-Chief G. W. Melville, U. S. N., in the Engineering Magazine for March.

United States Commercial Agent Atwell has submitted to the State Department a report on the French development of wireless telegraphy. Practical work in this line is now being done in Paris, where a line is in operation, sending messages a distance of two and one-half miles. A special radioconductor, known in this country as the Branley tube, takes the place of the ordinary soft iron magnet. The special receiver is operated from the sending station, with no other conductor but the atmosphere. The message is recorded at the receiving end by the old tape method, long ago discarded in this country. The sending station is equipped with a mast 65 feet above the laboratory, so as to escape iron-constructed buildings. The system can be used to explode mines at a distance, or even to operate a distant electric light, the only question being that of obtaining sufficient power.

The Alluvial Deposits of Western Australia.*

NUMBER V.—CONCLUDED.

By T. A. RICKARD, State Geologist, Denver, Colorado.

The water supply of the region comes from two sources, namely, that which has collected amid the purely superficial deposits of debris and drift covering the actual rock surface, and, secondly, that which has penetrated the decomposed rock down to the zone where oxidation ceases.

Wherever a depression occurs the prevailing rocks, granite and diorite, are overlaid with a variable thickness of their own detritus, which allows the collection of rain water and affords protection from too rapid evaporation. These are known as "soaks." At Hampton Plains, eight miles from Coolgardie, a supply of condensing water has been obtained from beds of this nature. During the wet season some of the depressions filled with such accumulations of detritus will receive more water than they can hold, and then the eye becomes gladdened for a few days by the sight of water running over the surface. As it becomes diminished by evaporation it disappears from view, but will be found to linger in the rock holes, where the supply is maintained by the slow drainage of the surrounding porous area. These are called by the aborigines "guamma" holes. The life of such natural wells depends, of course, on the water-bearing depression and upon the relative porosity of the deposit which it drains.

These supplies are in their nature uncertain. The next and more important source of supply is found at the ordinary drainage level of the country, namely, the horizon where the oxidation of the surface ceases and the relatively hard unoxidized rock offers a partial barrier to the free descent of the waters which have percolated through the overlying formation. The depth of this zone will depend upon the permeability of the superficial rock formation; it varies from 40 feet at Earlston to 202 feet at Kalgoorlie. A characteristic section is that given by the well put down on Reserve 3096, Coolgardie, where the Goldfields Water Supply Department sunk 165 feet and found 7 feet of sand, 47 feet of conglomerate and 111 feet of decomposed granite. The water was found at the base of the last, just above the unaltered granite.

Condensers.—Frequent mention has been made of the condenser. This is a characteristic feature of every mining settlement in the interior of Western Australia, and occupies the position accorded to the public well of a European village. Without this process of distillation, which renders the brackish water of the wilderness fit for human consumption, the mining industry could never have progressed beyond the merest prospecting.

The introduction of condensers is traceable to the sailors who took a prominent part in the early exploring expeditions. When the rush to the new goldfields occurred the Government, by erecting condensers at intervals along the main lines of travel, did much to diminish the loss of life otherwise inevitable in times of wild excitement by reason of the recklessness of those who joined the stampede without due care for the great necessity of life in a tropical desert.

The process of converting brine into drinkable water is simple. The salt water is put into a boiler and converted into steam, which is then condensed in vessels presenting a maximum of cooling surface. Ship tanks, having a capacity of 400 gallons, are commonly employed as boilers, and the condensing apparatus is constructed out of the corrugated iron which is everywhere employed for roofing purposes. The tanks used as boilers are usually set on edge in pairs, as shown in Figs. 17 and 18. The average product of each 400-gallon tank is about 300 gallons of distilled water daily. Two vertical short iron pipes draw off the steam, which passes into condensing chambers or "coolers." The latter were originally plain circular tanks, which were increased in capacity by the addition of sections, increasing the height. Sheets of corrugated iron were bent round until the ends met, and these were united by riveting and soldering. Several such sections were united, and a tubular tower about 30 feet high and 3 feet in diameter was the result. The top and bottom were closed by a flat sheet of iron. A 6-inch pipe connected the towers, and steam traveled up the one tower and down the next. (See Fig. 19.)

This type has been superseded of late by annular chambers. An outer corrugated iron cylinder 2.5 feet in diameter surrounds an inner 1.5-foot cylinder, so as to leave an annular space 6 inches wide, which becomes the condensing chamber. No attempt is made to suppiement the cooling effect of the surrounding air, though a brush shelter is sometimes erected so as to ward off the direct rays of the sun.

The daily expenditure includes the labor of two men, one on each shift, and the cost of the fuel consumed. A typical condenser is that erected on the Lake View & Boulder Junction mine, shown in Fig. 20. This plant has a capacity of 1500 gallons of condensed water per day and cost £100. The water treated comes from the mine and shaft and has a specific gravity of 1.03385, the total solids amounting, according to the analyses of Mr. E. S. Simpson, to 4.9308% and the chlorine to 2.3933%. The cost averages, during the cool season, 5 shillings, and during the summer 6.5 shillings per hundred gallons of condensed water. The condensed water is sold at from 10 to 12 shillings per hundred gallons. A first-class condenser would consist of at least eight boilers, each having 400 gallons capacity and a daily output of 300 gallons of condensed water, giving the plant a daily yield of 2400 gallons. The salt water is usually bought for from 2 to 4 shillings per thousand gallons. Fuel costs 20 shillings per cord and is consumed at the rate of one cord per thousand gallons of condensed water. Thus the cost would be:

	Shillings.
2 men at £4 per week of 6 days	27
2½ cords of wood	50
3200 gallons of salt water	10
Total	87

This would be at the rate of 36 shillings per thousand gallons. During November '97, condensed

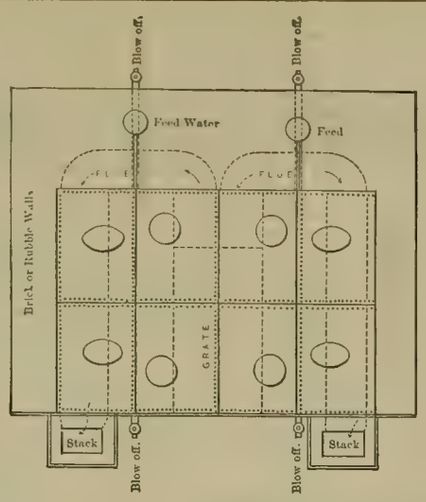


FIG. 17.—PLAN OF ORDINARY CONDENSER.

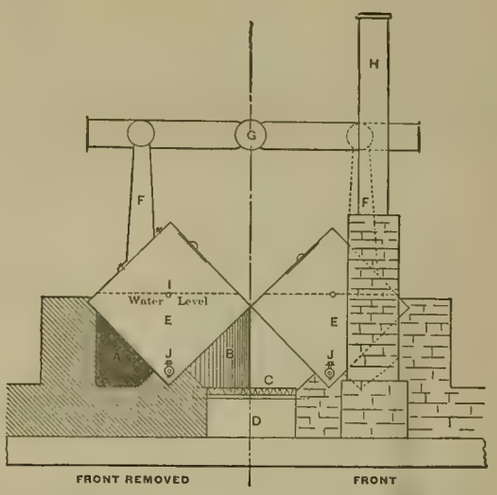


FIG. 18.—SECTION AND ELEVATION OF CONDENSER.

FIG. 19—BUYING WATER AT A CONDENSER.

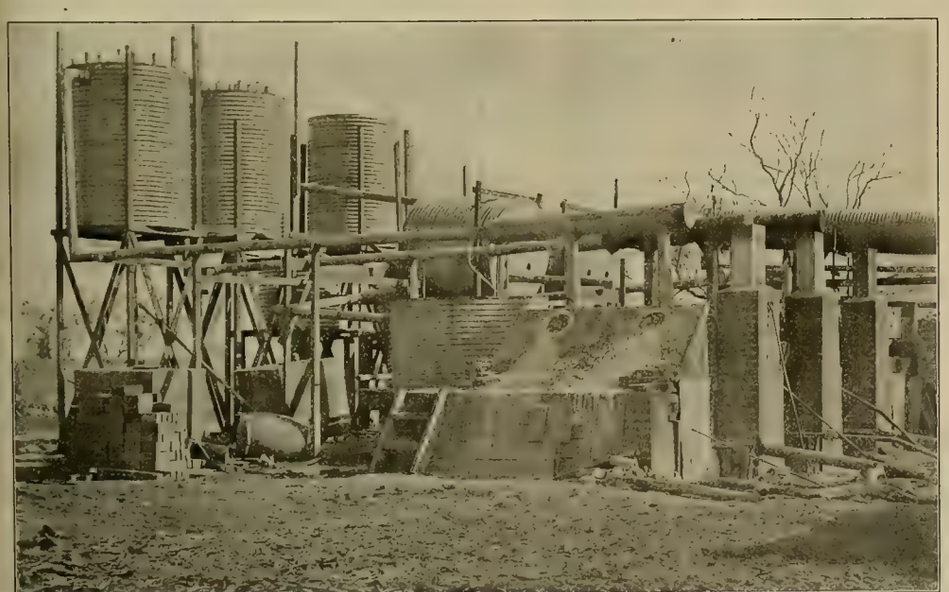


FIG. 20.—CONDENSER AT THE LAKE VIEW AND JUNCTION MINE, KALGOORLIE.

*Condensed from paper read before the Am. Inst. M. E.

water sold for 100 to 150 shillings per thousand gallons.

Concerning the use of salt water in the stamp mills and leaching works of Western Australia, I would say that its density is an obstacle to amalgamation because of the facility with which slimes are created. The finer particles of gold are thus prevented from settling on the copper plates of the tables, and are carried away in the tailings. At Kalgoorlie the cyanide works use the natural brine successfully, its magnesia being precipitated by lime, so as to prevent the decomposition of the stock solution.

In order to aid the development of the mining industry, which is still severely handicapped by the want of a sufficient supply of water, the government of Western Australia has decided to carry out a hydraulic enterprise of great magnitude. It is proposed to supply 5,000,000 gallons of fresh water per day to the Coolgardie goldfield by building a pipe line from the Darling range, where the Helena river will be impounded by a concrete dam 100 feet in height and 650 feet long. The source of supply is 320 feet above level, while the service reservoir at Coolgardie will be on Mt. Burgess, at a height of 1670 feet, or 1350 feet higher. These two reservoirs will be connected by 330 miles of 30-inch steel pipe. Nine pumping stations will be required. The appropriation for this work is $12,500,000. The annual operating expenses will probably approximate $1,600,000, and water will be delivered through a hundred miles of distributing pipes at a cost of 3 shillings and 6 pence, or 84 cents, per thousand gallons.

It will occur to the reader to ask whether boring for artesian wells has been attempted. Yes; in obedience to the public demand the Government put down a bore at Coolgardie which reached a depth exceeding 2000 feet and found—granite. The geological conditions render an artesian flow of water highly improbable. Nevertheless, in this colony, as elsewhere among the arid tracts of Australia, there is a whispered hope of finding a subterranean river. As the Carson and the Humboldt are swallowed up by the alkali wastes of Nevada, so in the desert plains of this southern continent there are many streams which flow into the interior and lose themselves in the sand or find for themselves an underground channel. This occurs in Queensland, where the geological conditions are quite different. Several very successful boreholes have been put down, an abundant artesian flow being obtained at depths of 2000 feet and over. This fact has given rise to conceptions, more poetic than scientific, of a great subterranean river yet to be discovered, and destined in days to come to make the desert break forth into fertility. It is a dream. No irrigation can turn the wastes of quartz sand into waving fields of wheat. Time, geological time, covering a period to measure which the duration of a man's life is an inadequate unit, can alone render the wilderness fit for human habitation.

Hardwood Veneers.

The use of South American rare hard woods is extending into many new fields and uses. The perfection of veneering machinery by which very thin slices of the wood can be cut off at half the former prices enables cabinet and furniture manufacturers to turn out loads of mahogany articles. These furniture articles are what the trade calls "built-up" furniture. That is, they have a core of white pine or other cheap wood, and the surface is then veneered with thin layers of mahogany. Before the veneering machinery was invented all veneers were hand sawed, and they cost considerable; but to-day 75% of the veneers are cut or sliced by huge knives. The sawed veneers are much better than the cut, and they last longer, but for the cheaper grade the cut answers all purposes. The slicer, as the veneer-cutting machine is called, is a costly machine, but it performs its work with wonderful effects. A large mahogany log is put into the powerful grip of the slicer, and as it moves against a rigid knife, which is 17 feet long, the veneer is cut off as evenly as a shaving is sliced from a block of wood by a plane. The whole log is thus sliced up into veneers $\frac{1}{30}$ inch thick. Thus one log may yield several hundred veneers. Sawed veneers are more expensive because not more than ten to fifteen can be cut from an inch of wood. The rest of the wood is lost in sawdust, while in the cut veneers there is no waste at all.

BY his will the late Alfred Nobel, the Swedish dynamite manufacturer, left almost the whole of his fortune to be converted into an international fund for the advancement of scientific research. The bequest, however, was disputed by the relatives of the deceased, and litigation ensued. It is now announced that a compromise has been reached, whereby the relatives receive about $1,000,000 of the property, the balance, amounting to about $7,000,000, being used as designated by Mr. Nobel. This will give, under the terms of the will, five prizes annually of about $41,000 each to persons making the most important discoveries in physics, chemistry, physiology and medicine.

The Crosshead and Bucket in Vertical Shafts.

Written for the MINING AND SCIENTIFIC PRESS.

When sinking in vertical shafts or, as is often the case in small mines, ore and waste are hoisted in buckets from the several levels through a vertical shaft, the work is greatly facilitated and the likelihood of accident reduced by the use of guide rails and crosshead. These cost but a small sum for lumber and placing in the shaft—about 10 cents per foot—and afford such additional security as to make them desirable regardless of the expense. The guide rails may be made from selected pieces of 3x4-inch scantling, cut in lengths to take in three full sets of timber, each set of guides meeting at the center of the wall plates and dividers. They should be planed and straight. The guides can be best secured to the end plates and center piece of the shaft by 6-inch lag screws, counter-sunk below the face of the guide. It is not necessary that the guide rails should be let into the shaft timbers, but will be perfectly safe if properly secured as suggested. The ends of the guides may butt flush or may be made additionally secure by cutting a tongue and groove in the ends, having a lag screw both above and below the joint, as shown in Fig. 1.

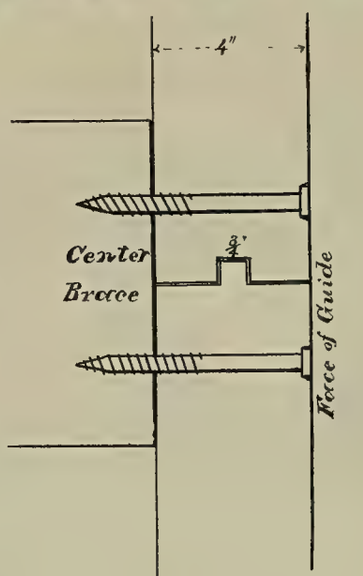


FIG. 1.

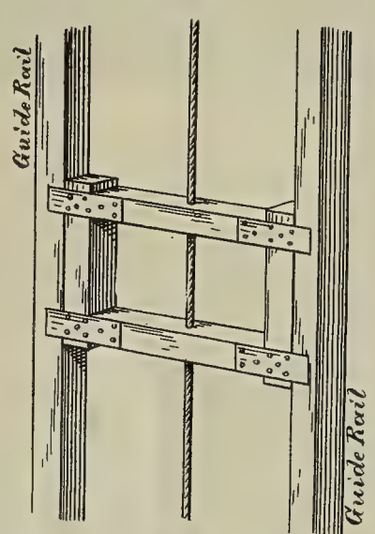


FIG. 2.

The crosshead (Fig. 2) should be built of 3x4-inch scantling, mortised and firmly bolted. Its width should equal the distance between the guide faces, allowing sufficient space for free movement. For instance, in a shaft 4 feet across the compartment the guides will take up about 7¾ inches of the space, after planing. The crosshead frame should then be 39¾ inches wide. The corners, top and bottom should be beveled to obviate the likelihood of catching slivers of wood or slight obstructions. The crosshead should have a depth of not less than 24 inches to secure steadiness when in motion, and the faces may be shod with iron plates which lap around the sides of the guide rail, or flat iron plates may be screwed to the sides of the crosshead frame, extending 3 inches beyond the frame, so as to inclose two sides of the guide rails. The crosshead is secured to the cable by use of wooden wedges, driven sufficiently tight to prevent slipping under all ordinary conditions, yet not so firmly as not to permit the crosshead moving in case of overwinding, serious consequences from which the crosshead is quite sure to prevent. To insure against the crosshead dropping upon the bucket, thereby injuring workmen or causing other damage, a "stop" in the form of a short piece of cable secured by clips may be placed upon the rope 8 feet above the bale of the bucket, out of reach of the men. The crosshead should be fastened not less than 10 feet above this stop, which will afford a good run in case of accident—overwinding, etc. Often the timbers in a shaft do not extend nearer than 15 to 20 feet from the bottom, unless the character of the ground be such as to require that it be carried down close, but placing the crosshead as above suggested admits of having the bottom of the guide rails about 20 feet above the bottom of the shaft. A sufficient factor for safety should be allowed, so that it will be impossible for the crosshead to drop clear of the guide rails. Near the bottom of the shaft it will be found desirable to use short sections, which are replaced by the long permanent guides when a sufficient distance has been made in sinking.

The use of the crosshead requires a higher gallows-frame than where no such device is employed, but it will be found an economical investment in the long run.

Small Reservoirs.

The proper way to irrigate small tracts of land is to do it from a reservoir. One cannot do much with a small stream of water and it will not pay to have a large plant and put it in operation for a small tract. A small pump can be kept in operation all the time cheaper than a large one occasionally. A reservoir should be built on the highest part of the tract sought to be irrigated and a small engine set to work filling it. The reservoir is built by scraping the earth from the outside and, of course, from such a large area as not to affect the utility of the land from which it is taken. With a levee all around 5 feet high 4 feet of water could be carried safely. The slopes ought to be two to one on the inside. A reservoir 20 feet square and 4 feet deep would hold 12,000 gallons. With the slopes as above the reservoir should be measured 2 feet from the bottom, or half way up the 4 feet of water; consequently to lay out a reservoir to hold 12,000 gallons put the stakes 12 feet square and build. For any other sized one take 8 feet off the same as in this. A reservoir 25 feet square will hold 18,750 gallons and would be 17 feet square at the bottom; one 30 feet square would hold 27,000 gallons and would be 22 feet at the bottom; one 35 feet square—27 at the bottom—will hold 36,000 gallons; one 40 feet square—32 on the bottom—will hold 48,000 gallons. Almost any of the land on the river or out on the plains will hold water with a little puddling. The cheapest way to puddle is to build a pen the size of the intended reservoir, including at least a portion of that to be under the embankment, wet it very wet, put some hogs in the pen and keep feeding them a little barley at a time, so as to make them not only walk around but root for the barley. A half sack of barley fed to eight or ten hungry hogs in half a day will make a good puddle. (This is about the only way a hog can be made to do useful work!) This could be tried and if it did not work satisfactorily the water could be taken off and the bottom covered about an inch deep with coarse sand mixed one part to five with Portland cement, put in dry, and let it be covered slowly. A barrel of cement may be counted at about 4 cubic feet and with the mixture above would cover the first-named reservoir about 1¾ inches. This would make it "jug tight." The supply pipe should come up from the bottom, so that the lift would never be more than the height of the surface. The cheapest power is of course the windmill, but for many purposes it is not reliable enough. Next to this is the small gasoline engine.

THE English torpedo boat, the Turbinia, credited with a speed of thirty-five miles an hour, may be surpassed by an American inventor, L. H. Towns of College Point, L. I., who announces the building of a boat that will go forty-five miles per hour. The new boat is to be 70 feet long, 7 feet wide, fitted with a 1000 H. P. carbonic gas motor; the engine, with three cylinders, to have a working pressure of 2000 pounds to the square inch, and, as there will be no boiler, and all the tubing is under the floor, no unnecessary space will be occupied by machinery. The engine is to be an upright one, with the piston action up from the cylinder.

THE restrictions placed upon California hydraulic mining resulted in the creation of a system of recovering gold from the old river channels which is known as drift mining. By this method long galleries are driven along the bedrock in the gravel and the gold bearing material extracted where it is richest—along and near the bedrock. This method of mining has proven very profitable in many cases and it has some features which make it a very desirable method. The environments of hydraulic and drift mines are very important considerations in determining the amount of capital necessary to accomplish a definite result.

Mining Summary.

ALASKA.

It is reported that not less than 3000 men will be at work in the Porcupine country this summer. Porcupine includes Clear Creek and Akkuk Lake country, and is on the American side of the boundary. Quartz veins are being located in the district.

Juneau has a sampling works for testing ores.

Americans are still rushing into the Atlin Lake country regardless of the Exclusion Act.

Another strike has been made driving a tunnel between the Bald Eagle and the Sumdum Chief mines at Sumdum. A rich ledge was struck.

Juneau *Mining Record*: The Gold Commissioner for Atlin Lake district has issued an order that all claim holders must be on their claims by April 1st.

ARIZONA.

(Special Correspondence).—Mining in northwestern Mohave county is increasing, and many sales have been consummated since the advent of '99. Chloride is now the most active and prosperous camp of this part of the country. The two prominent lead mines are the Elkhart and Tennessee. Both have large mills running and are shipping quantities of good lead ore. The Elkhart is owned by a Scotch company and the Tennessee by a Los Angeles company.

A valuable silver mine is the Distaff, owned by C. E. Sherman. It is being worked now by leasers, who are shipping high-grade ore.

The Merrimac, lately sold for $9000, is working a force of men and producing high-grade ore.

The Mollie Gibson, together with two adjoining claims, was sold in February for $17,000 to an Eastern company, which is preparing to erect a concentrator, boarding house, etc., and develop the property.

The copper mine owned by John and Kean St. Charles is being negotiated for.

Among the other mines working are the Tintic, Juno, Minnesota and Connor, owned by J. Barry, and the Rainbow, West Virginia, Lucky Boy, Conova and others, which are being worked by owners and leasers.

Other valuable and working mines are situated at White Hills, Mineral Park, Todd Basin and Cerbat.

Mineral Park, March 22nd, '99.

The lead mines of Castle Dome, on the Colorado river above Yuma, are being worked by E. F. Sanguinette of Yuma.

Yuma *Sun*: The King of Arizona Co. near Yuma is putting in a 100-ton cyanide plant and is prospecting for water in the valley. They propose to sink a well 2000 feet deep, and if sufficient water is not found a pipe line from the river will be put in.

Prescott *Courier*: A strike in the Hassayampa district is reported of a ledge 1 foot wide which assays $300 to $750 per ton gold, and twenty-six ounces silver. The mine is the Tip Top, owned by Shull & Phillips of Prescott, who own the Orphan Girl, the first extension of the Tip Top.

CALIFORNIA.

Amador.

Amador *Record*: The Lincoln shaft is down 862 feet and sinking at the rate of 10 to 12 feet a week. The shaft will be sunk to 1200 feet before opening up new levels. A crosscut is being run north at the 500 level. Twenty-three men are employed.——Supt. F. Walker started up the Reward mine, near Pine Grove, last Saturday, and is taking out the water and driving the tunnel.——In the same district D. Fisher is removing a hoist from the Wieland to the Spagnoli mine.

Amador *Dispatch*: The miners sinking the shaft in the Central Eureka mine are credited with having deepened the shaft over 50 feet a week.

Calaveras.

Amador *Record*: The Gwin mine has let a contract to the Union Iron Works of San Francisco for a 40-stamp mill.

Calaveras *Prospect*: The Jupiter gravel mine at Dogtown is working twenty-five men. ——The work of unwatering the Carson Creek mine, five miles south of Angels, is nearly finished and work will commence soon.

Angels *Echo*: A. Lee of Angels has been awarded the contract to build a 125-stamp mill on the Melones mine, at Robinson's Ferry.

Echo: It is the intention of the company having the Bald Hill mine, 2 miles south of Angels, under bond to put the main shaft down to 500 feet. The present depth is 120 feet.——Twenty men are employed on the Fox mine at Angels under the superintendency of T. Fleming. It is said a 40-stamp mill will soon be built.——J. Lotre of Italian ranch will place a 4-stamp mill on his mine on San Antone creek. It has been constantly worked for the past two years and is well developed. ——The Round Butte gravel mine has started up since the rain.——Campbell & Elliott discovered a quartz lead about 2 feet wide on the San Antonio ridge two miles from Sheep Ranch.——The cleanup at the Rose Hill mine near El Dorado proved satisfactory. L. Emery, owner of the property, has ordered new steam machinery for the mill. The rains have assured a supply of water for other power. They have spent $60,000 in repairing a reservoir and ditch and laying pipe to bring water to the mine. The water will be used for power and also for hydraulicking a large tract of placer land in connection with the Rose Hill property. Mr. Emery is erecting a large building on the road about one and one-half miles from El Dorado.——The Alpine and Extension mines, recently bonded to the Rose Hill Co. for $20,000, are being developed.——The Martha mine, an extension of the Ritter, near El Dorado, is being prospected. Development shows 600 feet of lead having an average width of 2 feet.——It is reported the Live Oak mine, owned by Tiscornia & Co., was recently bonded.

Del Norte.

(Special Correspondence). — San Francisco capitalists are running a tunnel several hundred feet long on the property of the Jones Creek M. Co., prospecting with a view to purchasing.——Gates & McMurray have put men to work on the old Union copper mine. They will ship ore to San Francisco.——Bailey & Chase are at work on their copper claims on Smith river, getting out ore for shipment to San Francisco.——Parties from San Francisco have located copper claims on Shelly creek, near the State line, and are getting some fine gold for shipment.——Grider & Deitrich are developing their cinnabar property on Diamond creek. They also have some very rich copper prospects in the same locality.——Mangum, Booth et al., of Grant's Pass, Or., have located several hundred acres of placer ground on the Siskiyou Fork of Smith river. ——Jenkins Bros. & Lewis are now running their arrastra on Myrtle creek. They have a prospect of developing a paying property, having free milling ore that assays from $13 to $150 per ton. This is the first systematic effort at working quartz made in the county. ——The late rains have insured sufficient water for a long season in operating the placer mines on Smith river and its tributaries.

Myrtle Creek, Cal., March 20th, '99.

Del Norte *Record*: J. Holloway recently brought into Crescent City from the South Fork of Smith river, as a result of twelve days' run, $50 in gold, mined by himself and partner. A shortage of water prevents steady work and big results.——J. Murray has gone with a crew of men to develop the Union copper mine at Low Divide.

El Dorado.

Mountain Democrat: The Crown Point mine is in operation again.——Numerous claims are being located in various parts of the county. ——The El Dorado Power Co. has been incorporated, for the purpose of supplying mines and other industries with power.

Fresno.

(Special Correspondence). — The mineral belt extending southward from Mariposa county through Madera enters and continues through Fresno county and is characterized by the same class of mineral veins. The formation is mica schist and granite, the ores usually high grade. There are also ancient river channels in this county, similar to those farther north in Calaveras and Tuolumne and capped with lava, and although good prospects have been obtained in gulches heading up in these old channels very little has been done to test the channels themselves. This kind of mining is not understood in this section and consequently is given no attention. There is abundance of timber and water and good fall, in fact, every condition to assist in the economical handling of these channel mines. No one can say they will not pay for the reason that no one has ever given them a trial.

Pollasky, March 24th, '99.

Inyo.

There is a wide field for the prospector in this county. The mines include gold, copper, silver and lead. In early days, when conditions were more unfavorable than now, mines were successfully worked here. Considerable prospecting is now going on near Darwin and in other localities with encouraging results.

Kern.

J. H. Underhill of the Butte mine at Randsburg has sold his interest in the property to W. H. McEwen of Los Angeles. The mine is credited with a production of $130,000.

Veins containing gold, silver and copper have been located near Red Rock.

Randsburg *Miner*: The Little Butte mine is taking out some rich ore and the outlook for that company is better than for some time past. They have paying ore in nearly all their levels.——The Yellow Aster Co. is putting up a large oil tank made from ¼-inch iron at the end of the track in Johannesburg. It is to be 12 feet high by 21 feet in diameter and will hold over 35,000 gallons. The oil will be pumped from the tank to the tank at the mill.

Los Angeles *Times*: In Fiddler's Gulch, at Randsburg, is a 15-foot ledge of ore, all of which prospects.——Out toward the Black Hawk, M. P. Minor is getting ore from the Golden Glance mine, and there are three or four additional properties that prospect well. ——Atkinson, on the Sunshine, recently milled five tons which went $200 per ton.——The new mill at the Black Hawk is ready to run. Their pipe line is in and the water connection made. This mill was formerly at Cuddaback lake.——In the Slate Range there is activity among miners and a number of prospects are being developed. Pridham & Quinn of the Eureka mill have associated E. M. Dineen with them and have removed their cyanide plant to Montgomery's, in Pleasant canyon, about four miles above Ballerat, in the Panamint country. There is a pile of tailings estimated to contain $20,000, after working which there are several other piles in that neighborhood to work. Their stamp mill will remain in Randsburg, to which place their cyanide plant will be returned after the work is finished at Panamint.——There are a number of good houses going up at Randsburg. Among them the Miners' Union is building a hall, 30x70 feet.

Lassen.

The rich strike in one of the Hayden hill mines will stimulate prospecting in this county and new discoveries may be looked for. There are also gold-bearing gravel deposits in the county, to which little attention has ever been given.

Los Angeles.

Four miles up the valley from Acton station is a quartz vein nearly 100 feet wide on which only superficial work has been done. The rock is gold-bearing.

The occurrence of an ancient gravel deposit, said to be a river channel, containing coarse gold, on Mount San Antonio, at an altitude of more than 8000 feet, furnishes a subject for geological investigation. The placers have been worked each spring for many years with good results.

The New York mine, near Acton, which was steadily worked for years, it is reported, will be reopened.

A recent run at the Red Rover mill yielded $1300 from 115 tons of quartz. The quartz in these mines—the Red Rover, New York and Old Topeka—is white fine granular and contains a low percentage of auriferous iron sulphide. Gold is rarely seen in the rock. The values run quite evenly from $10 to $15 per ton.

The discovery of a 5-foot vein of quartz which assays $6 per ton is reported from Calhuenga pass, north west of Los Angeles.

Mariposa.

Wolframite (iron tungstate) is said to occur about twenty miles south of the town of Mariposa, near the old Buchanan copper camp, and not far from the Chowchilla river.

Zinc ores occur in considerable quantity in the mines on Mt. Raymond, five miles east of Fish Camp. These mines were operated about ten years ago, and a large concentrating plant and wire tramway built. After a short run the mines were closed down, probably because the zinc predominated over the lead. The ores also contain silver. The ore bodies are large and occur in diorite. The development is superficial, consisting of several open cuts and short tunnels run from them. No systematic development has ever been undertaken. These deposits lie in the belt which runs along near the crest of the high Sierras, and of which but little is known, being opened at only a few points.

Nevada.

Grass Valley *Union*: The machinery has been ordered for the mill to be erected on the St. Patrick mine, which will arrive when the roads get better.

Nevada City *Herald*: Operations have been resumed at the Bullion mine, Grass Valley. Supt. G. Mainhart, who is an owner in the mine, has organized a new company.

Nevada City *Transcript*: The shaft of the Old Home, at the Kirkham place, Blue Tent district, is down 325 feet. At 350 feet another level will be started on the ledge and sinking continued. For 50 feet the shaft has carried the ledge, which is ochre, varying from 6 inches to 2 feet in thickness, having defined walls and carrying free gold. This is believed to be a continuation of the shoot which the Kirkhams worked fifteen years ago and which escaped them through a fault in the vein. There is a 5-stamp mill on the mine, and Supt. Logan expects to start next month and keep it running steadily.

Grass Valley *Union*: The Delhi at San Juan and the Live Oak at Columbia Hill are to resume operations.——The shaft of the Old Home mine at Nevada City is down 350 feet. Another level is to be started and sinking continued.

Orange.

There are coal indications at numerous places in the canyons back of Santa Ana, and coal has been mined in several veins, but nowhere on a large scale. The coal is lignite of rather inferior quality. It occurs at about the same geological horizon as the large deposits at the Chaney mine, near Elsinore, in Riverside county.

Placer.

The Morning Star M. Co., whose property is at Iowa Hill, have declared a $2.50 dividend, No. 100. It is the smallest paid for a long time. There are 100 men on the payroll.

Herald: San Francisco capitalists have bonded the copper property near Cooperstown. ——The Drummond mine, near Forest Hill, is to be started up again.——The Mayflower mine, near Forest Hill, has commenced hydraulicking.——The tunnel of the Alta mine, near Alta station, is now nearly 5000 feet long.

Grass Valley *Union*: The 5-stamp mill at the Red Stone, Blue Canyon, is running steadily.

Colfax *Sentinel*: Some fine looking quartz is being taken from the tunnel at the Azalea mine west of Blue Canyon.——The Van Avery quartz mine at Blue Canyon will resume operations soon.——The flood in Bear river caused by the recent rains has carried away the sluices, concentrator and other machinery of the Bear River Hydraulic Co., two and one-half miles north of Colfax.——Two years ago the United States Debris Commission granted fourteen permits to mine by the hydraulic process in Placer county. Only one of the mines, the Polar Star at Dutch Flat, has been able to run owing to scarcity of water. The recent storm will give nearly all of these mines a couple of months' run.

Riverside.

Old river channels are found in the hills southwest of the town of South Riverside, several hundred feet above the valley. Whether the gravels are gold-bearing or not has never been determined.

A nugget was discovered by some Mexicans who are working the placers on the desert near Virginia Dale. It was purchased by the San Bernardino Bank for $174. The district where the nugget was found should be a profitable field for the dry washer, for the hills are ribbed with gold-bearing veins.

San Bernardino.

(Special Correspondence).—The Gold Chief mine, six miles west of Manvel, and owned by R. Yound and others, is reported bonded. The property has considerable superficial development, and is an interesting one, geologically, being a large bed of quartzite, conglomeritic in part, and is gold-bearing. In many respects it resembles the Mountain Gold mines, sixty miles east of Victor in this county, on which at one time E. J. Baldwin of San Francisco built a 40-stamp mill.

Manvel, March 27th, '99.

C. A. Stilson and J. M. Hale are working the Gold Bronze mine at Vanderbilt, shipping their ore.

The Copper World mine, near Valley Wells, has a smelter in successful operation, producing 14,000 pounds of copper daily.

There are large bodies of low-grade copper ore in Mescal district, west of Ivanpah, and a few miles west of Vanderbilt copper ores are found in veins in granite.

Randsburg *Miner*: At Tecopah, near Resting Springs, Los Angeles parties are preparing to remodel and start the old smelter. This is a lead-silver camp. There are two big ledges with several claims on each.——Quinn & Dineen have their cyanide plant in operation in Pleasant canyon.

San Diego.

The Gold King mill, at the foot of Banner grade, is crushing ore from the Elevado mine, a mile southeast of Banner.

Years ago a 10-stamp mill was taken into the Oro Flamme canyon, east of Stonewall, and it is doubtful if it is ever removed. Some of the machinery was let down the steep hillside with ropes.

A prospector who went out into the Salton basin after a fruitless search of weeks made what he thought was a discovery of anthracite coal, and brought in all his pack animals could carry. It was black obsidian.

Yuma *Sun*: L. Auberry of San Diego has commenced erecting a 50-ton cyanide plant on a dump of tailings in the Picacho district, on the river a short distance below the old pumping plant. The dump is large enough to keep the plant running steadily for at least six months. The tailings are from the old Jaynes mines, which were worked years ago.

Shasta.

Redding *Searchlight*: The Sam Houston mine at Old Digging, adjoining the Texas, Con. was flooded by recent heavy rains and work had to be temporarily suspended.

Sierra.

Nevada *Transcript*: The Columbia Con. channel mine, owned by F. & W. E. Sharon and J. Harper, in what is known as the Henness Pass Ridge, will increase its operations. There is a 250-foot tunnel on the property, which will be extended to the channel. Waldemar Lindgren, United States Geologist, regards the Henness Pass as one of the largest intact gravel channels in California. It would have received the debris from the Sierra Buttes and other rich quartz mines.

Mountain Messenger: The North Fork Co. are in paying gravel. Thirty-five men are employed.——Men are at work on the Lucky Dog mine and the force will be increased.——At the Kenton mine on Kanaka creek, near Alleghany, twenty men are working. The mill is running also.——Lewis & Fessler own the El Dorado quartz mine near Alleghany. High-grade quartz is found in pockets.

Siskiyou.

There are in this county numerous good mines from which the loss in tailings is considerable. Only a few mills are equipped with concentrators; the cost of transportation and reduction is almost prohibitory. Chlorination or cyanide works are needed.

Yreka *Journal*: The Commodore Quartz M. Co., running a tunnel to tap the ledge at Barkhouse, Klamath river, expected to strike the ledge before now, and probably would but for its dipping further back into the hill at lower depth.——The Greenhorn Blue Gravel mine paid a dividend of 12½% recently from two weeks' work, net profit. The gravel yielded $250 a day, and double that amount Sundays, when all riffles are taken up. The mine is in charge of L. J. Wetzel.——The miners in the high and dry gulches have been doing work lately, securing sluice heads of water from the melting snow on the mountains, in addition to the rains. The hydraulic miners are rushing work with energy, having abundance of water to operate giants.——A. Steele, working the Ruwe claim at Cherry creek on shares, dug out a nugget recently weighing $34.

Yreka *Journal*: The Seattle Co., which purchased the Cape mine, on Greenhorn, from F. LeMay, received a quartz mill from San Francisco recently. There are several rich ledges on that creek and at other points around Yreka.——The Yreka M. Co. has been running their mill at Salmon river with a large force. The work at present is principally in developing.

Tulare.

Porterville *Enterprise*: J. McDonald, the principal owner of the Keystone mine, in Amador county, has bought the Minnie Ellen mine, eleven miles from Porterville, on the Halbert ranch, south of Deer creek, for $23,000, with an option for four months, during which time $3000 is to be paid Cook & Halbert; $1000 was paid down. Men will be put to work mining the rock, which will not be moved away unless the mine is taken. A stamp mill will be put in to test the rock.

Trinity.

Since the recent rains a large number of gravel mines are at work about Weaverville and the Trinity river is said to be lined in places with sluice boxes. On Nigger hill Mr. Lewmen has several miners at work.

Trinity *Journal*: The Indian Creek M. Co. is at work with a full crew.——Wm. Morris has struck pay dirt in his mine. The reservoir broke one day last week, sweeping flumes, etc., away. It will take some time to repair the damage.——La Grange Co., on Owen Gulch mountain, has expended a large amount of money in preparation and in securing water supply. Within two years it has driven a tunnel through Stuart's Fork mountain, a mile and a half, turning Stuart's Fork into Rush creek. A pipe line conducts the water for a good portion of twenty miles. The company owns or controls hundreds of acres of mineral land.

Tuolumne.

A vein of quartz rich in gold was discovered on the Barron ranch a mile and a half southwest of Soulsbyville in sinking a well. The soil and clay were nearly 25 feet deep.

The Columbia Tunnel & Exploration Co. have sunk several bore holes ranging from 100 to over 200 feet in depth. The site for the

proposed tunnel has not yet been determined upon.

The pump of the Bonanza mine in Sonora is unwatering the 1100 feet of incline and workings below the tunnel level.

R. M. Mein, E. A. Ogden and others have formed a company and bought the Mountain Belle, north of the Soulsby mine, which they propose to develop. The Soulsby mine is worked to a depth of 800 feet and is credited with the production of $6,000,000.

Independent: The mills of the Rawhide and App mines are running by water power.——The Crystalline group is preparing to start up with a large force of men.——J. Ferguson's 2-stamp mill in Sonora is running on ore from the pocket mines at Bald Moudtain.——A number of the large mines are using coal in place of wood.——The mill of the Bonanza mine is running.——The Alabama mine, near Jamestown, will start up soon. J. Gurrins is Supt.——C. L. Wilson of San Francisco has been inspecting the Belleview mine in the eastern belt with a view to purchase.

Union-Democrat: A gold chispa worth $35 was picked up on Washington street, Sonora, recently, and much of the metal in smaller nuggets was found, and many of the old dumps, washed clean by the rains, have proven little mountains of treasure.——Negotiations are under way for the purchase of the Bell mine, near Tuttletown. It has a shaft 400 feet and three crosscuts made, showing the body to be 50 feet wide.

COLORADO.

Commissioner Lee furnishes the following:

COUNTY.	GOLD, 1898.		SILVER, 1898.	
	Fine Ounces	Value.	Fine Ounces.	Value.
Arapahoe..	34	$ 702 78	7	$ 4 08
Archuleta..	7	144 69	40	23 30
Boulder....	28,128	581,302 41	91,432	53,259 14
Chaffee.....	11,008	227,535 36	85,278	49,671 52
Clear Creek	29,235	605,527 65	1,569,012	913,949 49
Conejos.....	888	18,354 96	29,777	17,345 10
Costilla....	267	5,518 89	993	578 42
Custer.....	35	723 45	24,319	14,165 82
Delta	28	578 76	16	9 32
Dolores.....	4,271	88,281 57	463,346	269,899 05
Douglas....	6	124 02	.....	.....
Eagle.....	1,479	30,570 93	70,783	41,231 10
El Paso..	653,476	13,507,348 92	67,799	39,492 92
Fremont...	421	8,702 07	1,270	739 78
Garfield....	.....	.....	.....	.....
Gilpin	95,961	1,983,513 87	305,687	178,062 68
Grand	39	806 13	11	6 41
Gunnison ..	3,919	81,055 73	152,800	89,006 00
Hinsdale...	2,481	51,282 27	186,456	108,610 62
Huerfano ..	7	144 69	40	23 30
Jefferson...	89	1,839 63	102	59 42
Lake.....	100,292	2,073,035 64	7,068,727	4,117,533 48
La Plata....	1,470	30,384 90	4,348	2,532 71
Larimer....	540	11,161 80	60	34 95
Las Animas	6	124 02	.....	.....
Mineral	2,244	46,383 48	4,177,184	2,433 209 68
Montrose...	131	2,707 77	6,290	3,663 93
Mesa.....	8	165 36	20	11 65
Montezuma	400	8,268 00	871	507 36
Ouray.....	41,246	852,554 82	1,420,330	827,342 23
Park.....	7,716	159,489 72	198,711	115,749 16
Pitkin	3,435	71,001 45	3,977,270	2,316,759 78
Rio Grande	180	3,720 60	1,568	913 36
Routt.....	617	12,753 39	2,173	1,265 77
Saguache ..	952	19,677 84	2,618	1,524 99
San Juan...	54,794	1,132,591 98	1,048,499	610,750 68
San Miguel.	76,085	1,572,676 95	2,129,082	1,240,190 27
Summit.....	16,634	343,824 78	415,687	242.137 68
Total	1,138,584	23,534,531 28	23,502,601	13,690,265 15

A Telluride, Colo., despatch says the Calumet & Hecla people have bought the Smuggler Union mines for $2,000,000.

BOULDER COUNTY.

At Puzzler over 100 men have been shovelling snow on the railroad that the mines might resume operations.

Development work on the St. George mine at Sunshine, begun last November, has continued.

The Ward Pyritic Smelter Company has contracted for the grading of ground for the new ore house addition to the smelter. This house will be 125 by 30 feet.

The Leviathan tunnel at Ward is now 200 feet deep.

The Dolly Varden at Sunset is getting out smelting and milling ore. The latest shipment showed a balance of $6 a ton after deducting hauling and the mill charges.

Denver *Post*: E. Thompson has received $75,000 from Springfield, Ohio, for the development of the Poor Woman mine at Sunset. A 1,000-foot shaft will be sunk.——The Evening Star at Sawmill hill, Ward district, has a streak which runs $30 per ton in gold.

Ward *Miner*: John Duncan has disposed of eighteen claims to the Columbia Mines Company.——The McDonald brothers of the Texas mine had twenty-five tons of ore run through the Giles mills this week.——A shipment of 4,800 pounds of ore made by leasers on the Ward-Rose, taken from the 200 east level, returned 7.20 ounces in gold.——M. Fishback has removed the steam hoist from the Chatham mine to the Honest John and sinking will be commenced.——The Newmarket Mining Company will run the 500 level several hundred feet west, and may sink the shaft 100 or 200 feet deeper the coming season.

Mining Record: The Boulder County mine at Caribou is working thirty-two men and there 1,500 tons of ore waiting for the Nederland mill to start up.——Preparations have been completed for the sinking of the Honest John shaft, at Ward, another 100 feet.——The Rip Van Dam tunnel is being driven, and the prospects for a strike are good.

CLEAR CREEK COUNTY.

The development of lodes within the townsite of Empire has commenced.——The discoveries made during the past season in mines that had lain idle for years will lead to increased prospecting of that class of mines when the winter passes. The success in the Silver Mountain and Empire City mines, with little labor and little capital, has created a demand for lease and bond of the producers of former times.——A find is reported in the breast of the lower adit of the Cleopatra mine, owned by P. Schnarr. Leasers have been extending the workings, and at a depth of 300 feet have almost solid ore, 3½ feet, and carrying $90 in gold per ton.

Silver *Standard*: It is reported that work on the Newhouse tunnel, at Idaho Springs, is to be resumed.——The new hoisting engine at the Corry City is acting satisfactorily and will be employed several days in handling the ore which has been taken out since the other engine was disabled. This is the second gasoline engine installed in this camp, the other being on the Frostburg.

Georgetown *Courier*: The Mt. McClellan M. Co. has sold its property, comprising the Stevens and Huckleberry groups—twenty-eight patented claims and six millsites—at the upper end of Clear creek, to C. K. Wolfe, H. Seigfried and J. H. Robson of Georgetown. The mines have produced over $2,000,000. The ores contain gold, silver and lead, and some of it is rich.

Gazette: The Atlantic mine at Empire will soon start up. The main shaft is 300 feet deep with levels every 75 feet, all in ore.——The Doric tunnel at Georgetown is now driven by two shifts.——Balotto & Co., have opened high-grade ore in the Smuggler, a mill returning 230 ounces of silver per ton.

EL PASO COUNTY.

It is currently reported at Colorado Springs that W. S. Stratton has sold his Independence mine to an English syndicate for a large sum, and that Mr. Stratton has gone to Europe.

Denver *Mining Record*: In cutting a station on the ninth level of the Portland at Cripple Creek a large flow of water was struck, which flooded the lower portion of the mine nearly to the eighth level.

Victor *Record*: The output of the Modoc mine at Altman for the month averages about a car daily, low grade.

FREMONT COUNTY.

Denver *Mining Record*: A one-half interest in the Copper King mine at Dawson, near Canyon City, was sold for $20,000 to T. C. Myers of Colorado Springs. Fifteen men will be put to work constructing a road to connect with the chute of 300 feet, this in turn connecting with the ore bins at the mine. Three shifts of six men each will drive the upper tunnel, and one eight-hour shift of two men will break ore.

GILPIN COUNTY.

Denver *Mining Record*: The Perigo mine, in the north end of the county and three miles from Phœnix, employs forty men, producing 150 tons per day. They have a 30-stamp mill. E. Stephenson of Boulder has contracted to sink a winze on the mine.——On Gamble gulch, in the Gold Dirt mine, lessees are cleaning out the drifts and shafts preparatory to putting on a large force. The working shaft is 500 feet down, and it is proposed to sink it to 1000 feet.——J. K. Brooks, one of the lessees on the Lone Star group at Perigo, is in Denver arranging for machinery for the Lone Star shaft. The ore at the bottom of the 175-foot shaft is very rich in gold, running up to thirty-seven ounces.

GUNNISON COUNTY.

Pitkin *Miner*: The ore houses of this district are filled with ore ready to be shipped and no way to get rid of it until the roads are opened again.

HINSDALE COUNTY.

Lake City *Times*: The Golden Wonder mine is a regular producer. It is stated that the ore shipped since the present leasing company took it has averaged $40. An 18-inch streak of $60 ore has recently been encountered in the drift in the bottom of the winze.

LAKE COUNTY.

The two pump men confined by the cave in the Bon Air shaft were rescued on the night of March 24th, after an imprisonment of thirteen days. A winze was sunk 200 feet to effect a rescue.

G. W. Cook, at the Garden City mine in California gulch, Leadville, promises to make of it the leading manganese producer. At present Mr. Cook is putting in place his new machinery, which includes a small pump to handle the water flow, as well as a large hoist. By the 1st of April both the Garden City and the Catalpa-Crescent will be hoisting the largest tonnage of manganese iron ever produced in their history and this tonnage will be kept up throughout the year in order to fill the big contracts made last month by Mr. Cook.

At the Moyer shaft of the Iron-Silver, Leadville, shipments have varied from 150 to 200 tons per day.

In this same vicinity the A. Y. & Minnie property, operated by lessees, owing to the bad roads, has been compelled to reduce its tonnage. The shipments from this combination have been averaging 1500 tons per month. In addition to shipping, about 350 tons of fine lead ore is the output.

Leadville *Miner*: Another strike of gold ore has been made on the Lime claim, on the south slope of Iron Hill, by lessees working with a windlass.——J. Beach has a lease on the north end of the Robert E. Lee mine, on Fryer Hill, and expects to find large bodies of iron ore. The mine was famous in earlier days for the masses of horn silver it produced.——On the Ground Hog mine, at Battle mountain, twenty-eight men are employed.

LARIMER COUNTY.

Denver *Mining Record*: A new strike of peacock copper ore has been made seven miles back of Fort Collins. The Empire mine in this district has a tunnel 130 feet on the vein and a shaft 80 feet. The formation is granite. The district is quite extensive, but little prospecting has been done. The ores are mostly sulphide copper, containing gold and silver.

ROUTT COUNTY.

A strike is reported to have been made in the tunnel of the Sunset claim on Yellow creek on the western slope of the continental divide near Steamboat Springs. It is a high-grade copper ore 20 inches in width.

In the Four Mile district the Rock Springs M. Co., Robert Nicholson & Co. and the Gold Valley M. Co. are making preparations to be ready to begin washing gravel by April 1st. The Gold Valley M. Co. will be able to run day and night. This company will employ fifty men.

The Hahn's Peak Placer Co., on the south side of the peak, near its base, will commence washing April 1st. Mgr. McFadden is in Denver. Forty men will be employed, with wages at 25 cents an hour.

SAN MIGUEL COUNTY.

Telluride *Journal*: A rich strike is reported from the Jim Corbett mine in Saw Pit. The ore was first encountered in a kind of cave, from the sides of which were taken some of the handsomest lime crystals and stalactites ever exhibited in Telluride.

SUMMIT COUNTY.

Denver *Mining Record*: The Swandyke camp is located near the head of Swan river, thirteen miles east of Breckenridge, and twenty miles west of south from Georgetown. The ores are sulphides in the main, though there is a belt of tellurium. The tellurium is calaverite, but it is upon the big sulphide veins that greatest dependence is placed. These veins are large, many 30 feet wide, and one has a width of 42 feet. They carry well-defined pay streaks of good grade. The belt runs between the heads of Montezuma and Hall valleys, which explains why it has remained undiscovered so long. The Pompa lode claim, which is only developed by a 15-foot hole, was recently sold for $1800. The ores carry gold, silver, copper and lead.

IDAHO.

Spokane *Chronicle*: The San Francisco group of claims in the Buffalo Hump country has been purchased by W. H. Wright of Spokane, representing an English company, for $100,000. The San Francisco group, one of the first locations, comprises the Baby Louise, Monte Carlo and San Francisco, three distinct ledges lying almost parallel with each other. Practically no work has ever been done.

Spokesman-Review: A strike is reported from the 16 to 1 at Wallace, in the Cœur d'Alenes, in a crosscut tunnel in 360 feet. Fifteen inches of clean galena were cut.

Hailey *Times*: Another strike—the second since the present management took the property—has been made in the Crœsus mine on the lowest level at a depth of 410 feet.

MONTANA.

Phillipsburg *Mail*: Smith & Kent, who own the Hidden Treasure mine on Lookout mountain, struck 18 inches of rich ore in their shaft a few days since at a depth of 160 feet, but were soon thereafter driven out by water. They will soon run a tunnel on the vein 900 feet, reaching a depth of 300 feet under the shaft.——Twenty-five bars of bullion were shipped from the Bimetallic mill Saturday. The shipments are now regular weekly. Forty men have been put on at the Bimetallic and Granite mines during the past ten days and it is the intention to increase the force of miners as soon as the work of repairing is sufficiently advanced. Seventy-five stamps are constantly dropping day and night at the Bimetallic mill at Clark.——Two bars of bullion were shipped Saturday from the Sweet Home mill, the result of a week's run on Cuno ore. Ten tons are crushed daily. The mill is now running day and night, both steam and water power being used.

Clancy *Miner*: Ten stamps of the Diamond Hill mill in Hassel district are being moved to the new gold mine at the head of Lump gulch, near Clancy, owned by D. W. Ross.——The Blue Rock is one of the group owned by the Gold Hill M. & M. Co., with headquarters at Great Falls, Mont., and are ten miles west of Clancy and twelve miles south of Helena. The formation at the mines is granite, their elevation 5500 feet. There are two porphyry dykes running the length of the property, a distance of 3000 feet. There are two quartz lodes in the porphyry, one about 3½ and the other 8 feet wide. The dykes vary from 40 to 100 feet in width and prospect throughout in gold.

NEVADA.

Pumping on the Comstock is expected to shortly resume. In all such new work there is always unavoidable delay in changes and additional arrangements in meeting hitherto untried conditions. The throat piece and improved inlet are now considered equal to requirements, and it is calculated that when the work of unwatering begins again the water can be lowered 200 feet before it becomes necessary to lower the pump.

Virginia City *Chronicle*: A Churchill county prospector, who has a 3-inch streak of quartz that pays by the hand-mortar, has utilized the windmill of a neighboring rancher for operating a 30-pound stamp, and pulverizes half a ton of ore in twelve hours, with wind for power.

Winnemucca *Silver State*: The Buck mine, four miles from Humboldt House, is reported bonded to Eastern men for $25,000.

Randsburg *Miner*: At Good Springs, forty-five miles north of Vanderbilt and fifteen miles east of the California line in Nevada, Prof. Shultz is putting in a leaching plant of twenty tons capacity, and working in the mines and mill about thirty men. This is a copper mine. The location was made years ago. The company are putting up buildings and are going to give it a thorough trial. There is plenty of water.

Territorial Enterprise: An agreement has been concluded with the Chollar and Potosi companies for the extension of the Zadig drift through the property of those companies to the Occidental Con. north line. This drift was run on the Brunswick lode on the Sutro tunnel level, 1000 feet south of the tunnel when work was suspended, and the face is 1100 feet north of the point where it will connect with the Occidental. The companies through whose ground the drift passes will contribute pro rata toward the work, with a prospect that ore may be discovered.

NEW MEXICO.

New Mexican: W. L. O'Kelly has purchased the Saddle mine, located between the Snake and Eighty-five mines of Hon. W. S. Hopewell.——Welch & McPherson have purchased the Flora Temple of Robin & Macy.——Negotiations are pending for the sale of the Eureka.——Hon. W. S. Hopewell has secured a lease and bond on the Eighty-five and has placed ten miners at work.——J. L. McLaughlin is the new owner of the Horn lease on the Sherman, and Bennet & Orchard have leased and bonded the El Dorado mine and work eight men.——The Cincinnati mine has put on a night shift of eleven men.——Teams and ore wagons are at a premium in the Hillsboro district.——A new hoisting plant has been placed on the Butler mine.——The force on the Grey Eagle has been increased to seven men.——The Placer Basin mine, owned by D. Essinger, is now yielding eight tons of $90 ore per day.——M. M. Freed has sold his twelve Cabello mountain copper claims to the Fidelity M. Co. of Salt Lake City.——J. M. Webster will resume work on his Lookout gold and silver mine, on Trujillo creek.

Rico *News-Sun*: The cyanide plant for the Old Abe mine, at White Oaks, is ready for operation. The main building is 165 feet in length, and other buildings cover the six tanks and boiler and engine room. Each of the tanks has 50 tons capacity and the entire works 300 tons per week. The tailings which have been accumulating and which are made by the 50-ton stamp mill will be treated. There are now about 10,000 tons of tailings, which average between $5 and $10 per ton. In the mine the shaft is down 1100 feet. The first station in the new shaft was cut at 800 feet, and at each succeeding 50 feet levels have been run.

Silver City *Enterprise*: At the Atlantic, working steadily, thirty men employed, the daily output of ore is ten tons. The drift is now 510 feet from shaft; a distance of 24 feet will make connection and open up another shoot of ore.

OREGON.

(Special Correspondence).—The Union-Companion mines at Cornucopia, owned by J. H. Searles & Co. of New York, have been partially closed down pending improvements to mine and mill. J. Arthur has contracted to put in a sluice box to save the black sands that contain the flour gold.

The Golconda mine at Sumpter, thirty miles from Baker City, has about completed its $100,000 bromo-chloride plant. Mr. Winters is Gen. Mgr.

Baker City, March 28th, '99.

The *Republican* of Baker City publishes a list of mines near Baker City and says the mills have a total of 373 stamps and the mines give employment of 1113 men. The list comprises eighty-five mines.——It is claimed that the Vaughn copper mine on the Oregon side of Seven Devils is 130 feet wide.

SOUTH DAKOTA.

The Homestake Company at Lead City are building an experimental cyanide plant.

Custer *Chronicle*: The Gold Coin mines, eight miles west of Custer, have been transferred to the Vigilante Mining and Milling Co., for $99,000.——A new shaft is to be sunk on the Grand Junction mine seven miles northwest of Custer. The mine is a very large one but has never been properly managed.

Times-Pioneer: Criley & Bell who have the lease on the Wildcat, near Deadwood, owned by Aaron Dunn and associates, in Spruce gulch, have found a good sized-body of ore in a tunnel they were driving. The Wild Cat joins the Belle Eldridge on the lower side, and runs up to the Champion.——Isaac Downing and partners, who have the lease on the Belle Eldridge, are taking out ore and hauling it to the smelter.——The Champion, owned by the Highland Chief Mining Company, has resumed operations. This work is under the supervision of J. C. Randall.

UTAH.

Tintic *Miner*: Operations will be resumed at the Bullion-Beck mill. Water will be obtained from Mammoth.

Salt Lake *Tribune*: A force of men has been sent out to renew work on the New Moon in Skull valley. They will resume work by crosscutting in the vein. The New Moon is a promising cyanide property. A mill will propably be built during the summer.——The Diamond Con. M. Co.'s property on Treasure Hill near Silver City, Tintic, reports the new shaft down 65 feet and thoroughly timbered. Bunches of copper ore have been found in sinking assaying as high as 23.4%.——A rich strike is reported from the May Day mine at Tintic.——Ore carrying lead values has been struck in the Yankee mine situated near the May Day and the Humbug at Eureka.——President Newhouse of the Highland Boy Co. says that the Highland Boy smelter, now in course of construction near Murray, will be running and handling ore by June 1st. The tramway from the mine is finished and will soon be hauling the ore from Bingham down to the smelter.——The Mountain View mine near the Humbug at Eureka, has reported breaking into a good ore body.——It is said that high-grade ore had been struck in the Northern Light, Eureka, in the south drift.——The Tusquella mine on the West Dip, Camp Floyd district, has broken through the shale in the new shaft and has ore at 125 feet.——The Joe Bowers Extension Co. require sinking pumps with a capacity of sinking to a depth of 1000 feet on their property at Tintic.

Park *Record*: A few men have been put on at the Ontario.——Seventy men are working at the Daly-West. The mill is to be started next week.——The Webber & Kearns concentrator at Park City is being repaired. It will require a month to finish it. Some new machinery is to be added.——It has been found necessary to make many changes in the new King mill. It will probably be five weeks before the machinery will be put in motion.——The shaft at the Silver King is down 1300 feet.

After sinking a sump and cutting a station at this level, a drift will be run to cut the ore body.——Plans for the new Anchor mill will be out next week.——The Superior M. Co. has let a contract to R. Smith to sink an incline of 100 feet on that property.

WASHINGTON.

A 20-ton concentrating plant is en route to the Crystal Butte mine on Meyers creek on the Colville reservation. About April 1st Mgr. Thomas will employ twenty-five men if he can find them. The lead varies in width from 10 inches to 2 feet.

The office of the new Republic Co. will remain in Spokane.

A bed of lignite has been found in Asotin county. The deposit has been traced up the Snake river from Mallery Ridge as far as Elbow canyon, and crops out in several places along the river in Wallace county, Oregon.

Coeur d'Alene *Press*: The Palmer Mountain G. M. & T. Co. of Spokane owns forty-three claims in Palmer Mountain district, west of Republic, with a crosscut tunnel now in 1700 feet with nine veins cut. The depth at the present face is 900 feet. No drifting has been done.——The El Dorado has a 60-foot tunnel on ore going 20% to 25% copper. J. P. Dexter is working it.——On the Mammoth, a Whisky Hill property, a crosscut is running to tap the vein 500 feet deep.——The Golden Zone has 2000 feet of tunnels, all in ore. A concentrator is now being erected.——The Okanogan Free Gold Mines, Ltd., of Rossland has 280 feet of tunnels, numerous open cuts and shallow holes, and is erecting a mill, concentrator and cyanide plant. The company will mine an average of 200 feet deep before sinking will be necessary.——At Weheville the J. G. Blaine shaft is down 60 feet and the bottom in ore. A contract for 200 feet is in progress.

At Spokane last week fourteen more new mining corporations were launched.

Spokane *Chronicle*: At a recent meeting of the new Republic Co. it was announced that it is proposed to develop the Republic by a double-compartment shaft to be sunk 1000 feet and the capacity of the cyanide mill is to be more than doubled.——G. W. Runnels has opened a ledge of black oxide of copper on the Iconoclast claim on Tollman mountain, near Keller.——Supt. R. C. Vandeford of the Umatilla, near Keller, which is being developed by Finch & Campbell of Spokane, reports the tunnel in 335 feet. He expects to cut the ledge soon at a vertical depth of over 200 feet.——The men working the Teddie claim, about a mile and a half east of Keller, have cut the ledge at a depth of 50 feet with a crosscut tunnel 92 feet and exposed a large body of low-grade sulphide ore. The ledge is 25 feet between walls. The mine is owned by a Spokane company, headed by T. S. Griffith.

Spokesman-Review: The Crystal Butte, in the northwest corner of the Colville reservation, has made another strike. The winze is down 140 feet, with a pay streak 30 inches wide and an average assay across the ledge in the bottom of the winze of $162 per ton in gold. Free gold shows plainly in much of the ore.——In the Review claim a strike of free-milling ore has been made, and R. Allison, one of the owners of the claim, is going to arrange for the erection of a 10-stamp mill.——The Jersey Lightning Co. has let a contract for 25 feet of shaft on that property. The company will put a stamp mill on the claim if the values hold out as the shaft goes down.——The Ben Wharton Co. is working four men and has struck the vein at a depth of 50 feet in the shaft which was sunk to catch the vein on its dip.——Supt. Hoffman of the Scotia mine on Toulou mountain, near Roseburg, has received samples of ore from the bottom of the shaft which is being sunk under contract. The ore is chalcopyrite. The shaft is down 63 feet.——The ore in the Princess Maud at Republic has undergone a change from the friable sugar quartz to a hard, dense variety, though the value has improved somewhat, and the vein maintains its width, about 5 feet.——The Lexington G. M. Co. has been organized to develop the Lexington claim on the west fork of the San Poil, near the mouth of Gold creek. The ledge lies between slate and porphyry, and shows a width of 40 feet on the surface, a mixture of quartz and porphyry. About 6 feet below the surface the material gave assay values of $6.40. At 32 feet the values have risen to $18.60 per ton in gold.——The sale of a half interest in the Santa Fe and Kodak claims, north of the Rogers' Bar trail and two miles east of the San Poil, in the south half of the Colville reservation, by C. W. Wagner, to Spokane men is reported. The price paid is not made public. A contract was let to C. W. Wagner and J. Payne to sink a 50-foot shaft on the Santa Fe. Mr. Wagner states that this claim shows a ledge 10 feet in width that assays from the surface and from open cuts from $6 to $20 per ton.——News of good developments in the free-milling ledges of the Myers Creek district, in the northwest corner of the Colville reservation, is received.

WYOMING.

(Special Correspondence).—The idea seems to have become general that Wyoming was almost exclusively a pastoral State. This is not so, however, as the present year will demonstate. In western Wyoming are gold mines of undoubted value, and some also in the extreme eastern edge of the State in the Black Hills, where not only gold, but lead, silver, tin and iron are found. In the Hartville region are large iron mines, at Rawhide Buttes, copper, and also near Grand Encampment, in the southern part of the State. There are immense coal deposits in several portions of the State, and we have dry lakes in the beds of which are valuable deposits of soda, borax, etc., and gypsum beds extending for miles, oil wells, and much else, besides building stones, clays and beds of sand, all of which have commercial value.

Laramie City, March 20th, '99.

Salt Lake *Tribune*: The Union Pacific Company has bought the Kindt coal mine, on the road between Fort Steele and Saratoga, which is taken to indicate the probable building of the line from Dillon, Colo., to Fort Steele.

FOREIGN.

AUSTRALIA.

The Wallaroo mine, it is said, was discovered by means of the green copper carbonate thrown out in a small mound by a burrowing animal. The mine was developed by private capital and the first four or five years the balance sheet showed a debit of about $400,000. Now it is one of the most extensive and valuable properties in South Australia. The ore carries about 13% copper.

BRITISH COLUMBIA.

The Trail smelter will soon be supplied with lime from the newly discovered quarry, a few miles from Nakusp.

Spokesman-Review: The double compartment shaft on the North Star, at Fort Steele, is down 215 feet. A station has been started at the 200-foot level to crosscut the lead.——The tunnel on the Stemwinder on North Star hill is in 95 feet.——On Tracy creek work has been resumed on the Minnie and Tiger claims by the Fort Steele Development Company. The claims show galena from the grass roots in a contact vein.——It is reported at Fort Steele that the Moyie and Queen of the Hills mines at Moyie have been sold to an English syndicate.

The Kootenaian: The Vulture mine in the Slocan has made another strike, 2 feet of solid galena ore with 1½ feet of carbonates in the face of the tunnel, making a continuous vein the length of the tunnel which is 180 feet; the ore shows on the surface for 1,000 feet.

Rossland *Miner*: J. Moran who recently sold the Kamloops mine, Camp McKinney, to Rossland parties, has been offered $15,000 for his one-fourth interest in the Okanogan claim, situated on the eastern end of the Cariboo group.——The vertical shaft on the Minnehaha at Camp McKinney has reached the 200 level, and the crosscut commenced. It is expected the vein will be cut in 30 feet when stoping will be commenced at the 100 and 200-foot levels. The mill will probably be in operation by August 1.——An order has been placed in Montreal for a 15-drill compressor for the Cariboo mine at Camp McKinney to be installed and in operation within sixty days. Recent development has caused the company to arrange for ten more stamps for the Cariboo mill.

Victoria *Times*: The rich strike recently reported from the Three W's mine was on Granite creek, ten miles east of Alberni canal. The vein has been stripped 40 feet and is 2 feet wide. The quartz is honeycombed and shows considerable free gold. About 200 feet distant from this strike another excavation has been made, apparently on the same vein.——The Golden Eagle mine, at Alberni, has been closed down owing to frequent snowslides.——Additional men are at work on the True Blue, four miles from Kalso, under bond to the Hall Mines, Ltd., of Nelson.

MEXICO.

The volcano of Colima, in the State of Jalisco, is again active. The inhabitants are leaving the vicinity.

Two Republics: G. Hopkins, formerly a mine manager in the Organ mountains of New Mexico, has purchased from E. Baird the Cushinbery copper property, situated on the east slope of the San Andreas, south of Mimbrillo canyon. Mr. Hopkins will at once reopen the mine.

El Paso *Times*: E. R. Jewett has discovered in the Sierra Madre country silver-copper ore which assays ninety ounces silver and 15% copper to the ton. The prospect is sixty miles from Casas Grandes and is the first discovered in that vicinity, although there are a number twenty miles distant. As it is accessible, it is a desirable locality, and prospectors are flocking there.——Two new strikes have been made in the San Blas mining district, on the Sierra Madre Railroad, of copper ore which assays 20% to the ton and some silver.

SPAIN.

The *Revista Minera* of February 24 furnishes details of the Spanish mineral statistics for 1898. The silver ingots obtained in Spain last year amounted to 114,020 tons. The production of lead was as follows:

	Tons.
Crude lead exported	178,885
Manufactured lead exported	979
Lead in ores exported	4,400
Lead consumed in Spain	8,500
Total	193,764

Assuming that the ores yield on an average 55% of metal, this total represents a production of 352,000 tons of lead ore. The Government mine, Arrayanes, produced 18,961 tons of lead ore. The Spanish production of mercury last year was as follows:

	Flasks.
Almaden	46,211
El Porvenir (Mieres)	1,450
La Union Asturiana (Mieres)	450
La Soterrana (Pola de Lena)	71
Other mines in Asturias and Granada	540
Total	48,722

THE PHILIPPINES.

E. M. Hand, a Montana mining expert and assayer, who was sent to the Philippines by a Holland company that owns a concession of mineral land ten miles square, fifty-six miles inland from Gorontalo, writes from Finando: "Out of thirty assays so far I have only found a trace of gold and they were from places that were supposed to go $20 or over. I do my own prospecting, but always have fifteen or twenty natives with me. I am a miner, carpenter, blacksmith and assayer. It would not be a bad job if it wasn't for the heat. That is perfectly damnable, but the nights are cool, so one rests well. It is always shady in the jungle but very sultry, as there is never a breath of air."

Industrial Notes.

—A Ballard, Wash., shingle mill in '98 cut 322,000,000 shingles.

—Arizon's copper production in '98 was worth over $19,000,000.

—Jefferson Co., Montana, has sold its 4½% bonds at 1% premium.

—Leadville, Colo., will buy the present water plant for $350,000.

—In '98 San Francisco exported $40,000,000 worth of general products.

—Spokane, Wash., is boycotting Chinese labor and Chinese-made goods.

—Seattle, Wash., last week let a $38,000 sewer contract to F. McLellan.

—Wages in Washington logging camps this season are from $1.50 to $3 per day.

—A $350,000 beet sugar factory is to be built in Spokane, Wash., by D. C. Corbin.

—During '98 Denver's manufactured products aggregated in value $25,600,000.

—The O. R. & N. Co. will build from Moscow, Idaho, to the Clearwater country.

—Drought in New South Wales has in the last two years destroyed 8,000,000 sheep.

—A paper mill "to cost $350,000 and employ 400 hands" is to be built at Floriston, Cal.

—Oranges and potatoes were the same price at Sacramento, Cal., last week—25 cents per dozen.

—Sacramento, Cal., is about to bond itself for $400,000 for sewerage, street improvement and water works.

—The Santa Fe road has ordered 2000 freight cars in anticipation of a big wheat crop in the San Joaquin, Cal., valley.

—The new Alaska code of criminal procedure, in effect July 1st, '99, will provide to the U. S. treasury an annual revenue of $500,000.

—Another big railroad war has started, and the Pacific coast conventions next summer may cause its continuance through the year.

—A Seattle, Wash., transportation combine, contrary to established usage, has cut in two passenger and freight rates to Dawson City.

—Through the sale of Mrs. Jane Stanford's Central Pacific R. R. stock the Stanford, Cal., University will receive nearly $2,000,000 more.

—Wells-Fargo Express Co. has absorbed and ousted some of its competitors, and now nearly controls New Mexican and Colorado business.

—Since Aug. 1st, '98, 40,000 tons of coal have been sent to Manilla, Philippine islands, from this country, mostly from the Atlantic side via Suez canal.

—San Francisco's new city hall is "completed." It was begun just twenty-nine years ago. It was to cost $1,500,000. To January 1st, '99, it has cost $5,723,987.

—Moran Bros., Seattle, Wash., shipbuilders, have sued the North American T. & T. Co. for $37,642, balance due on the construction of Yukon river steamers.

—The story of Russia's building a ship canal to connect the Black and Baltic seas is a diaphanous fake, started by a space writer on a Sunday daily and extensively copied.

—A. Godbe of Ensenada, Lower California, Mgr. of the mines fifty miles south of Ensenada, is reported to have contracted with the Japanese Government to deliver 500,000 tons of iron ore.

—Despite a lack of recent rain southern California will have a prosperous season, all its varied industries being in good shape. That section of California shows great increase in wealth, population and industrial development.

—In San Francisco Claus Spreckels and associates have organized the Independent Electric Light & Power Co., capital $10,000,000, to supply San Francisco residents with electric light and power at considerably less cost than at present.

—The old monitor Camanche, which has been bought from the Government, is to be converted into a freight ferry boat to be run on San Francisco bay. Her antique engines will be replaced with new machinery and she will be remodeled at a cost of $50,000.

—The pole line of the Blue Lakes, Cal., power plant is completed from Stockton to Mokelumne Hill. The power will equal 50,000 H. P. Danger signals have been posted along the poles to the power house warning persons against coming in contact with the wires under penalty of their lives.

—There are now eight regular lines of steamers plying between the ports of the United States and British Columbia on one side of the Pacific ocean and China and Japan on the other side, besides two lines running to Australia and New Zealand. Several of these lines also touch at Honolulu.

—The Utah & Pacific road is building an extension from Milford in Utah in a southwesterly direction to a point in Nevada. From there a branch line will be built to Pioche. The line will be operated by the Utah & Pacific people, but they will have a traffic exchange agreement with the Oregon Short Line at Milford.

—The Clear Lake, Cal., Power Co. expects that the Cache creek of Lake county will furnish water power to generate electricity for illuminating and power purposes, to be conducted to Santa Rosa, Calistoga, St. Helena, Napa, Vallejo, Petaluma and Benicia. A diverting dam is projected to guide the water into a flume 4x8 feet, following the contour of the mountains for five miles, the flume having a fall of 5 feet to the mile, and having an elevation of 262 feet above the creek bed at the terminus of the flume. The water is to be carried in three 40-inch pipes, 950 feet to turbines in the power house. These turbines are to be on the same shafts with the dynamos. From the power house a pole line conveying six wires, carrying 40,000 volts, is to be constructed to Calistoga.

—At the port of Kobe, Japan, the imports and exports together for '98 were valued at $99,126,000, against $81,074,500 for '97. The imports represented $69,066,500 in '98 and $55,370,500 in '97. The exports for the two years were $30,059,500 and $25,704,000, respectively. The commerce of Kobe during '98 was almost $3,500,000 in excess of that of Yokohama, thus making Kobe the leading commercial port of Japan.

—On the Siberian railroad work is conducted directly by the Government without the mediation of contractors. Laborers are chiefly from European Russia, reinforced by natives of Siberia and gangs of convicts. The mechanics are chiefly Italians, Belgians and Poles; track-laying is done by the railroad batallions of the army; in Eastern Siberia and Manchuria Chinese coolies are employed. About 10,000 men are at work on the line west of Lake Baikal, on which the track is nearly all laid, and 6000 east of it. The engineers are all Russians. As far as possible materials are obtained from the country on the line. The road is being cheaply constructed, with steep grades and sharp curves, and does not admit of high speed. The fastest train at present—once every two weeks—runs seventeen and one-half miles an hour. The line east of the lake to the Amoor valley, 688 miles, is called the Transbaikal railroad. Work has been prosecuted on it since 1895, and it is to be completed this year, at least at far as the river Onon, 563 miles from Lake Baikal, where the Chinese Eastern railroad begins. The construction of a railroad down the Amoor valley, 1332 miles, which was the plan before the right to build through Manchuria had been secured, seems definitely abandoned. The whole length of the line from Cheljabinsk, near the European border, through Manchuria, to Vladivostock, including a circuit of Lake Baikal, will be 4120 miles; Cheljabinsk is 2225 miles from the line between Russia and Germany. The line as far as Irkutsk is 2022 miles long. Vladivostok, the Pacific terminus, is credited with 15,000 permanent inhabitants.

—The San Francisco & San Joaquin Railway Co. has transferred to the Santa Fe the terminal site at Spear and Harrison Sts., San Francisco, and the property adjoining. Taking the revenue stamps attached to the deed as a basis for the price of the property, $378,000 was paid by the railway for its terminus in San Francisco. Governor Gage of California has signed the so-called Santa Fe Consolidation bill. This is the measure introduced at the instance of the Santa Fe people for the purpose of permitting, as its advocates claimed, that corporation to operate its system as a whole, instead of being compelled to do so through the medium of three or four different corporations. It was asserted that, unless the existing laws were amended, it would be impossible to purchase the line from Mojave, Cal., to the Colorado river, necessary to complete the system. The leading feature of the Act is made clear by the following excerpt: "Any railroad corporation owning any railroad in this State may sell, convey and transfer its property and franchises, or any part thereof, to any other railroad corporation, whether organized under the laws of this State or of any other State or Territory, or under any Act of Congress; and any such railroad corporation receiving such conveyance may hold and operate extensions and branches thereof and do any other business in connection therewith, as fully and effectually to all intents and purposes as if such corporation were organized under the laws of this State." The bill was opposed on the ground that it would permit the consolidation of the Central and Southern Pacific Railroads.

Recent Mining Incorporations.

Nut Pine G. & S. M. Co.; capital stock, $100,000; subscribed $50; E. and G. H. Lent, W. F. Humphrey, C. O. and R. G. Hooker.

Dirigo Con. M. Co., San Francisco, Cal.; capital stock, $1,000,000; subscribed $150,020; W. W. Great, C. W. Cross, G. R. and L. F. Tuttle, H. Newburg.

Big Oak Flat M. & D. Co., Oakland, Cal.; capital stock, $100,000; D. R. Shafer, J. H. Williams, Big Oak Flat; C. H. Wever, H. H. Castle, Alameda; H. S. Aldrich, Oakland.

Green Jumper G. M. & D. Co., Sonora, Cal.; capital stock, $52,500; J. T. Ryan, E. J. Landers, F. Corbin, J. W. Purdy, Sonora; W. S. Risley, Alameda.

Bown M. Co. (amended articles), San Francisco, Cal.; capital stock, $1,000,000; subscribed $50; J. M. Wright, H. C. Park, San Francisco; W. J. Rule, P. Rowe, Tuttletown; W. Chartron, E. J. Dubois, J. Monthiers, Paris, France.

Commercial Paragraphs.

THE Marion Steam Shovel Co., Marion, Ohio, has sold within the past two weeks twelve steam shovels for shipment to Russia.

THE Hassell Iron Works Co. of Colorado Springs, Colo., whose present specialty is the automatic horse whim, recently made shipments of same to Buenavista, Colo., and Gila Bend, Ariz.

THE Jeanesville Iron Works Co., Jeanesville, Pa., last week received an order from one of the large coal companies near Scranton for four 10x6x12 inch boiler feeds; two 22x10x36 inch wood-lined duplex mine pumps; one 20 and 38x16x48 inch compound condensing duplex mine pump; one 16–24 and 40x16x46 inch triple expansion duplex mine pump, including two large condensers for the two latter pumps.

Personal.

GEO. H. EVANS is at present in South America.

HENNEN JENNINGS has returned to London from San Francisco.

H. E. PICKETT has returned to Placerville, Cal., from the East.

W. F. GORE now has charge of the dredge at Big Bar, Fraser river, B. C.

R. C. CHAMBERS, Supt. Ontario mine, Park City, Utah, is in Butte City, Montana.

W. H. PAUL, of Denver, is consulting engineer for the Bassic mine, Silver Cliff, Colo.

H. ZADIG of San Francisco has returned from a visit to the Occidental mine at Virginia City, Nevada.

SENATOR DORSEY of Colorado, who has mining interests at Pichaco, Cal., has gone to New York City.

V. T. MCGILLICUDDY, formerly dean State School of Mines, Rapid City, South Dakota, is at Olympia, Wash.

M. H. DEYOUNG of San Francisco is appointed California's official representative at the Paris Exposition.

JOHN ROSS, JR., Supt. Wildman-Mahoney mine, Sutter Creek, Amador Co., is temporarily sojourning in Oregon.

SIMON GUGGENHEIM, Gen'l Mgr. Philada Smelting & Refining Co., says the Guggenheim smelters will not enter the trust.

T. A. RICKARD, State Geologist of Colorado, was this week reappointed for his third term, a deserved recognition of efficient service.

E. G. DENNISTON, proprietor of the Denniston San Francisco Plating Works, has returned from a business visit to Los Angeles, Cal.

W. G. SCOTT, of Shasta Co., Cal., suggests the formation of an organization to be known as "The Pacific Coast Society of Mine Superintendents."

E. H. BENJAMIN, secretary California State Miners' Association, was in Los Angeles this week, extending the membership of that organization.

JOSHUA D. HOSKING of the Kearsarge mine of the Osceola Con. to-day succeeds Graham Pope as Gen. Mgr. and Supt. of the Franklin mines at Houghton, Mich.

P. P. BUSH of Denver, Colo., western representative of the Canton Steel Co., is making a trip through the Northwest. He was in Butte, Mont., March 25th.

S. C. IRVING, President Paraffine Paint Co., of San Francisco, has gone to Washington, D. C., in the interest of the California Manufacturers' and Producers' Association.

H. G. MURRAY, who for several years has been foreman of the Gwin mine, has resigned his position to accept the superintendency of the Lightner mine at Angels, Calaveras Co., Cal.

LOUIS JANIN, SR., E. M., AND J. H. MEANS, E. M., of San Francisco, Cal., have gone to British Columbia in connection with the litigation involving the Iron Mask mine and North Star.

B. I. WHEELER of New York is in San Francisco and is prominently mentioned in connection with the presidency of the University of California, made vacant by the recent resignation of Martin Kellogg.

CHAS. S. DODGE has bought the Washington Gulch, Montana, placer plant, formerly owned by W. M. Johnston & Co.. This property was illustrated and described in detail in the issue of Feb. 5th, '98.

MR. E. I. PARSONS, for so many years constructing engineer for the Hallidie Ropeway and the California Wire Works, takes a position on the 1st inst. with the John A. Roebling's Sons Co., 25-27 Fremont street, San Francisco.

MARCUS DALY of Montana is in New York City, where he is locally credited with intention to turn the management of the Anaconda over to the Standard Oil Co., though it would seem that if any one was so empowered, J. B. Haggin would be the man.

E. W. NASH, Sec'y Omaha & Grant Smelting Co., has been elected president of the smelter trust with headquarters at Omaha. Mr. Nash is credited with the assertion that the capitalization of the company will be $100,000,000, and that the trust includes every smelter in the country except Guggenheim's of Pueblo.

THOS. B. BURNS, cashier San Francisco Subtreasury has returned from Philadelphia, where he attended the Assay Commission, being the first Sub-treasury employe thus appointed. The Assay Commission this year recommended that the standard weights be annually in December compared with those of the Bureau of Weights and Measures.

CHARLES R. WORES of the Tucson, Arizona, sampling works says that hundreds of assays are being made to-day where there was comparatively no work a year ago. Mr. Wores attributes this to the general activity in his section and to the price of assaying at the Arizona University, as prospectors give the local assayers the preference with prices the same.

JNO. T. GRAHAM of Denver, Colo., is authority for the statement that the first step made by the new smelter trust and combine will be to advance the price of silver 10%. He says the trust's operations will be beneficial instead of oppressive, and that all who entered into the combine signed a contract agreeing not to raise the price of treatment of ore for ten years.

AT the first meeting of the newly elected board of directors of the Manufacturers' and Producers' Association, in San Francisco last Monday, the old board of officers was elected, as follows: President, A. Sbarboro; first vice-president, James W. Kerr; second vice-president, Frank L. Brown; third vice-president, J. P. Currier; treasurer, A. Sbarboro; secretary, Lewis R. Mead.

SCOTT MCDONALD of Spokane, Wash., is in San Francisco for his health. He held a big interest in the Payne mine in the Slocan, B. C., till last week. The mine is sold to Canadians, who will move the office from Anaconda, Montana, to Montreal. W. L. Hogue of Anaconda is to be president. The shipments from the Payne mine from Jan. 1st, '99, to March 14th, '99 (the day of sale), aggregated 2388 tons, which netted $52 per ton after deducting duty and all charges for freight and treatment.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING MARCH 21, 1899.

621,772.—LUGGAGE CARRIER—A. L. Bancroft, Walnut Creek, Cal.
621,773.—FRUIT PRESS—L. Blatz, La Miranda, Cal.
621,445.—LAWN MOWER—Campbell & Woodworth, Dayton, Wash.
621,774.—PRESERVING WOOD—C. S. Chamberlain, Oakland, Cal.
621,636.—TOILET PAPER CASE—Davis & Cornelius, Turner, Or.
621,775.—FEED WATER HEATER—G. F. Day, S. F.
621,653.—BRAKE ADJUSTER—Gilman, Norton & Brown, Tacoma, Wash.
621,524.—MITER BOX—W. H. Gordon, Portland, Or.
621,566.—WATER GATES—J. H. Hendy, S. F.
621,768.—FILTER—T. W. Hill, Los Angeles, Cal.
621,420.—STEAM BOILER—F. Jones, Santa Paula, Cal.
621,345.—CABLE GRIP—R. Jonsrud, Sandy, Or.
621,475.—ELEVATOR—J. J. McCormick, S. F.
621,503.—SINGLETREE—R. R. Pigg, McCoy, Or.
621,431.—HYDROCARBON BURNER—Sheedy & Carrick, Los Angeles, Cal.
621,396.—TRAP—C. W. Williams, Los Angeles, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ANTI-FRICTIONAL ATTACHMENT FOR WATER AND OTHER GATES.—J. H. Hendy, San Francisco, Cal. No. 621,566. Dated March 21, 1899. This invention relates to an attachment for water and other gates, and is especially designed to relieve the friction of the flange of the turnable nut by which the gate actuating screw is reciprocated in one direction or the other in order to open or close the gate transversely of the passage which it controls. It consists essentially of a gate movable transversely across the water pipe or other passage which it controls, a screw-threaded nonturnable stem connected therewith, a nut through which the threaded portion of the stem passes and a hand-wheel by which the nut is turnable. This nut has an outwardly projecting annular flange at the bottom and a chambered cap within which the flange is turnable. Grooves are made in the opposing faces of the flange and the interior of the chamber and balls are fitted in these grooves to make an easily movable joint so that the nut can be readily turned to advance the gate in either direction. The faces of the interior of the chamber may have removable disks fitted in them with the grooves formed in these disks so that they can easily be replaced in case of wear.

FEED WATER HEATER AND PURIFIER.—Geo. F. Day, San Francisco, Cal. No. 621,775. Dated March 21, 1899. This invention relates to improvements in apparatus for heating and purifying the water which is to be supplied to boilers for steam purposes. It consists essentially of an outer shell or casing having transverse diaphragms separating it into independent vertically disposed chambers, one of which is a clear water chamber, an inlet passage opens into the lower part of the uppermost chamber to admit exhaust steam and an outlet therefor from the top of the chamber, a relief pipe exterior to the chamber connects the clear water chamber with the lowermost chamber. Horizontally disposed trays are suspended in the uppermost chamber to form alternate passages for the steam and water upon opposite sides. The pipe connecting the upper heating chamber with the lower sediment chamber is formed with plugs in line with the pipe and with its connections with the chambers so that it may be easily cleaned and inspected. A rising and falling float within the clear water chamber has a hollow arm and a hollow shaft, the ends of which extend through stuffing-boxes to the exterior of the chamber so that any leakage into the float will be discharged therethrough. A crank arm is also fixed to the shaft and is connected with a valve which controls the water inlet in unison with the rising and falling of the float so as to regulate the supply of water to the heating chamber. An automatic sediment discharge device is connected with the sediment chamber comprising a steam trap and a valve which is opened periodically by the action of water supplied to the trap so that steam is admitted to operate upon a piston and operate the discharge valve of the sediment chamber.

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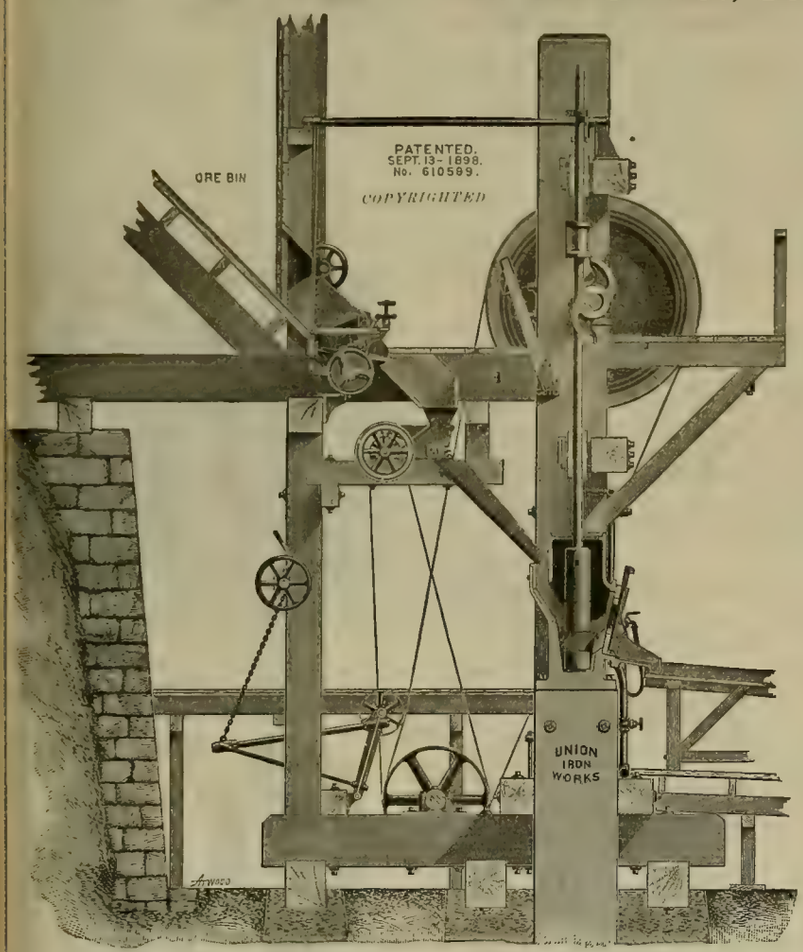

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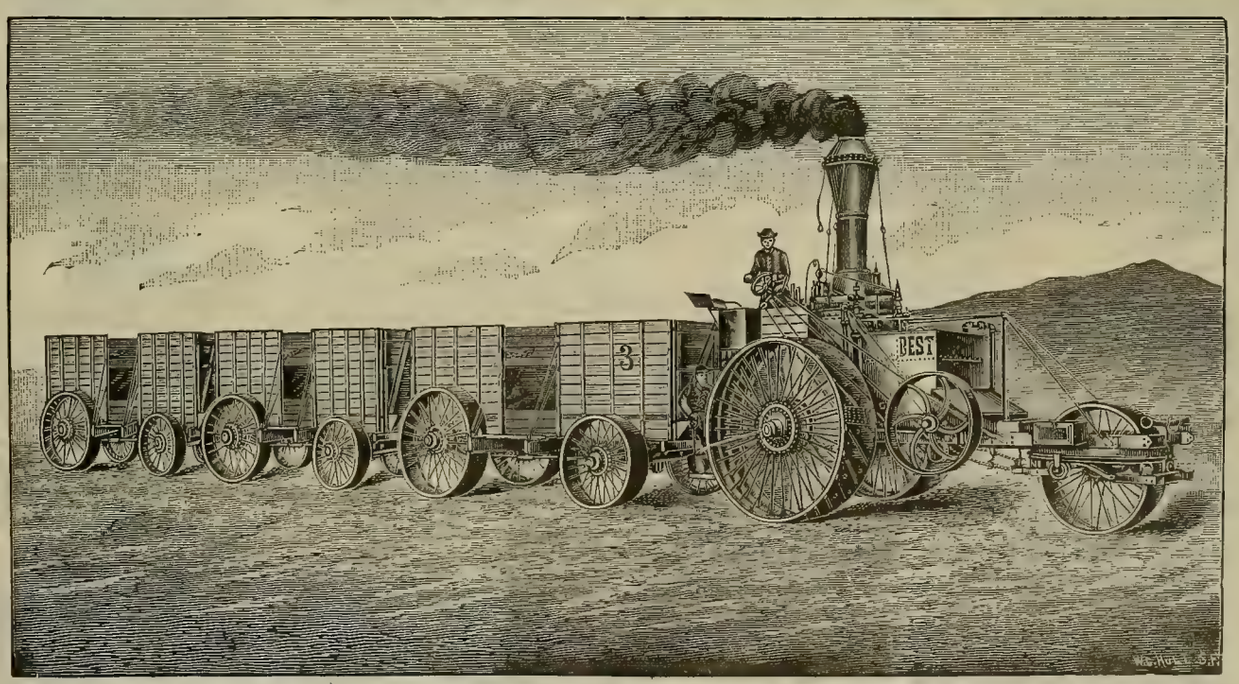

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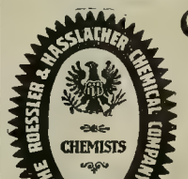

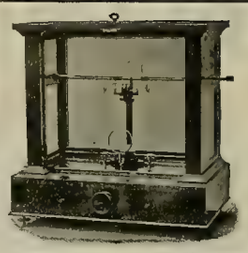

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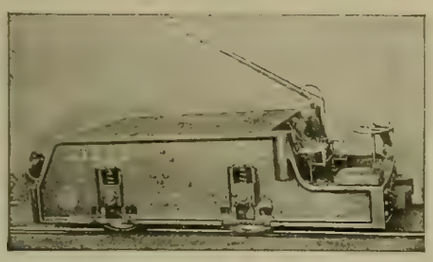

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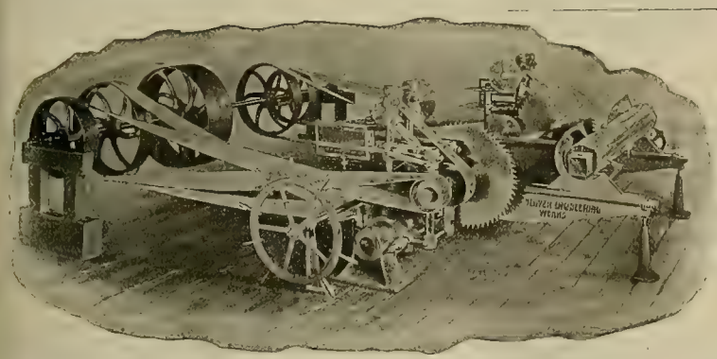
Mine Timber Framing Machine.



Will do the work of twenty carpenters and each timber will be an exact duplicate of the other.

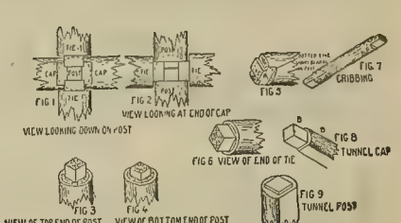


FIG 1
VIEW LOOKING DOWN ON POST
FIG 2
VIEW LOOKING AT END OF CAP
FIG 3
FIG 7 CRIBBING
FIG 6 VIEW OF END OF TIE
FIG 8 TUNNEL CAP
FIG 3 VIEW OF TOP END OF POST
FIG 4 VIEW OF BOTTOM END OF POST
FIG 9 TUNNEL POST

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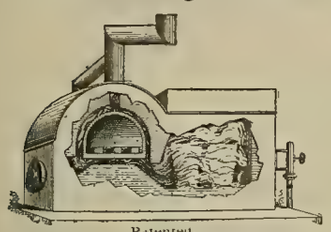

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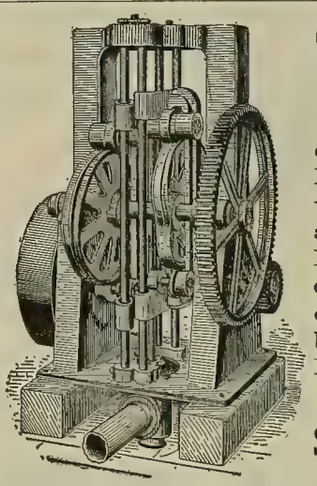

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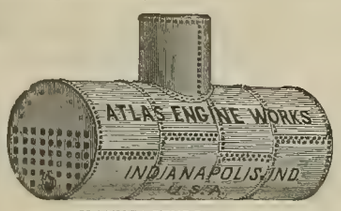

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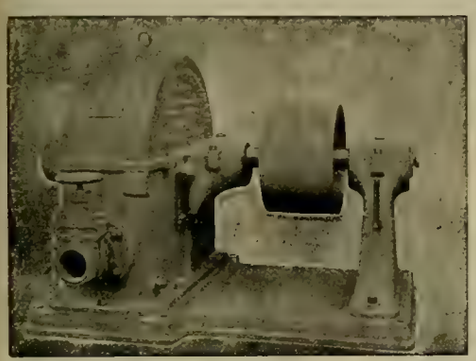

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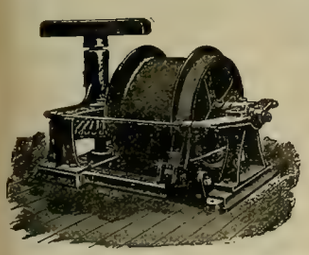

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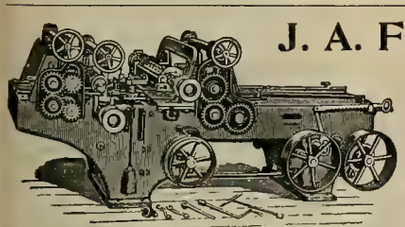

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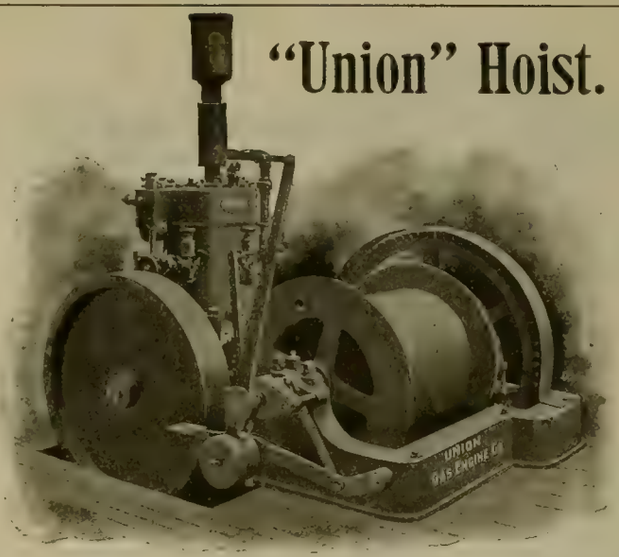

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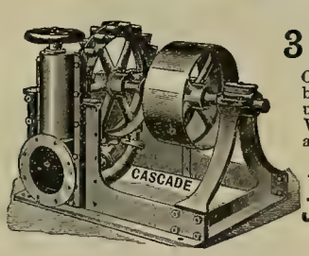

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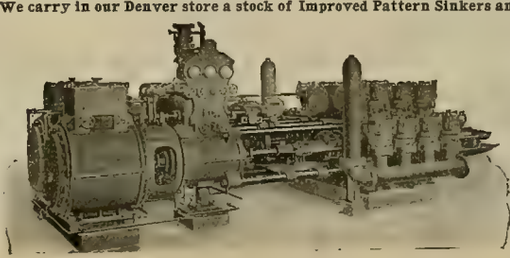

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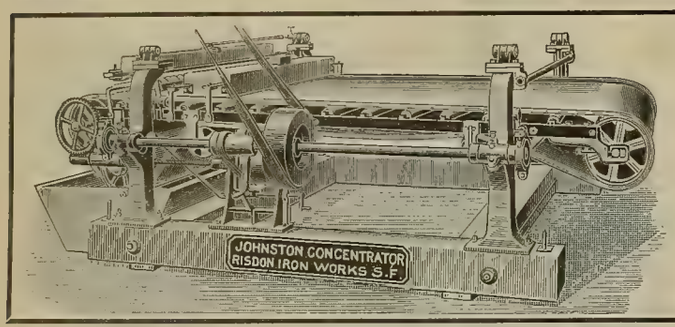

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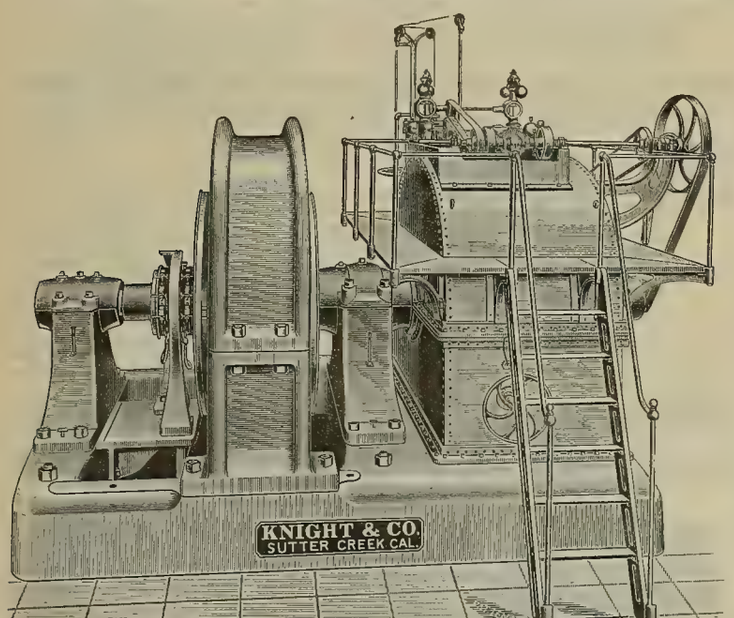

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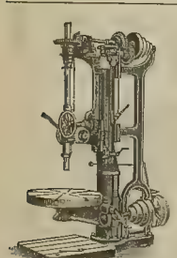

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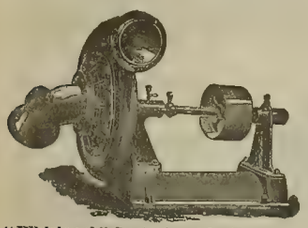

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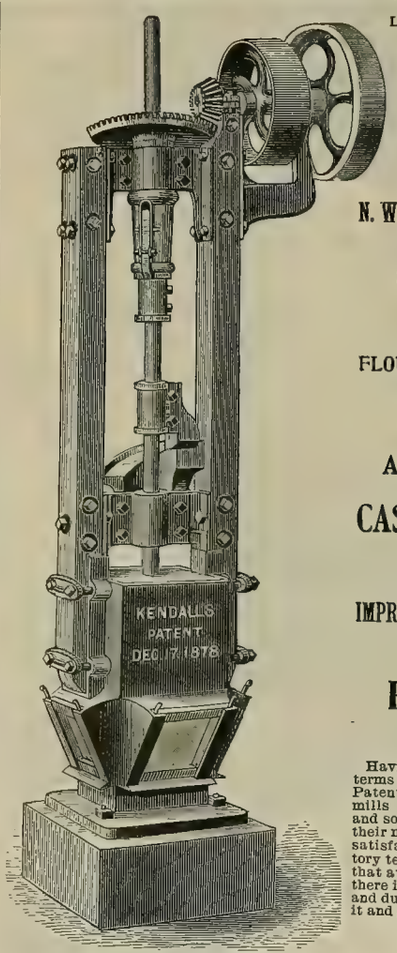

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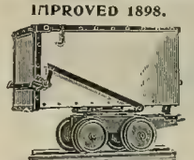

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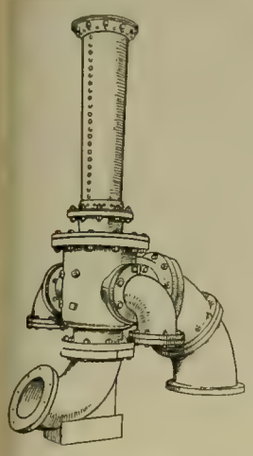

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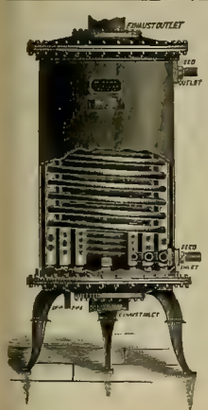

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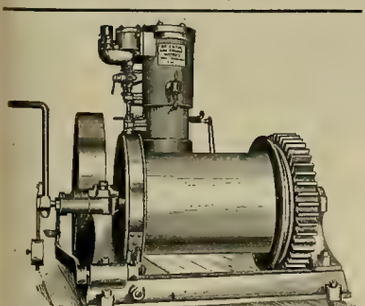

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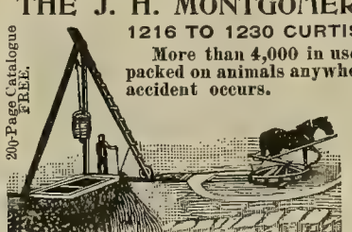

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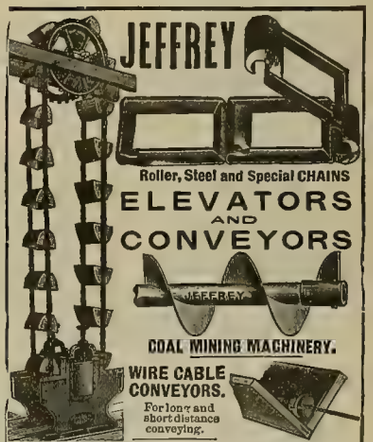

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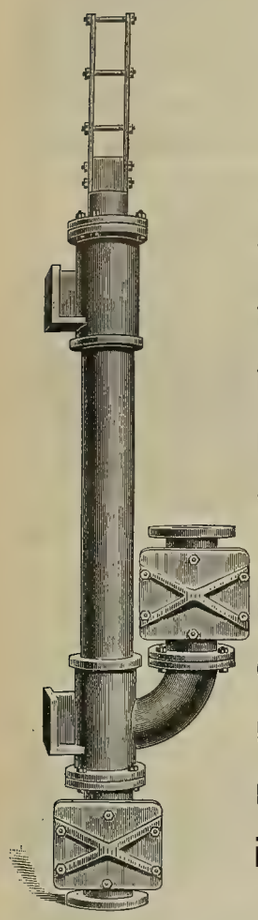

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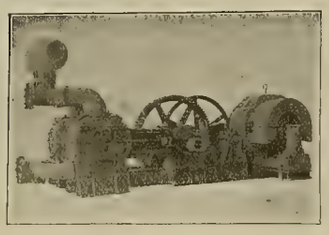

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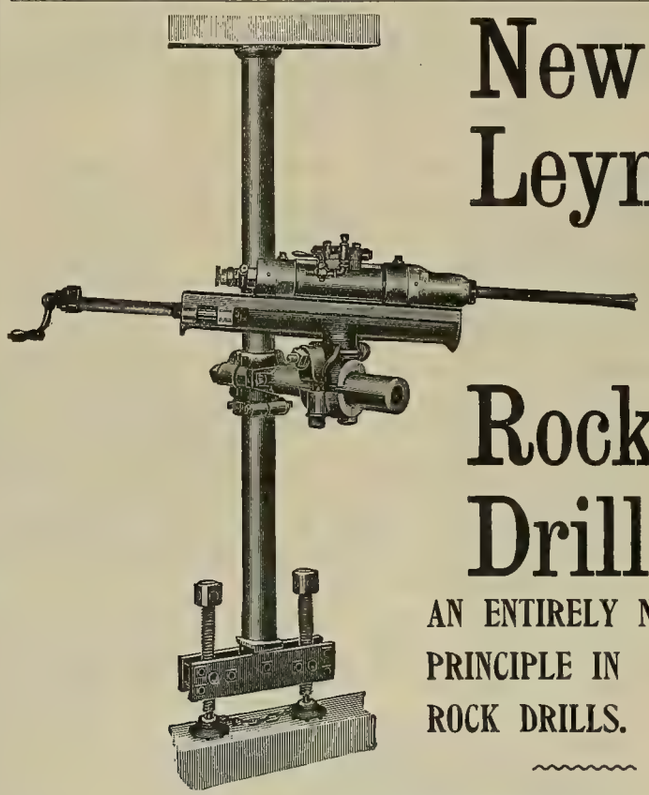

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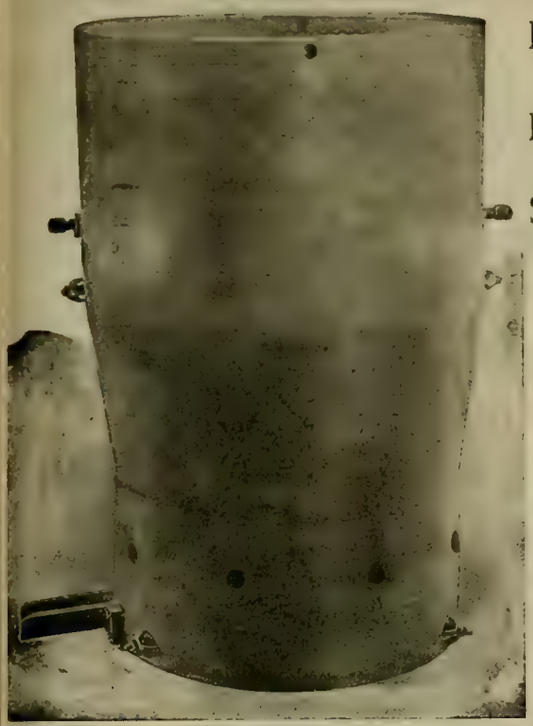

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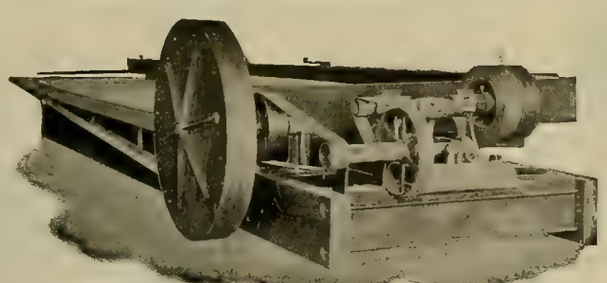

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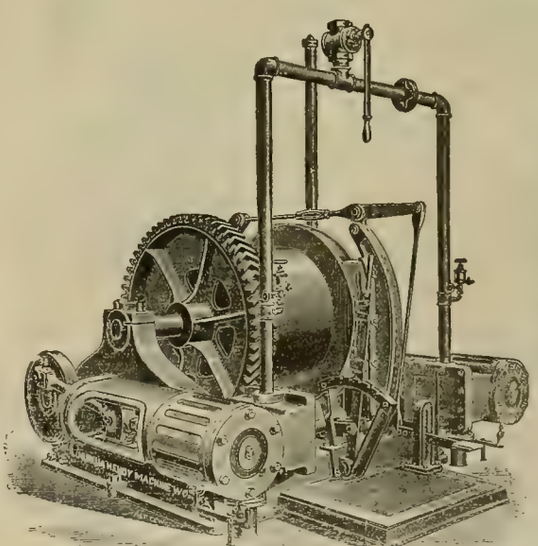

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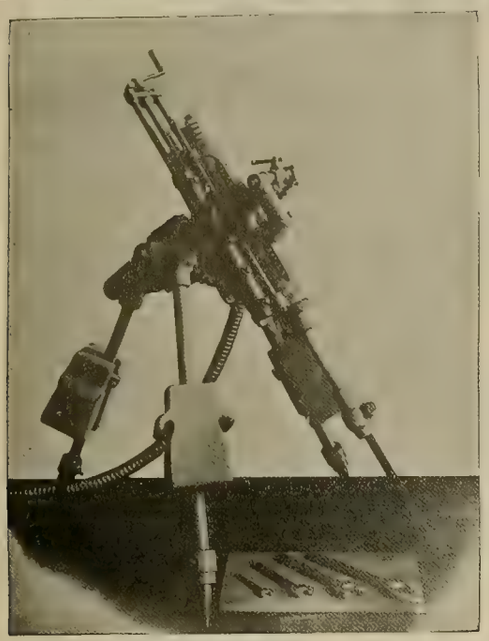

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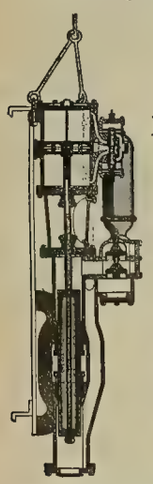

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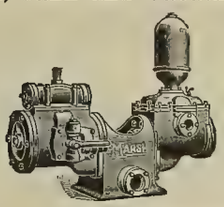

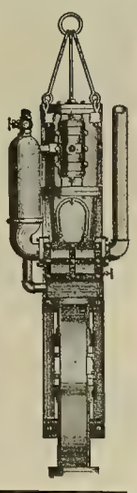

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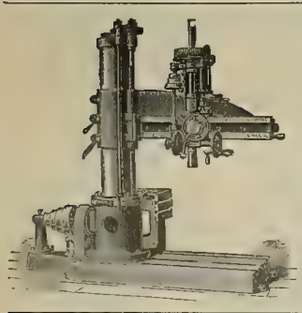

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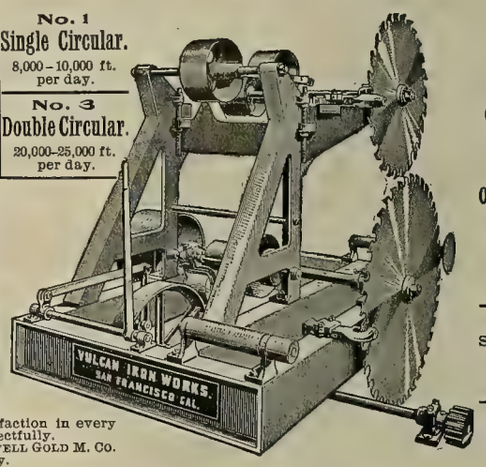

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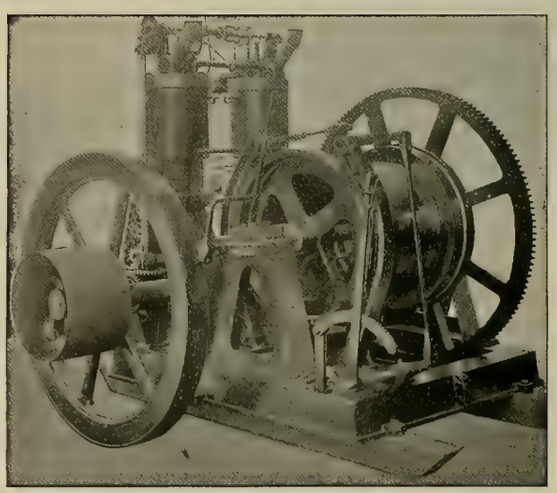

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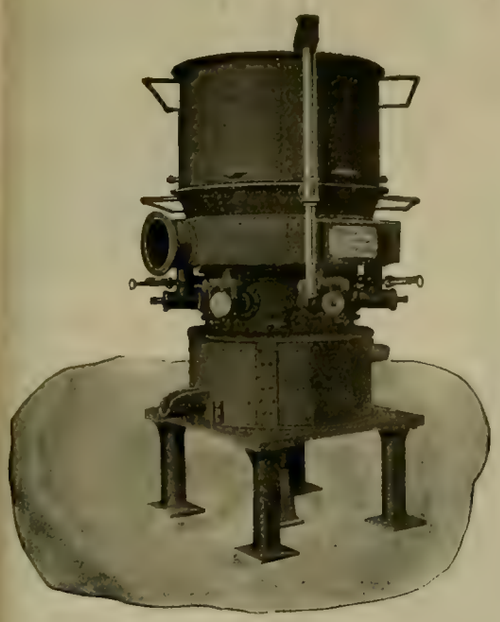

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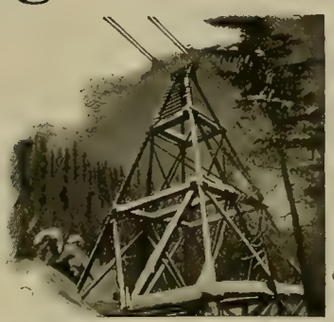

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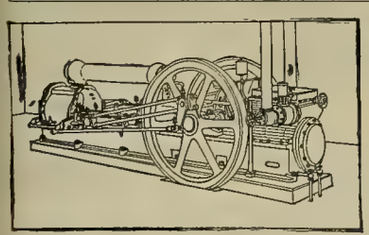

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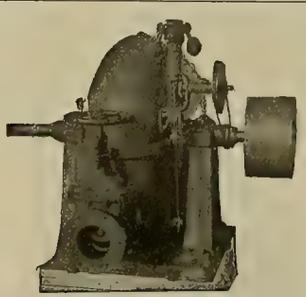

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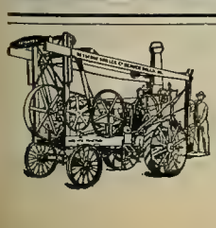

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Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

Market Reports.

SAN FRANCISCO, March 30, 1899.

SILVER. — London, 27¼d; New York, 59½; San Francisco, 59½; Mexican Dollars, 47½@48. New York exchange, sight, 15; telegraphic, 17 cents premium.

It is calculated that more fresh silver was added to the world's supply in '98 than in any year except '92, the total being 190,000,000 ounces, as compared with 183,096,000 ounces in '97 and 165,100,887 in '96. The market value was $105,000,000. In production the United States led last year with 60,000,000 ounces, Mexico coming next with 55,000,000. The average price for the year was 58.26 cents per ounce in New York, giving the silver dollar a bullion value of about 46 cents. The highest price in New York last year was 60.68 cents per ounce in September, and the lowest was 54.90 cents in March. A large increase is reported in the use of silver in the arts. A moderate demand for the metal continues in Asia. China, Japan, India and the Straits Settlements took 49,350,000 ounces from London, 12,990,000 from America and 7,000,000 from Australia. France coined some silver, and Russia a small amount. Spain wanted silver to scale down its obligations, but could not raise the money to pay for the bullion.

LEAD. — New York reports "barely steady," $4.37½ bid, $4.40 asked; brokers' price, $4.20.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 7c; bar, 7¼c.

COPPER. — New York reports Lake unchanged; $17.50 bid, $17.75 asked; brokers' price, $17.75. Local, bar, 24c per lb.

IRON.—American, soft, $22@24 per ton; Scotch, $27. Local bar, 2½c per lb.

STEEL.—12½c per pound.

TIN.—Pig, 30c per lb.; Bar, 35c. New York reports unchanged, $24.15 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¼c.

QUICKSILVER.—Local, $42.50@43; export, $39@39.50; carload lots, special rates.

PLATINUM.—London, 64s per ounce; New York, $16.50; San Francisco, $17. In '67 platinum sold for $4.40 per ounce. From that point the price advanced steadily until a corner was organized in '89, which put the price up above $20 per ounce. The great advance in price restricted the demand and resulted in a greatly increased visible supply. This metal was dumped upon the market in '92, and the price fell to $6.50, but not to the original quotations. After this slump the market quickly recovered to $12@16 per ounce, and the quotations have ranged within those limits the most of the time since that date. Increased demand now tends the price upward again.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13¾c; less than one ton, 15¼c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $8; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, bd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 2c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9¼@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1⅝@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7½c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¾c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less. This week the American Steel & Wire Co. made another advance of 15 cents a keg on the price of nails. Small lots are now quoted at $46 a ton, an advance since December of $23 a ton.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 30, 1899.

9:30 A. M. SESSION.

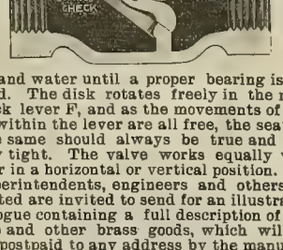
200 Andes	20c	200 Gould & Curry	45c
400 Best & Belcher	62c	200 H. & N.	37c
200 Belcher	49c	300 Mexican	78c
200 Crown Point	32c	300 Potosi	33c
300 Challenge Con	40c	200 Savage	33c
200 Chollar	40c	300 Union Con	65c
350 Con. Cal. & Va.	$2 25	400 Yellow Jacket	31c

2:30 P. M. SESSION.

600 Ophir	$1 30	200 Yellow Jacket	31c
600 Mexican	84c	500 Belcher	51c
500 Gould & Curry	49c	200 Confidence	$1 00
400 Best & Belcher	66c	400 Sierra Nevada	$1 35
750 C. Cal. & Va.	$2 35	350 Utah	23c
600 Savage	35c	500 Seg. Belcher	07c
1000 Cholliar	42c	200 Justice	24c
200 Potosi	35c	100 Overman	20c
200 H. & N.	36c	700 Union Con	68c
200 Crown Point	33c	100 Challenge	45c

New Re-grinding Swing Check Valve.

Herewith is illustrated a swing check valve that the manufacturers consider has some desirable points that merit its favorable consideration, they being in the line of improvement. It appears simple, efficient and is warranted to be tight. The re-grinding is quickly accomplished at any time by unscrewing the cap B from the shell A, inserting screw-driver into the slot E and rotating the disk back and forth with a little grinding



sand and water until a proper bearing is obtained. The disk rotates freely in the neck of rock lever F, and as the movements of the disk within the lever are all free, the seating of the same should always be true and perfectly tight. The valve works equally well either in a horizontal or vertical position.

Superintendents, engineers and others interested are invited to send for an illustrated catalogue containing a full description of the above and other brass goods, which will be sent postpaid to any address by the manufacturers—The Wm. Powell Co., 2525 Spring Grove Avenue, Cincinnati, Ohio.

Recently Declared Mining Dividends.

Morning Star M. Co., Colfax, Cal.; dividend No. 100, $2.50 per share.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed. MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

Cable address Edbee Codes, Lieber's Bedford, McNiel's, A B C Universal Commercial. U. S. A.

CREIGHTON & CO.,

Republic and B. C. Mining Stocks.

Reliable quotations furnished on all standard British Columbia, Washington and Idaho Stocks.

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SPOKANE, WASH.

UTAH

Mines—Dividend Paying and Investment Stock.

W. E. HUBBARD & CO., 15 W. 2d So. Street, SALT LAKE CITY.

PACIFIC EXPLORATION COMPANY

Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.

W. E. Holbrook, Pres't. L. F. Haskell, Sec'y. 29-30 Chronicle Building, S. F.

Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

STERLING DRILL STEEL.

A high grade Crucible Cast Steel, especially adapted for drilling in hard rock.

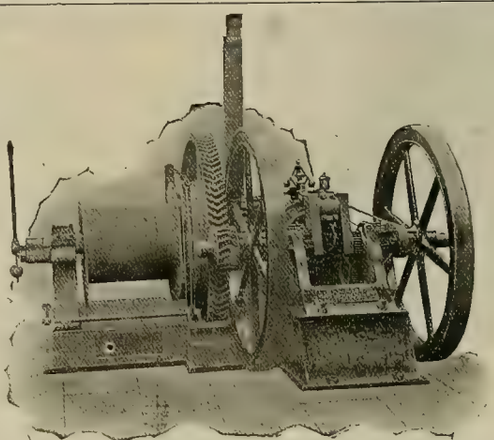
Price 12½ cents per pound.

Manufactured by

FIRTH-STERLING STEEL COMPANY.

ABNER DOBLE COMPANY, General Agents,

S. W. COR. FREMONT & HOWARD STS., SAN FRANCISCO, CAL.



FRESNO, June 25, 1898

Hercules Gas Engine Works, San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,

305 MARKET STREET, SAN FRANCISCO, CAL.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

ELECTRICAL ENGINEERING COMPANY,

MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,

ALSO REPAIR AND JOB WORK OF ANY KIND.

Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.

509-511 Howard St., - San Francisco.

THE JACKSON HAND POWER ROCK DRILL.

NO JAR. EASY RUNNING. POWERFUL BLOW. RAPID STROKE.

Operated by One Man. Works in Any Rock or Position.

.....Write for Circulars and Testimonials to Your Hardware Dealer or to the Company.....

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Offices 1756 Larimer St. Box 1352. Denver, Colorado.

New York Office, 120 Liberty St. Cable Address: "Jack Drill," N. Y., ABC Code (4th Ed.) and Lieber.

WE ALSO DEAL IN GENERAL MINING MACHINERY AND SUPPLIES.

REPUBLIC and ROSSLAND Mining Stocks

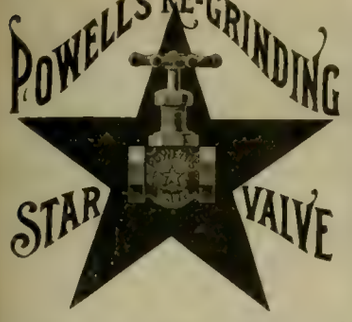
Bought and sold for non-residents. SOLID DIVIDEND PAYERS as an investment. Prospective producers as a speculation. Write for information.

H. P. PALMER & CO.,

Exchange Nat. Bank Bldg., SPOKANE, WASH.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc. Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St. S. F.



A Valve that Shuts Steam Off TIGHT.

Full particulars by addressing the manufacturers,

The Wm. Powell Co.,
CINCINNATI, O.

Puget Sound Machinery Depot, Seattle, Wash. carry a stock.

Assessment Notices.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of March, 1899, an assessment (No. 17) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 28th day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the seventh (7th) day of March, 1899, an assessment (No. 66) of ten (10c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 33 Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the tenth (10th) day of April, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the second (2nd) day of May, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33 Nevada Block, No. 309 Montgomery street, San Francisco, California.

HEAD CENTRE CONSOLIDATED MINING COMPANY.—Location of principal place of business San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1899, an assessment (No. 7) of twenty (20) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of May, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1899, an assessment (No. 6) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 1st day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

G. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California. Office hours from 1 to 3 P. M.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of March, 1899, an assessment (No. 18) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of April, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENT AGENCY
PATENTS
330 MARKET ST. S.F.

DELINQUENT SALE NOTICE.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 8, new series) levied on the 8th day of February, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Frances Pierce	226	215	$15 05
John T Thornton	154	50	3 50

And in accordance with law, and an order from the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, room 10, No. 324 Pine street, San Francisco, California, on WEDNESDAY, the 12th day of April, 1899, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. P. THURSTON, Secretary.

Office—324 Pine St., San Francisco, California.

JAMISON MINING COMPANY. Rooms 50 and 54, No. 120 Sutter street, San Francisco, California. March 21st, 1899. SEMI ANNUAL DIVIDEND NO. 3.

At their meeting of March 21st, 1899, it was resolved by the Board of Directors of the Jamison Mining Company to pay to the stockholders of the company from the surplus funds in the treasury, a dividend of Eleven Thousand Seven Hundred Dollars ($11,700), being three (3) cents per share on the capital stock of the company.

The dividend will be payable at the office of the company on the 15th day of April, 1899, to all stockholders of record on the 5th day of April, 1899. Transfer books will be closed at the close of business on the 5th day of April and reopened on the morning of the 17th of April, 1899.

SAM. W. CHEYNEY, Secretary.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the GWIN MINE DEVELOPMENT COMPANY will be held at the office of the company, No. 1209 Claus Spreckels Building, San Francisco, California, on TUESDAY, the 11th day of April, 1899, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer books will close on Saturday, April 8th, at 12 o'clock noon.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels Building, San Francisco, California.

A Small Sinker AT A Small Cost.

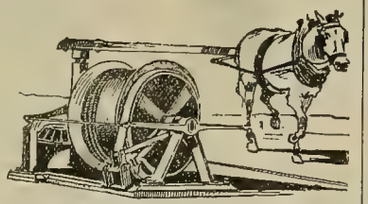
THE MOORE SINKING PUMP.

1500 Gallons per hour.
300 foot lift.
Wt. 450 lbs.

No outside valve gear. Valve requires no setting. Is simplicity itself.

Address
C. B. BOOTHE & CO., Los Angeles, Cal.
H. H. FIELDING, Denver, Colo.
JOHN POOL, Portland, Or.
or M'f'r's, UNION STEAM PUMP CO., Battle Creek, Mich.

EL PASO
Automatic Horse Whim.



This is the latest improved horse power hoist offered prospectors, possessing all the best features of other styles with improvements added. The end thrust is entirely done away with, thus increasing the efficiency and saving considerable wear. **The Automatic Safety Brake** is so arranged that accident is impossible, being in position until held out by operator to lower bucket. ::::: It is made entirely of iron and steel. Weight, about 1400 pounds

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MICHIGAN COLLEGE OF MINES.
Supported by the State of Michigan. Practical work. Elective system. Special advantages for men of age and experience. For catalogues address
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DEARBORN Drug and Chemical Works. Laboratories. Water Chemists. Vegetable Boiler Compounds.

ALL KINDS OF ANALYSIS. OILS A SPECIALTY. WATERS FREE.

Finest and Largest Laboratories in the World.

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Weber Hoists. 6 to 100 H. P.

Cost to Run, 1c per hour per H. P.

All Latest Improvements.
Get Catalogue.

WEBER GAS ENGINE CO.,
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FOR SALE BY ALL DEALERS.

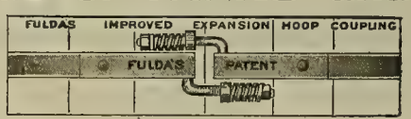
Coast Representatives,
Schaw, Ingram Batcher & Co.
SACRAMENTO and SAN FRANCISCO.
Machinery & Electrical Co.
Los Angeles.

Guaranteed equal to Jessop's or Firth's in rock work.

HAMMERED, NOT ROLLED.

CANTON STEEL CO.,
CANTON, OHIO.
—Manufacturers of—
Canton Extra Drill Steel,
Canton Tool Steel,
Canton Pick Steel.
Superior to all others both in TOUGHNESS and ease of WELDING.

Fulda's Planing Mills and Tank Manufactory,
30 to 40 SPEAR ST., SAN FRANCISCO, CAL.
—MANUFACTURERS OF—
All Kinds of TANKS and VATS.



Our Patent Self-Tightening Hoop Coupling is the Only Practical Method of Keeping a Tank Tight at All Times Without Any Care or Trouble.

—WRITE FOR PRICE-LIST.—

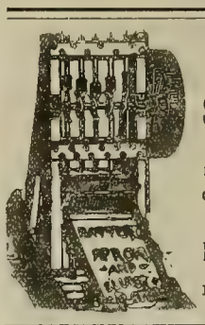
Sulphuric Acid

—MANUFACTURED BY—

THE WESTERN CHEMICAL CO., Denver, Colo.

For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas, Etc.

Our CHEMICALLY PURE ACIDS and AMMONIA are guaranteed perfect.



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Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.
Every Description of Mining Plates Made.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES REPLATED. TWENTY-SIX MEDALS AWARDED. GOLD, SILVER, NICKEL, COPPER & BRASS PLATING.

Denniston San Francisco Plating Works,
653 and 655 Mission Street, San Francisco, Cal.
E. G. DENNISTON, - - - - - - - - - - Proprietor
Telephone, Main 5981. Send for Circular.

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FOWLER'S
Fossil and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
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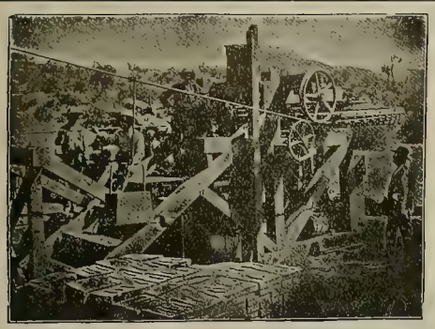

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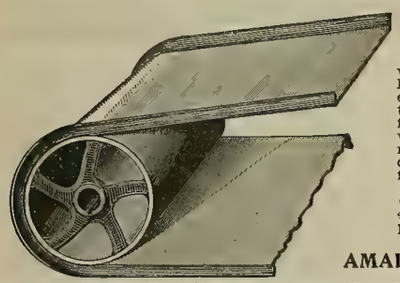

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January 2, 1897.

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February 19, 1897.

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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2022.—VOLUME LXXVIII. Number 14. SAN FRANCISCO, SATURDAY, APRIL 8, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Equipment and Development of New Mines.

When a new mine is to be equipped and developed, it is desirable to place on the property machinery suitable for the purpose of development and to block out the ground as expeditiously and cheaply as possible. There is much diversity of opinion among mine superintendents as to what comprises a proper equipment and also as to what lines of development should be followed. As a matter of course, the plan adopted will be influenced by the conditions under which the mine will operate. As all undeveloped mines are most uncertain as to size of ore deposits, value of ore, amount of water that may be encountered and character of ground, it is wise to anticipate difficulties, even in a mine which at or near the surface seems more favored than some of its neighbors. As the quantity of ore that may be found is unknown when development commences, experience has shown that it is unwise to put up an expensive hoisting plant until it has been determined that such a plant would be necessary. Veins large at the surface may not continue large in depth, and even should they do so, the value of the ore may be such as to afford no profit, in which case no hoist would be required at all. On the other hand, some mines, small and low-grade at and near the surface, in depth develop large ore bodies of great value.

In such cases the small prospecting plant may be replaced by such a one as the development of the mine may justify. For a relatively small sum of money a good hoisting plant may be set up which will hoist at moderate speed 1000 pounds of rock at a load, with which a large shaft may be sunk many hundreds of feet.

Abundant power should always be provided, however, whether steam, water or electricity be employed, for the reason that many shafts comparatively dry near the surface become very wet in depth. When a large influx of water occurs, whether it prove to be a permanent and constantly increasing quantity as depth is attained, or whether, after a sudden rush of water, it is found to steadily decrease as pumping or bailing is continued, abundant facility for handling a larger quantity of water than has ever been encountered should always be at hand. Large valve buckets are very useful as auxiliary to pumps when working in levels, but a valve bucket is useless when sinking.

When the shaft has reached a depth of 500 to 1000 feet and levels run along the ore body or vein, crosscuts made and raises put through, the manager has a definite idea of the quantity of material exposed possessing a net value, and can then put in a hoisting plant suited to the requirements of the mine. It would be unwise to put in a hoist capable of raising 2000 or 3000 tons of ore in twenty-four hours at great velocities, when it would be found difficult to supply a 40-stamp mill with 100 tons of ore daily from a small vein. Very large ore bodies may be extracted hurriedly, the chambers timbered and filled as the work progresses. A mine capable of supplying 1000 tons of ore or twice that amount daily should be equipped with engines capable of raising that amount and doing it easily.

What applies to hoisting engines applies with equal force to metallurgical plants. The character and capacity of plants for the beneficiation of ores cannot be determined upon with safety until the development of the mine has demonstrated its capacity and the character of the ore. Mistakes in this direction are probably of less frequent occurrence than formerly, but it is not many years since it was not uncommon to see a smelter erected to treat dry ores and wet-crushing stamp mills built to treat lead carbonates and galena. There are very few ores indeed that cannot now be successfully treated by some one of the many processes in practical operation in every corner of the world. All that now remains to do is to ascertain the one best adapted to the ore in question, all things being taken into consideration, as cost of transportation, chemicals, fuel, labor, etc. Improvements and lower cost in the processes of to-day may be anticipated and new processes which will treat some ores successfully may be expected to supercede processes now in use.

In shaft sinking it is cheaper to cut out the stations when the various points at which levels are to be run are reached, and the levels should also be started at such time, sinking only enough to afford a sump below the level. In mines where it is evident a large amount of ore is to be handled, where skips or buckets are used for hoisting, it is very good practice to cut out under the floor of the level a space for an ore bin or pocket into which ore or waste may be dumped from cars trammed to the shaft from the faces of the drifts or from the chutes. This provides an economical means of loading skips and hoisting may be carried on independent of stoping and tramming. The first level in the mine should be run from the shaft at a point above which little or no stoping will be done, at least not for a long time. Having run this level work in it may be discontinued for the time and the shaft carried on down to the next level. It is not necessary to stop shaft sinking to run the level, except while cutting out the station, the ore pocket and starting the level. Having run the second level, the location of raises may be established, and when this is done winzes may be started in the level above at points on the vein immediately above the raises. By this means the connection is more quickly made, and it will be found that the employment of the extra men on the windlass or auxiliary hoist at the winze pays, for men will not and cannot work to advantage in a hot raise laden with powder fumes. Good ventilation is a most important factor in the economy of mining.

GENERAL VIEW OF MAGALIA DRIFT MINE, BUTTE COUNTY, CAL. (See page 372)

The detail of arrangement of mill holes is so various that that feature need not be discussed. When opening the third level it will be found advantageous not to put the next series of mill holes directly below the series above, but at some little distance to one side, which greatly lessens the likelihood of accident.

In recent years a great many shafts are being sunk in the walls of the vein in preference to sinking on the vein. This is usually, though not always, good practice. Where the fissure is known to be soft and accompanied by swelling ground next to the fissure, it is far better to sink in the wall, and, in the case of a wide vein, always in the foot wall; in a small vein, or one of moderate size, either wall may be safely chosen, though the foot wall is preferable. Of course, such conditions as are referred to can only be known by proximity of a developed mine on the same vein, as was the case of the Argonaut mine, at Jackson, Amador Co., Cal., where the extensive development of the Kennedy mine adjoining showed that a shaft in the wall was to be preferred to one in the fissure. A prospect shaft should always be sunk on the vein, when adjoining mines give no indication of what may be expected, and, if the development be satisfactory, a permanent working shaft may be sunk at a point with reference to the position of the ore shoots and their trend. Tunnels for development should always, where possible, be driven on the vein.

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ESTABLISHED 1860.

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J. F. HALLORAN.....Publisher

San Francisco, April 8, 1899.

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TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

THE Central Eureka mine, near Sutter Creek, Amador county, Cal., is making a record in shaft sinking, the average being 5 feet per day, at a depth of nearly 1200 feet.

THE recent report of the directors of the Geldenhuis Estate Co. of Johannesburg, S. A. R., shows the affairs of the company to be in excellent condition. Large profits are realized from the operation of their several mines and dividends to the amount of 97½% paid, but a large cash balance is also retained in the treasury for contingencies—a practice well worthy of emulation.

BRITISH COLUMBIAN mine owners are agitating a plan to have lead mined and smelted in Canadian territory and refined in the United States, permitted to re-enter Canada duty free. At present 6,000,000 pounds of lead are annually shipped into Canada, upon which the duty is 15%, and on this the lead manufacturer has to pay the cost of freight to London and return, as well as the duty of 15%.

COMPLAINT is made in British Columbia that the Canadian Pacific R. R. Co. is secretly working against its openly expressed intention to further British Columbia lead smelting by keeping its Trail smelter in operation. It is held that the January meeting at Spokane, Wash., between its representatives and those of the United States smelters, resulted in an agreement that the latter should pay the former $5.50 a ton on all lead ore carried from British Columbia into this country, and that the Canadian railway corporation proposes to charge the same for treatment at Trail as that charged by the United States smelters. Omaha smelter charges are $8 per ton: it costs British Columbia lead miners $20.50 per ton to send their ores to the Omaha smelter and have them there smelted, and the British Columbia people think their local railway company ought to make reduction on treatment charges, while they protest against the bonus secured on the American business. The mistake the British Columbia people make is in assuming that a railway company's business is run on a philanthropic basis. Canadian Pacific stockholders want dividends. The business of that corporation is primarily to make money in the carrying trade. Where it enters into the business of smelting that must give way to the primary requirements of the main purpose—to run a railroad at a profit.

Copper Values With Depth.

Natural interest is felt in recently published assertions in Eastern papers that Lake Superior copper mines are growing leaner with depth, and decreasing in ore value as the workings go down. Apart from the inevitable "working" of the street, on any statement and with any argument to put stock up or down, the matter is one deserving notice on general grounds. If Michigan copper ore veins grow poorer with increased depth, the fact is of interest to copper miners everywhere. It has been generally assumed that at the depth of a mile below the surface some Lake Superior copper mines showed no exhaustion of quantity nor any diminution in value, and that the downward limit of profitable working could be determined only by the degree of heat in sinking on an amaygdaloid lode. Such view, while attacked, has not been overthrown, and the arguments directed against it seem susceptible of contradiction. The chief argument advanced by those who claim the Lake Superior copper mines are petering out is an array of figures showing lessened percentage of copper in the ores mined and milled in the Tamarack, Atlantic and Quincy in '98 as compared with '87, '86, and '76. While this certainly would, by itself, seem to substantiate the claim of decreasing values, yet every miner knows that unless accompanied by full and accurate details, such data are of no value. Such figures may upset the street, may bull or bear the stock, but in the absence of corroborative showing no miner will consider the question more than raised. Assuming, for the sake of argument, that everything claimed by the published figures referred to may be so, they prove nothing. True, they suggest that as the workings extend downward the ore is poorer, and thus directly imply that a limit will be reached where the ore has not sufficient percentage of copper to pay for extraction. But the question so important to the copper miner everywhere—does the ore give out at great depth?—is not thus determined. Indeed, it is probable that were full and exact data forthcoming, the truth would be apparent that so many other things enter into the problem as to indicate that the reverse of the assumption was in line with the facts, and that the ore averages were up to former standards. "Averages" are referred to. It is only by "averages" that the increasing or decreasing value of a great mine can be rightly determined. In such enormous depths as those attained in the Lake Superior district the picking out of the work of isolated years constitutes misleading comparison. Take, for example, the Quincy mine, one of the three mentioned. In a letter to the Boston News Bureau, H. J. Stevens, a well-informed local correspondent, shows that "the Quincy mine was merely a fair one to a depth of 1000 feet. From 1000 feet to 1200 feet the rock was so lean that it did not pay for stamping. Below the 1200-foot level the mine became far richer than ever before, and has remained so to the present depth of approximately 4500 feet." He also brings up a factor of considerable importance in showing that in that district closer milling is now the rule. "It costs but one-half to two-thirds as much money to stamp a ton of rock as it cost ten to twelve years ago, thanks to improved machinery and methods. This enables mine managers to stamp rock at a profit which by reason of its paucity of metal must have been discarded one or two decades ago. This reduces the percentages from rock stamped, but increases the percentages from rock mined." Regarding another of the mines mentioned—the Atlantic—it is further in evidence that in that mine every pound of rock from wall to wall, about 85 feet across, goes under the stamps, and it is manifest that when so much inevitably poor rock thus goes through, the percentage of copper to the ton stamped must as inevitably be low. The case seems in some respects parallel to that of so many California gold quartz mines that, though now paying handsomely, were at one period on the point of abandonment because they did not "go down." So far as observable, there is nothing in the present onslaught on the Lake copper mines stock to warrant cessation of downward operations on copper properties.

THE last California Legislature appropriated $130,000 to pay the expenses of collecting and maintaining an exhibit in Paris in 1900. It provides for the appointment of three commissioners to the Paris Exposition, to have control of funds and exhibits. They are to get $5000 each and all expenses, and each must give a bond to the State, in the sum of $10,000. Of the $130,000 the mining industry of the State is to have $25,000. Any additional amount for appropriate mining display at the exposition must be otherwise provided. The mineral industries of the entire United States have been allotted 8000 superficial square feet of space for exhibition purposes at the exposition. Of this area nearly one-half will naturally be required for aisles to afford passageway through the exhibits, leaving probably 5000 square feet of actual exhibiting space. To fill this strip, about 50x100 feet, the United States would probably be represented by the iron and coal mines of Pennsylvania, Ohio and Alabama; the iron mines of Michigan and Minnesota; the copper mines of Michigan, Montana and Arizona; the gold and silver mines of California, Colorado, Arizona, Utah, New Mexico, Montana, South Dakota, Wyoming, Idaho, Washington, Oregon and Nevada, and the lead and zinc mines of the Mississippi valley States. Here are no less than eighteen States—and there are still others. If each State is given an equal amount of space, which they undoubtedly have the right to demand, the allotment to each will be about 280 square feet, which would be covered by a line of flat show cases 8 feet wide and 35 feet long. It becomes at once apparent how ridiculously inadequate the space will be should there be a fairly representative exhibit. It is equally apparent that any mining State that wants proper representation should appoint its commissioners and begin its work, the sooner the quicker.

"WHAT did the last Legislature do with California mining law?" is the gist of numerous questions received since the California Legislature adjourned. It repealed the Act of March 27th, '97. Nothing else it did about mining is of effect. It passed a law providing how claims should be located, but the Governor refused to sign it. So that the California miners are just where they were before the Act of March, '97, was passed. The Legislature which adjourned in '97 passed an Act prescribing the manner of locating mining claims, recording notice of location, amending defective locations, providing for the deposit of district records with county recorders, and prescribing the effect to be given recordation of notices of location and affidavits. Some things were badly needed then, and are as badly needed now. One was a plain, clear, precise definition of what constitutes proper marking of location. This the Act of '97 did not contain. It did contain several provisions that were desirable, but was defective and unsatisfactory. Nothing was done by the latest California Legislature regarding the State school lands. The preceding Legislature, however, repealed the Act of March 28th, '74, providing for the sale of mineral lands in sections 16 and 36—school sections ceded to the State by the Federal Government. This matter is of considerable importance. The repeal, in effect, relinquished any State claim to mineral lands in the township sections specified, they being declared to be "free and open to exploration, occupation and purchase of the United States, under the laws, rules and regulations passed and prescribed by the United States for the sale of mineral lands."

THE recent decision of Judge Hallett in the U. S. Circuit Court of Colorado, in the case of the Matoa Co. vs. the Chicago-Cripple Creek Co., is important in that it determines the rights of both tunnel locators and those who were previously located on the line of the tunnel. According to this decision, the locator of a tunnel site cannot drive his tunnel through ground previously located by others without an agreement with such prior locators. The tunnel locator is entitled to 3000 feet of every vein he may discover crossing his tunnel—1500 feet on each side—whether apexing on the surface or not, and not previously claimed; but he may not enter within the lines of a previous locator in search of such veins.

Concentrates.

THE better way to write the date of the present year in Roman letters is MCIM.

THE next session of the Northwest Mining Association will be in Seattle, Wash.

EMPLOYES of the Mountain Copper Co., Shasta Co., Cal., pay an annual hospital tax of $12 to the company.

F. B. CRONIN of Melbourne, Australia, announces an invention "for saving gold by means of mineral oil."

AN experiment is not an experiment for practical purposes unless every condition of the larger plan in view is included.

TEN per cent copper ore should pay handsomely under ordinary conditions. Quincy, Mich., copper ore averages 8.5%.

THE Marconi system of telegraphing through space without wires was illustrated and described in detail in the issue of Jan. 8th, '98.

THE "Boise basin" is not a bowl-shaped depression, but a section of country made up of the valleys of the Weiser and Payette rivers, Idaho.

THE pumice mined at Black Rock, Utah, is principally bought by the Chicago Pumice Co., the finished product selling in that city at $25 to $33 per ton.

THE last U. S. Congress appropriated $15,000 for the maintenance of the California Debris Commission, and traveling expenses for the Commissioners when engaged in their work.

A NEW mining law goes into effect June 21st, '99, in Colorado of interest to many there. It abolishes the extra trial in ejectment suits which have hitherto constituted a large part of Colorado's mining litigation.

A TECHNICAL description of the process of making briquettes from fine ores for smelting was published in the issue of Feb. 18th, '99, page 175. Parke & Lacy Co., 23 Fremont St., San Francisco, supply those machines.

CONSUL URBAIN J. LEDOUX of Three Rivers, Quebec, furnishes a report of Canada's mineral productions in '98. Of the total output of metallic products, valued at $21,622,601, $13,700,000 was gold, $10,000,000 representing the Yukon output.

THERE is nothing unusual in a daily crushing of five tons rock by a stamp. Such duty is often exceeded. It is not uncommon for a California stamp mill to average five and one-half tons of rock per stamp per twenty-four hours. for a month at a time.

IT has been asserted without contradiction that the first inventor of the modern way of hanging up a stem in a stamp battery was a German who made and put in use such a device at the Reese mill, Sierra Buttes gold mine, Sierra Co., Cal., in the early fifties.

A PARTIAL bibliography of articles on the cyanide process, the name of the paper in which it appeared, the name of the author, and the date of appearance, was published in the issue of Nov. 28th, '96. Of about 200 articles so classified, 51 appeared in these columns.

WATER may be removed from tanks or mines or other excavations by means of the syphon to a depth where the atmospheric pressure equals the weight of a column of water. Theoretically this is 33 or 34 feet at sea level, but this diminishes with increasing altitude.

OPTIONS on mining claims to the amount of about $2,000,000 in the Buffalo Hump region in Idaho, since its discovery a few months ago, is somewhat unusual, in consideration of the fact that its principal mine—the Big Buffalo—is reported to be no more than a good prospect.

ITALIAN miners are increasing in numbers in Colorado. Colorado mine owners who employ them say about 60% of their earnings is sent back to Italy. They are all union men and get the union scale of $3 per day, of which they save $2. Few are married, and fewer naturalized.

URANIUM, or pitchblende, is usually associated with lead and silver, sulphur and arsenic. The pure mineral contains only the oxide. That is used in imparting fluorescence to glass and decorative painting. Ore containing less than 10% uranium oxide is of little commercial value.

THE Superintendent of the Mint at San Francisco may purchase mutilated and uncurrent silver coins in sums in excess of $3 at the price fixed by the Director of the Mint for silver contained in gold deposits. Such coins should be sent to the Mint by registered mail or express, prepaid.

A GOOD flux suitable for many ores is composed of six lbs. bicarbonate of soda, four lbs. litharge and two lbs. borax glass. A cheaper composition, and one that usually gives satisfaction, is made of six lbs. bicarbonate of soda, four lbs. thirteen ozs. litharge, and three lbs. powdered borax.

THE present status of California mining law is precisely what it was before the law of March 27, '97, was passed. That law prescribed the manner of locating mining claims, recording notices, affidavits, etc., and was repealed by the recent Legislature. It ceased to be a law on the 1st inst.

THE battleship Iowa, now in San Francisco bay, was begun Aug. 5th, '93, and was delivered to the Government in August, '97. She is 360 feet long, 72½ feet wide, draws 24 feet of water; her engines had an indicated horse power of 11,000. Her rated speed is 16 knots (17.76 miles) an hour. She cost $4,000,000.

A COLORADO metallic extraction company's circular contains some remarkable statements. Not content with the customary "revolutionizing the science of gold extraction," which, of course, is incidental, this company "has already treated successfully a moss which grows on the river on which it proposes to erect a mill."

TO FIND the total pressure of quiet water on a dam, tank, lock gate or other surface, multiply together the area in square feet of the surface sustaining the pressure, the vertical depth in feet of its center of gravity below the surface of the water, and the constant number 62.5 and the product will give the pressure in pounds.

AN assignment of a patent, either in part or the whole patent, must be made in writing and duly recorded. Any transfer short of this is a mere license, gives licensee no title in the patent and no right to sue in his own name for infringement. Any rights of the licensee must be enforced through or in the name of the owner of the patent.

WITH ordinary precaution there need be no danger of accidents from the use of a gas or gasoline engine in or around a mine. Of course, where explosive gas is generated, a gasoline engine igniting from an external flame is not advisable; but, ordinarily, no greater degree of precaution is necessary than in the use of any other form of applied power.

MARIPOSITE is a scaly micaceous mineral of beautiful emerald green color, and occurs abundantly along the gold belt of California, being usually associated with a dolmitic rock, which latter sometimes graduates into ankerite. Mariposite was first described by Prof. Silliman, Dec. 2, '67. Its composition is variable. It never occurs massive, but always as a scaly mineral.

PROBABLY the highest dredging for gold anywhere is that at Breckenridge, Summit Co., Colorado, over 9000 feet above the sea. Placer mining goes on in that locality near the source of the Platte river, at Mt. Lincoln, which is 14,000 feet above the ocean level. An illustrated article on page 376 gives further details of placer and quartz gold mining in high altitudes in Colorado.

THE thirty forest reservations of the United States embrace an area of 40,000,000 acres in thirteen States and Territories. Seven are in the State of California, the largest of which—the Sierra forest reserve—includes 4,006,000 acres. Within the past thirty-five years it is estimated that 11,000,000,000 feet B. M. of timber on public land have been destroyed by forest fires.

IN constructing dams, piers, walls or other structures of similar character, it is very essential that the foundation be placed on rock when possible, for when water is able to find its way underneath such structure, the upward hydrostatic pressure of the water has a tendency to lift the structure with a force equal to the weight of the water displaced by the structure.

IN his recent report, Le Neve Foster, Inspector of Mines in Great Britain, presents figures showing that the United States leads in the world's production of iron, Great Britain second, Germany third. Spain produces the largest quantity of lead, the Malay peninsula nearly two-thirds of the world's supply of tin, and Upper Silesia makes Germany foremost as a zinc producer.

THE directors of the Mountain Copper Co., Ltd., Keswick, Shasta Co., Cal., report that the revenue for '98 showed a gratifying increase, and the net profits, after deducting all costs and charges, amounted to $816,160. It is proposed to pay on the 5th inst. a final dividend of 5%, making 7½% for the year, to place $345,000 to the credit of the reserve and depreciation fund and carry forward $640.

LOWERING of treatment charges; increased transportation facilities; better knowledge of processes and surer results; reduced cost of machinery and supplies; competition of labor and competition of capital; constantly increasing demand for the product; the certainty of science as applied to commercial effort—these are among the causes of the changed conditions and the great advance in the mining industry.

THE strength of a man for continuous work, maintained for eight hours a day, is estimated as one-tenth of a horse-power. The engines of the battleship Oregon develop and maintain 9500 H. P. To maintain the same power by human muscles—for instance, by men turning cranks geared to the screw-shafts—would require 285,000 men, 95,000 on each eight-hour shift—more than all the men in California.

AN assay office, as at Helena, Mont., Boise, Idaho, Denver, Colo., or Carson, Nev., will advance 90% on all the gold left there, and, when the actual value is determined, will settle by check on the sub-treasury. All settlements are on the basis of fine gold. British gold is eleven-twelfths fine; American, French and German, nine-tenths. American gold coin is received at its face value till it has lost one-half of 1% by wear, after which it is received by weight only.

THE production of the Chapin iron mine, the largest in the Menominee range, Michigan, in '98 was 724,768 tons. It has produced up to date nearly 8,000,000 tons of ore. The Hamilton shaft on this property is down 1460 feet, equipped with engines taking five tons at a lift. The pumps have a capacity of 1700 gallons per minute. The main levels are 100 feet apart, divided by three sub-levels with intermediate levels where desired. Small timber only is employed, the Nevada system having been abandoned.

ACCORDING to the provisions of the recent California appropriation bill, the Governor is given the right to usurp the office and prerogatives of the State Mineralogist. The bill appropriates $50,000 for the maintenance of the Mining Bureau, directs that $20,000 of this shall be expended in field work and vests in the Governor the right of appointment of the assistants in the field and the fixing of their respective salaries. This takes that whole matter out of the hands of the State Mineralogist and leaves him nothing more to do than attend to the office work and its supervision.

UNDER date of the 1st inst., a prominent California mining superintendent writes from El Dorado county: "While I am taking several other mining journals, there is not one of them that compares in helpfulness and general practical mining information to us right here on the ground with the MINING AND SCIENTIFIC PRESS. I find its files a most valuable reference book on mining matters." Another Colorado mine superintendent writes: "Send two additional copies to ——, foreman, and ——, the millman, this address, and send bill to me. It is a good investment."

IN the case of Black vs. Elkhorn M. Co. (163 U. S. 445), the United States Supreme Court says: "The interest in a mining claim, prior to the payment of any money for the granting of a patent for the land is nothing more than a right to the exclusive possession of the land based upon conditions subsequent, a failure to fulfill which forfeits the locators' interest in the claim. To sum up as to the character of the right which is granted by the United States to a locator, we find: First, that no written instrument is necessary to create it. Locating upon the land and continuing yearly to do the work provided for by the statute gives to and continues in the locator the right of possession as stated in the statute. Second, this right, conditional in its character, may be forfeited by the failure of the locator to do the necessary amount of work; or, if, being one among several locators, he neglects to pay his share for the work which has been done by his co-owners, his right and interest in the claim may be forfeited to such co-owners under the provisions of the statute. Third, his interest in the claim may also be forfeited by his abandonment, with an intention to renounce his right of possession. It cannot be doubted that an actual abandonment of possession by a locator of a mining claim, such as would work an abandonment of any other easement, would terminate all the right of possession which the locator then had."

AT the close of the 56th Congress was passed a law which enacts "that the Secretary of War, in carrying out the provisions of any Act of Congress providing for the restraining or impounding of mining debris in California may, in his discretion, when in his judgment the aggregate of appropriations already made by said State and Congress and available therefor are sufficient to complete the same, undertake the work necessary thereto by hired labor and by purchase of supplies and materials therefor, and may accept payments on account thereof as the work progresses under and according to the provisions of the Acts of the Legislature of said State for such purposes."

ONE theory of the genesis of the "mother lode" in California is that at the time of the upheaval of the Sierra Nevadas, and the disruption and tilting of the adjacent rocks, a series of fissures were formed which were subsequently filled with quartz and other mineral matter by alkaline water at a high temperature. Alkaline solutions, at a high temperature and under pressure, will dissolve large amounts of quartz, which is deposited in a crystalline state on the cooling of the solution. How the gold got there is also the subject of much discussion. A great deal has been written on this subject. What is believed to be the latest and best article thereon was written for this paper by Ross E. Browne, and appeared in the issue of Jan. 29th, '98.

AT Trenton, New Jersey, on the 4th inst., articles of incorporation of the American Smelting Refining Co., with a capital of $65,000,000, were filed with the Secretary of State. The company is empowered to mine, smelt and refine ores, minerals and metals. The incorporators are W. E. Dwight, T. M. Day Jr., J. J. Tracy, H. W. Thomas and A. P. Bartlett, all of Jersey City, N. J. The entire prospectus of the company was published on page 297, of the issue of March 18th. It is noticeable that since that publication and the accompanying inference of a prospective 10% advance in the price of silver thereby, there has been a corresponding advance in Mexican Central railroad securities. In '98 a 10% advance in the price of silver would have increased that road's net earnings for the year, on a U. S. currency basis, $208,000.

ANSWERING H. S., Anaconda, Mont., and L. T., Phœnix, Ariz., one matter can be best disposed of by reference to the fact that while a pound, troy, contains 5760 grains, a pound, avoirdupois, weighs 7000 grains. Concerning the declination of the advertisements, it is somewhat difficult to make it clear to one who does not understand it without explanation, why this paper will not print an advertisement pure and simple, in form identical with the regular body of reading matter in the paper. The motive for such refusal rests upon an unwillingness to have anything which is paid for as an advertisement go to the reader in a form which would lead him to believe it to be editorial matter, and, therefore, not paid for. It is a simple question of integrity between the publisher and the reader, and as such will, it is believed, command respect.

THE work or actual labor on a mining claim necessary to hold it need not necessarily begin on the first day of January, that date being specifically named as limiting the time when such work shall begin. The necessary $100 worth of development work on an unpatented mining claim can begin on any day after the first day of January next succeeding the date of location; but must all be done within that year; that is, supposing a mining claim was located to-day—April 8th, 1899—the locator has until Dec. 31st, 1900, to do the necessary development work on that claim enabling him to hold it. Any work done on that claim between now and Dec. 31st, '99, does not count on next year's necessary assessment work, and no work is necessary between April 8th, '99, and Dec. 31st, '99, to hold it; but $100 worth of work must be done on the claim between April 8th, 1899, and Dec. 31st, 1900, to hold it.

SO FAR as known, the "Ashcroft process" has not been a satisfactory commercial success. Effort is now making in London to experiment with a similar electrolytic process on a smaller scale. This modified process, which is claimed to be cheaper, mainly consists in stirring the crude ore into a bath of melted zinc chloride contained in a cauldron heated from beneath. A little molten lead in the bottom of the cauldron alloys with and removes the silver and gold from the ore. The rich lead is then withdrawn and the mixture of sulphides and chlorides of lead and zinc subjected to the action of an electric current. Free sulphur is given off in the form of vapor in a practically pure state, and is sublimated. Of the metals the lead is first deposited in a molten state, and afterwards the zinc. The cost of the process is stated to be $10 per ton. From a commercial point of view, the statements made concerning the matter are not alluring.

AT St. Louis, Mo., last week, Judges Caldwell, Sanborn and Thayer of the United States Court of Appeals rendered a decision in the case of the Durant M. Co., plaintiff in error, against the Percy Con. M. Co., in error, to the United States Circuit Court of Colorado. A decree of the lower Court, granting the Percy Con. M. Co. $11,431 damages for ores taken from its property by the Durant M. Co. was reversed on the ground that one who ignorantly removes ores from another's claim is liable for damages to the value of the ores and no more. An important point in mining law is passed upon by this decision. The question has often arisen in the courts as to the extent of the liability of those who have unknowingly removed ores from another's mining property. It makes considerable difference in the amount of damages that any Court may probably hereafter allow in similar cases. In this particular case the difference amounts to $8600. When the case was heard by Judge Hallett, the jury was instructed that it would be impossible for a company to make a mistake underground and dig into another company's claim, and that the trespassing company was therefore liable for the full amount of the damages sustained. This would permit of a verdict for the full value of the ores, the cost of extraction not being considered, and in addition thereto a reasonable amount of exemplary damages as a penalty for encroachment. The higher Court holds that a miner is just as likely to make a mistake underground as above.

The Magalia, Cal., Drift Mine.

Written for the MINING AND SCIENTIFIC PRESS by A. D. GASSAWAY, E. M.

The Magalia drift mine, commonly known as the Perschbaker, lies under the lava capping of the Magalia ridge, at an average elevation of about 2000 feet, between Big Butte and Little Butte creeks, in sections 13 and 24, township 23 north, range 3 east, M. D. M., Butte Co., California.

The channel was first discovered on the west bank of Little Butte creek and followed down stream under the capping of tufa and volcanic mud 3000 feet, on an average grade of about 11%.

The course and grade of the channel were very irregular and as the work progressed the water increased until there was about 35 miner's inches to contend with.

The plant consisted of three boilers and two small air compressors at the mouth of the mine on Little Butte creek, and a steam hoist and line of steam pumps underground, which rendered the mine a very expensive one to work; the plant becoming inadequate, the mine was temporarily closed down, and finally passed into the hands of N. D. Rideout and J. B. Haggin who resumed operations in the spring of '94.

As the topographical features of the surrounding country rendered it impracticable to tap the channel with a deep drain tunnel, a perpendicular shaft was sunk 512 feet deep to bedrock, about 45 feet ahead of the face of the old workings. The shaft is double compartment, the inside dimensions are 5x11½ feet. The hoisting and pumping compartments are 5x4½ feet and 5x6 feet respectively. The timber sets are placed 5 feet apart from center to center and are made of 8x8-inch sawed spruce, lagged by 2x8-inch plank of the same material.

At first the shaft cut through a stratification of volcanic ash and lava to a depth of 146.5 feet, when a stratum of basaltic sand and gravel about 6.5 feet thick appeared with a slight increase in the flow of water which had been small to this point. Seventy-two feet more of volcanic material were then passed through, when another stratum of basaltic sand and gravel 20 feet in depth was encountered.

The flow of water now increased from 35 gallons to 165 gallons per minute and sinking was temporarily stopped. In sinking the first 200 feet the work was done by means of a portable boiler and steam engine, 8x12-inch cylinder, and a 6-inch jackhead pump. Meanwhile a plant, consisting of two boilers, hydraulic hoist and air compressor was installed.

A large compound differential plunger sinking pump, weighing about eight tons, was then suspended in the shaft by blocks and a ⅝-inch steel cable and operated by steam-heated compressed air. The diameters of the high pressure and low pressure cylinders were 10½ inches and 18 inches respectively. The diameters of the plungers were 10 inches and 14 inches respectively and the length of the stroke 24 inches.

Near the 245-foot level a fissure, or water course, in the lava was cut and the flow of water increased to nearly 500 gallons per minute. This fissure was followed through the lava to the 320-foot level, where it departed from the line of the shaft. Pump stations were cut at the 245-foot and 320-foot levels, the average flow of water between those points being 500 gallons, or about 44.5 miners' inches. Part of the time it amounted to 625 gallons per minute, or about 56.6 miners' inches.

One of the greatest difficulties to contend with was the volcanic sand and grit, which cut the pumps out and interfered with the work to such an extent that it was finally necessary to attach a separator, or settling chamber, to the lower part of the pump between the latter and the suction hose. The separator was so constructed that the water on entering the chamber was deflected from a perpendicular to a horizontal course and caused to assume a rotary motion against the walls of the chamber, whence it would drop to the bottom. When necessary, the pump was stopped and the sand removed through an outlet made for that purpose. In order to carry on the work rapidly, two No. 7 steam pumps were used part of the time, in addition to the large pump described above.

The shaft continued on through lava to the 337-foot point, when another stratum, 10 feet in thickness and somewhat similar to the gravel encountered before, but finer, was cut through.

The next 65 feet was through a stratified formation of volcanic mud or ash. Fair headway was made through this material, as it was good blasting ground and the flow of water such that one of the No. 7 pumps handled it with ease, while the large sinker remained at the 320-foot level.

At 412 feet the shaft entered a stratum of cemented volcanic mud or ash 40 feet in depth. On passing through this, a 5-foot stratum of sand and gravel was entered, so loose that it was necessary to drive the lagging ahead to hold it. This stratum contained so much water that the large sinker was lowered to handle it, a duplex steam pump, size 12x8½x10 inches, replacing it at the 320-foot station to lift the water to the 245-foot level, where a compound duplex Dow plunger pump, size 10x16x8½x12 inches, raised it to the surface.

The next 50 feet was through the hard gravel of the channel resting on the slate bedrock.

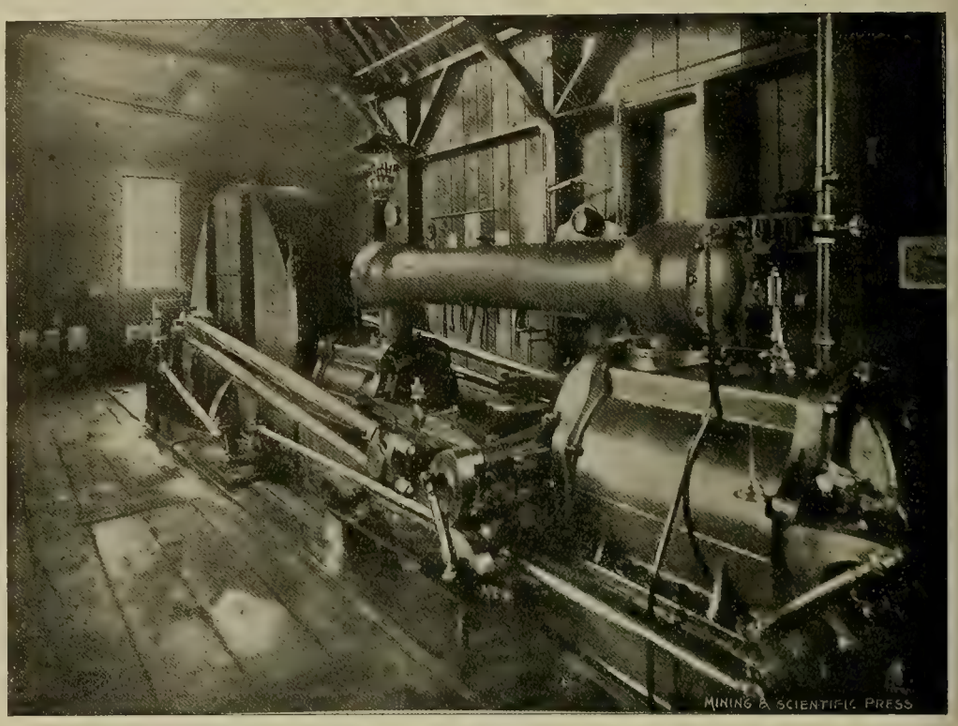
A large pump station and a sump 10 feet deep were then cut out in the solid bedrock at the bottom of the shaft. Here a large compound duplex plunger pump, size 16x26x8¾x18 inches, was installed. This pump weighs about 31,000 pounds and has a capacity of 500 gallons per minute when working under a lift of 500 feet vertical, and is driven by compressed air reheated by steam.

Steps were then taken to tap the old works, which were about 40 feet distant, and nearly full of water with a vertical head of about 200 feet. This was done by feeling ahead with long drills through the hard gravel—a necessary proceeding—as the position of the old face was not exactly known. On June 14, '96, a 10½-foot drill hole broke through and the water was gradually drawn off in a few days, the large pump and a relay system, composed of the large sinker suspended at the bottom of the shaft, and the pumps at the 320-foot and 245-foot levels throwing the water to the surface—a distance of 510 feet. At one time these pumps acting together threw 80 miners' inches of water to that point.

The Channel.—The channel has been followed down stream from the shaft about 3950 feet. The first 1750 feet has an average grade of about 6%. At that point a fault with an upward throw of about 5 feet was encountered. The next 1450 feet, reaching to a point 3200 feet from the shaft, has an average grade of about 4%. Here a second fault was encountered. This one has an upward throw of about 38 feet on an angle of inclination of 58°, with a course S. 30° W., perpendicular to the line of strike, which was S. 60° E. (magnetic). Before reaching the fault the grade of the channel becomes lighter, 2% or 3%, and sand banks and bars were numerous. There was a clean cut of the channel and the faulted section was found about 32 feet above its normal position and 10 feet to the westward. The movement of the fault on the upstream side occurred in serpentine bedrock, the groovings or striations being very prominent at some points, while at others the bedrock faces were as smooth as glass. The gravel of the channel was broken and fissured in the immediate vicinity of the movement.

The grade of the faulted section of the channel has been changed, it being comparatively level to the 3450-foot point, where a third faulting occurred with an upward throw of about 6 feet, the movement and strike being parallel with that of the other two. The movement here also occurred in serpentine. The grade from this point to the face, about 500 feet, is about 3%, the indication being that it will increase.

The bedrock of the faulted section is composed of successive belts of serpentine, eruptive rock, slate and porphyry, with a few small veins of asbestos lying in the serpentine. The eruptive rock is very hard and the belts vary in strike and dip. The contact of these formations is very smooth and prominent. The downstream side of the third fault has not yet been reached, so the extent of the raised section is unknown. Beyond, the channel may lie in



AIR COMPRESSOR, MAGALIA MINE, BUTTE CO., CAL.

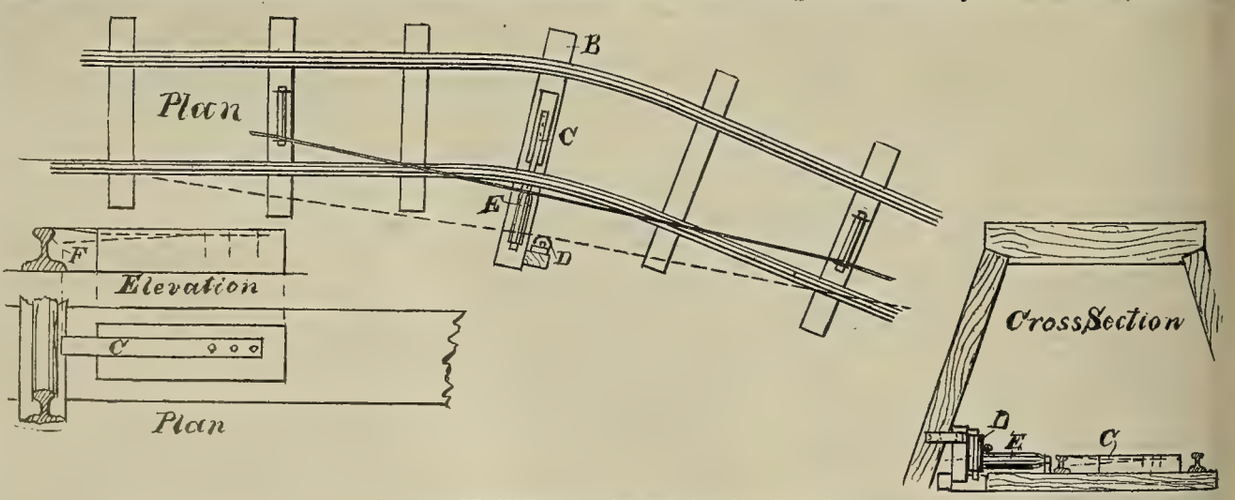


FIG. 1.—ARRANGEMENT OF TRACK ON CURVE.

C is an enlarged view of the spring which is depressed to *F* when the wheel passes.

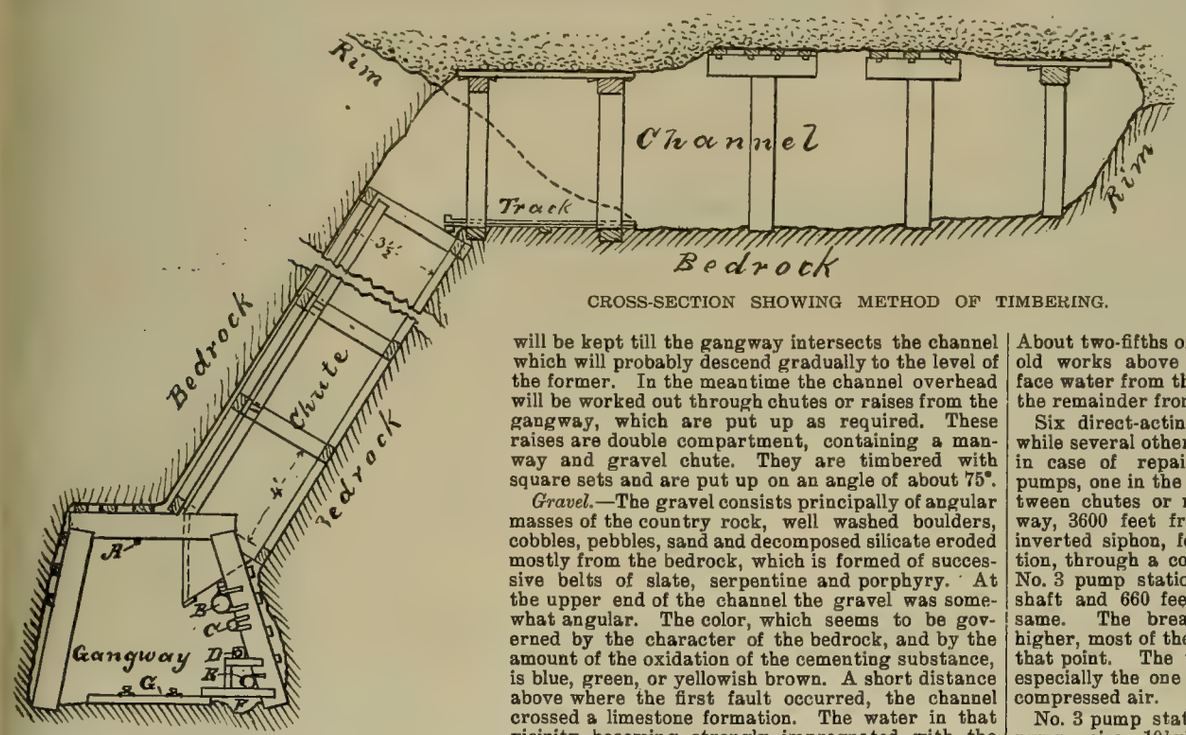
its normal position. Faultings are somewhat uncommon in this locality, although they are numerous in northern Sierra and Plumas counties. In southern Sierra and Nevada counties the grades of the ancient channels have not been altered greatly by these movements; but some portions of Placer county show such action, there being a prominent fault exposed in an old hydraulic pit near Yankee Jim's.

Methods of Working.—The channel is narrow and tortuous, with rims somewhat abrupt. The breast seldom exceeds 60 feet in width. The gangway is kept in or near the trough of the channel, in order to drain the ground and handle the gravel to the greatest advantage. As a result, the gangway is very crooked, making the haulage somewhat difficult on account of the many irregular curves in the track. The track has an 18-inch gauge, and is made of steel rails, twelve pounds to the yard. The empty trains, consisting of three cars, with a capacity of 16 cubic feet each, run down by gravity. An underground hoist is located near the bottom of the shaft, and another at the 1750-foot station. The first is run by either steam or compressed air, the second by compressed air. On account of friction and the weight of the cable, the trains will not run down beyond the second hoist, where the grade becomes lighter. A 1½-inch crucible steel rope, seven wires to the strand, is used on the upper hoist. A cable of this character, although not so flexible, wears better than a rope composed of nineteen wires to the strand.

A turnout or switch has been constructed at the 1750-foot station near No. 2 hoist, where the trains pass each other. As the average grade below is somewhat less than 3½%, a ⅝-inch plow steel rope is used to lessen the friction and weight as much as possible. Four cars to the train are used on this section, one of them acting as a dummy to increase the weight of the train, remaining on this division, the switching being done at No. 2 hoist. The trains on this division run down 1800 feet, or 3550 feet from the bottom of the shaft. The track in this portion of the mine is straighter and the grade more uniform than above.

The rope is carried around the curves on a system of horizontal and perpendicular rollers placed in the center on the outside of the track. If located outside, a spring is placed between the rails to throw the cable over the rail onto the roller to lessen the friction and to save the rope, as shown in the sketch, Fig. 1. These rollers are made of wrought iron tubing 2 to 4 inches in diameter, cut to the proper length, usually 8 to 12 inches, and are fitted with hard wood turned down to the proper size in the lathe. They are all made at the mine with the exception of the cast iron boxes for the upright rollers, which are purchased in lots ready for use. There are about 500 of these rollers in the mine.

When the second fault was encountered the gangway was carried ahead beneath the channel in bedrock on a 2½% grade to station No. 3 which is 3625 feet from the shaft, and as far as gravity will carry the trains of the second division. Another turnout was constructed here, and the gangway carried a head on an upgrade of ¾ of an inch to the rod. This grade will be kept till the gangway intersects the channel which will probably descend gradually to the level of the former. In the meantime the channel overhead will be worked out through chutes or raises from the gangway, which are put up as required. These raises are double compartment, containing a manway and gravel chute. They are timbered with square sets and are put up on an angle of about 75°.



CROSS-SECTION SHOWING METHOD OF TIMBERING.

FIG. 2.—MAIN GANGWAY IN BEDROCK, CHANNEL OVERHEAD.

Gravel.—The gravel consists principally of angular masses of the country rock, well washed boulders, cobbles, pebbles, sand and decomposed silicate eroded mostly from the bedrock, which is formed of successive belts of slate, serpentine and porphyry. At the upper end of the channel the gravel was somewhat angular. The color, which seems to be governed by the character of the bedrock, and by the amount of the oxidation of the cementing substance, is blue, green, or yellowish brown. A short distance above where the first fault occurred, the channel crossed a limestone formation. The water in that vicinity becoming strongly impregnated with the carbonate of lime, on circulating through the gravels below redeposited the lime in solution. This precipitated lime cemented the gravel down to the second fault, some of it becoming very hard. The most heavily cemented portions occurred in the low depressions of the channel, while other portions were comparatively free from the cementing substance. Below the second fault the gravel is not so heavily cemented although it is quite hard.

Drills.—Nearly all of the drilling is done by machines driven by compressed air, one 3-inch Leyner and two 3-inch Ingersoll-Sergeant drills being used for that purpose. It is much more profitable to breast with machines than with moils or hand drills as the holes are deeper and break better. Experience shows that a hole can be put in gravel as well with a machine as by hand. Single screw drill columns from 3 to 6 feet in length are used mostly, although the double screw column with arm and clamp is sometimes used in the gangway. The breasting is carried as low as good work will warrant, most of the gold lying on or near the bedrock. No. 2, 30%, Hercules powder is used for breasting and in the soft rock of the gangway. Some of the eruptive dykes in the latter are so hard that they require No. 1 or 70%.

Timbering.—On an average the ground is not heavy and the greater part of the timbering is done with a single post and cap, lagged overhead and securely wedged, the intention being to keep the ground from starting. The caps are approximately 8x10x36 inches long trued up on the top and bottom, and are made of round or split timber. The posts are made of round timber with an average diameter of 12 inches. The length is governed by the height of the breast.

The gangway is timbered with tunnel sets consisting of two 7-foot posts and a cap 4½ feet in the clear. These sets are placed 5 feet apart from center to center and securely lagged overhead, 5½-foot lagging, 2 inches thick and not less than 6 inches wide, being used for this purpose. For breasting, 3½ and 4-foot lagging, 2 inches thick and about 6 inches wide, is used. There is no "swelling bedrock" in the mine, and the roof is generally hard or cemented. The sketches show the methods of timbering. (See Figs. 2 and 3.)

Signal Bells.—For making signals from the bottom of the shaft to the surface the ordinary bell wire and gong are used; but below that point electric gongs, 8 or 12 inches in diameter, are employed. No. 12 rubber covered Habershaw copper wire is used on porcelain insulators. The battery consists of about one-half dozen Hercules cells. They cost but little and do good work. Push buttons were used at first, but they soon got out of order on account of the dampness. Now the circuit is closed by bringing the bare ends of the wire in contact with each other. The bell wires were not serviceable on long distances on account of the slack in the wire and friction.

Drainage.—The mine is making about 40 inches of water at present, somewhat less than about a year ago. This is probably owing to the comparatively dry season. About two-fifths of this amount is coming from the old works above the shaft, a small amount of surface water from the 70-foot level in the shaft, and the remainder from the new works.

Six direct-acting pumps are steadily employed, while several others are held in reserve, to be used in case of repairs or breakdown. Two No. 7 pumps, one in the breast to overcome the grade between chutes or raises, and the other in the gangway, 3600 feet from the shaft, together with an inverted siphon, force the water to No. 3 pump station, through a column composed of 5-inch casing. No. 3 pump station is 2950 feet distant from the shaft and 660 feet vertical below the collar of the same. The breast at present being somewhat higher, most of the water from there is siphoned to that point. The two pumps have very little to do, especially the one in the gangway, and are run by compressed air.

No. 3 pump station contains a compound duplex pump, size 10½x16x8½x10 inches. In the same station is a No. 8, which is used in case of an emergency. These pumps throw the water to a point near the large pump station at the bottom of the shaft through about 2800 feet of 6-inch casing and have a lift of about 150 feet. They are run by compressed air reheated by steam, and may be run by steam alone. They are, also, arranged to pump through to No. 2 pump station, 1150 feet distant and 1800 feet from the shaft.

No. 2 pump station contains a compound duplex pump, size 6x12x8½x10 inches, and also a No. 7, to be used in case of repairs on the other. These pumps handle the drainage of the the mine from the shaft to this point, and, in case of an emergency, relieve the pumps in No. 3 station.

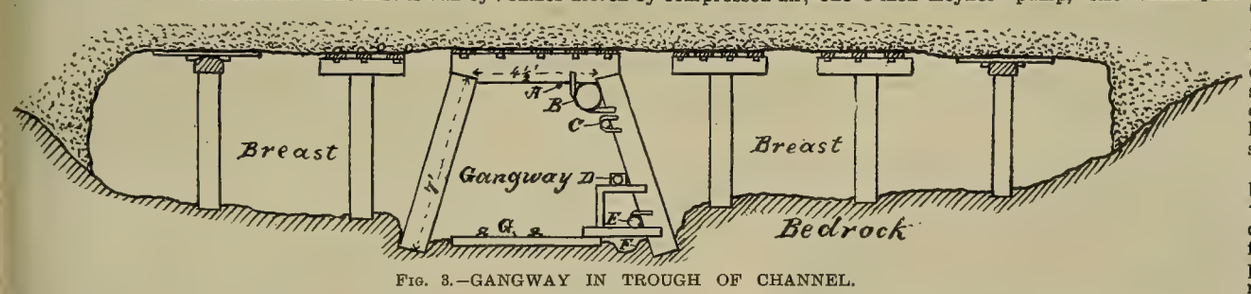


FIG. 3.—GANGWAY IN TROUGH OF CHANNEL.

A shows position of electric bell wires; *B*, 10-inch air pipe; *C*, compressed air pipe; *D*, boxed steam pipe; *E*, position of pump column; *F*, drain; *G*, track.

The pump station at the bottom of this shaft contains the large compound duplex plunger pump, before described, with a capacity of 500 gallons per minute under a vertical lift of 500 feet. On the same station is the compound duplex Dow plunger pump, formerly at the 245-foot station, and now used to relieve the other when the latter is undergoing repairs. These pumps are arranged to run either by compressed air or steam. At the 320-foot station are two No. 8 pumps, and at the 245-foot level is a large pump, size 16x10x16 inches. These pumps, with the large sinker suspended at the bottom of the shaft, form a relay which in an emergency can be used to assist the other large one. At the 70-foot level is a small Dow pump, which throws out the surface water that accumulates there.

Compressor.—The compressor is of the compound type, built by the Norwalk Iron Works of Connecticut. The diameters of the intake and compressing cylinders are 26 inches and 17½ inches, respectively, with a 30-inch stroke. It is built to run at ninety revolutions per minute and maintains an average pressure of about ninety pounds. It has a nominal H. P. of 215 and a capacity of 1659 cubic feet of air per minute at the level of the sea. The machine is driven direct by a 126-inch Pelton wheel, made heavy enough to act as a fly wheel, running under a vertical head of 160 feet. Two nozzles of about 4¼ inches and 4½ inches diameter, respectively, direct about 655 inches of water on the wheel.

(*To be Continued*)

The Rights of Tunnel Claimants.

Following is a full text of a decision given Jan. 16, '99, by Judge Hallett in a Cripple Creek case—the Matoa Gold Mining Company vs. the Chicago-Cripple Creek Gold Mining Co.—in which the defendant corporation took from a patented claim a large amount of ore by virtue of an alleged right obtaining from a certain tunnel location, the bore of which passed through the ore body in question, which occurred within the limits of plaintiff's claim:

Instructions to Jury.—Hallett, J. (orally): These instructions are given on behalf of the plaintiff:

This is an action for damages by the plaintiff against the defendants on account of an alleged trespass, alleged to have been committed upon certain mining property of which the plaintiff claims to be the owner, situate in Cripple Creek mining district, El Paso county, Colorado. The plaintiff alleges that from on or about the 4th day of August, 1896, until the 1st day of January, 1898, it was the owner and entitled to the exclusive possession and enjoyment of certain premises described in the amended complaint;

That during said period of time the defendants unlawfully entered upon said premises in the underground workings thereof and took and carried away and converted to their own use a large amount of ore and mineral-bearing rocks of great value.

The defendant—the Chicago-Cripple Creek Gold Mining Company, L. E. King—deny such unlawful entry and the taking and carrying away of the ore, and further claim a right to enter upon said premises and take any ores found within the veins, lodes and ledges from which the same is alleged to have been taken by virtue of a tunnel location made and owned by the Chicago-Cripple Creek Gold Mining Company, known as the Chicago-Cripple Creek Gold Tunnel & Tunnel Site Company, and by virtue of certain tunnel lode claims located by the owner of the said tunnel site on vein or veins cut in the bore of said tunnel while passing through the premises in question.

The defendants—the Mutual Benefit & Leasing Company, John Nolon and W. W. Wemott—each filed a disclaimer in which they deny any title, claim or interest whatever in the premises on which the trespass is alleged to have been committed, but containing no denial of the trespass as alleged in plaintiff's complaint.

Upon these issues the court instructs you that the burden is upon the plaintiff to show its ownership of the ore in question; the court also instructs you that, if you find any ore was taken from the premises by the defendants as alleged in the complaint, and at the time of the taking of said ores the plaintiff was the owner of said premises, then it would be entitled to recover the value of the ores so taken, which is to be determined by you under the rules hereinafter stated.

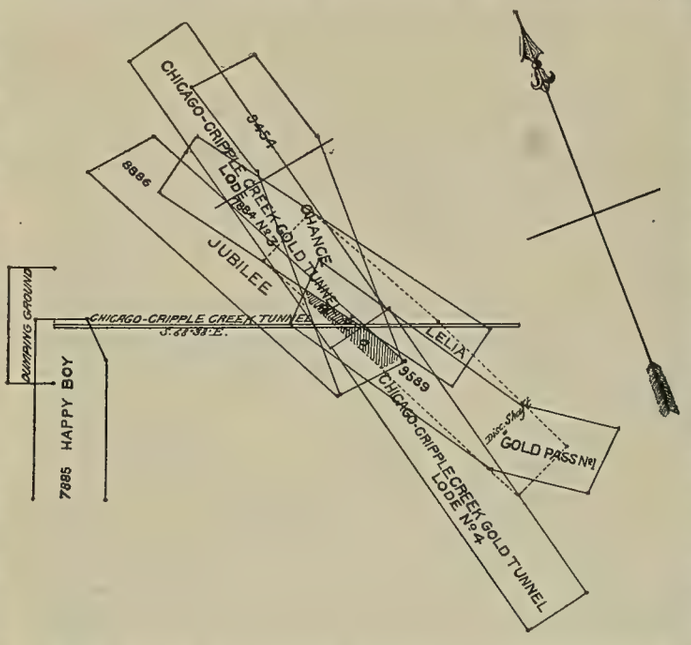
It appears from the evidence, and for the purposes of this case is undisputed, that on or about the 12th day of November, 1891, James H. Freeman, Jr., Jesse B. Petersen and William F. Petersen entered upon the unappropriated public domain of the United States and discovered and located the Gold Pass No. 1 lode mining claim, and that this location included within the surface lines the tract of ground upon which the alleged trespass, if any, was committed;

That subsequently thereto and on the 10th day of June, 1895, an amended location certificate of said claim was filed for record in the office of the County Clerk and Recorder of the county of El Paso, State of Colorado, and that the said Gold Pass No. 1 location was transferred by divers mesne conveyances from the locators thereof to the plaintiffs in this case and United States patent for the said Gold Pass No. 1, issued on the 15th day of April, 1898, to the plaintiff in this action.

It further appears in the evidence that on the 28th day of June, 1892, the defendant—the Chicago-Cripple Creek Gold Mining Company—located a tunnel and tunnel site three thousand feet in length from the mouth or portal to the terminus thereof, and that the line and bore of said tunnel as projected in said location intersects and crosses the tract of ground included in the original Gold Pass No. 1 location and the portion of the tract of ground described in the plaintiff's complaint and upon which the alleged trespass, if any, was committed; that subsequently and about the 20th day of December, 1896, while driving the bore of said tunnel through the premises included within Gold Pass No. 1 location, defendants cut a certain vein or veins of mineral-bearing rock and attempted to locate thereon two tunnel lode claim locations, numbered respectively 3 and 4—one extending northerly from the bore of said tunnel approximately fifteen hundred feet and one southerly also a distance approximately of fifteen hundred feet.

And it further appears that the ore in controversy in this case was taken from the vein or veins so attempted to be located by the aforesaid defendants.

It further appears in evidence that on or about February 8, 1894, Edward R. Warren made a location known as the Jubilee lode mining claim, which overlapped a portion of the Gold Pass No. 1 mining claim and included within its surface limits a part of the territory upon which the alleged trespass in this case was committed; that the owners of the Jubilee location subsequently deeded to the owners of the Gold Pass No. 1 location the tract of ground last above referred to, and thereupon the owners of the Jubilee location proceeded to patent, and the owners of the Gold Pass No. 1 location excluded from its application for patent the tract of ground so previously deeded to it, and it was subsequently patented to the owners of the Jubilee claim and excluded from the patent of the owners of the Gold Pass No. 1 claim.



PLAT OF CLAIMS IN CONFLICT IN MATOA vs. CHICAGO-CRIPPLE CREEK CASE.

You are instructed that a valid location of a lode mining claim entitles the owner or owners thereof to the exclusive possession and enjoyment of all veins, lodes and ledges the tops or apexes of which lie within the surface lines of such location, or whether appearing at the surface or between vertical planes extending downward to the full depth, and that this right of exclusive possession and enjoyment applies not only to the vein upon which the discovery and location is made, but to all veins within the surface limits as herein stated.

The Gold Pass No. 1 location having passed to patent, is presumed in this case to have been in every respect regular and valid, entitling its owners to the exclusive possession and enjoyment of all veins, lodes and ledges the tops or apexes of which lay within its surface boundaries whether appearing at the surface or at any point within vertical planes extended downward through the full depth, and that they were entitled to such rights at the time the tunnel location of the defendant was made, such lode claim location completely segregating the tract of ground included within its boundary from the public domain; and therefore the defendant acquired no rights by its attempted location of a tunnel site across and through said tract of ground included within the Gold Pass No. 1 location, because such territory was at that time no part of the public domain of the United States, and was not subject to location under any law of the United States.

The Court instructs the jury that the ground in which it is charged the trespass occurred was included within the lines of the Gold Pass No. 1 lode, as originally located, and that the owners of the same, by taking a deed from the owners of the Jubilee for a part of such ground in conflict between the said two claims before its exclusion from the Gold Pass No. 1 lode and its subsequent patenting to the owners of the Jubilee lode, was not a waiver of the priorities which it had as a part of the original Gold Pass No. 1 location.

The Court instructs the jury that, if they believe from the evidence that the defendants committed the trespass charged and extracted ore belonging to the plaintiff, in fixing the amount of the plaintiff's damage they cannot allow the defendants anything in the way of credit for mining the ore or taking it to the surface, but that the amount of damages which they must find for the plaintiff in that case is the value of the ore at the mouth of the pit; or, in this case, the mouth of the tunnel or other openings through which it was mined.

The jury are instructed that the plaintiff company having charged a trespass against the defendants, the burden of proof is upon it to show that the same was committed by the defendants and the amount and value of the ore extracted by them with as much certainty as the circumstances of the case will permit. The jury are further instructed in this connection that, where one person wrongfully enters the property of another, and not only commits an injury thereto, but takes away the means of proving with certainty the nature of the loss, the law does not require the one whose property has been damaged to make more than a reasonable showing of the extent of the same, but requires the one committing the trespass after such has been made to bear the full responsibility of the uncertainty and confusion which he himself has produced and to make a full and complete showing of all of the facts, showing the amount of the damage he has inflicted; and if the jury believe from the evidence that the defendants in this case have not produced the full record of all of the sales of ore extracted from the property in controversy, and testified fully as to each and every shipment of ores made therefrom, the value of the same and the amount received therefor, then and in that case the jury are at liberty to fix the amount of the ore and the value of the same extracted, from the testimony of the plaintiff herein, taking into consideration for so doing the total number of tons shown to have been extracted and the average value of the same as shown by shipment or in any other manner.

The Court instructs the jury that, if they believe from the evidence that any or all of the defendants committed the trespass and extracted the ores charged against them in this case, under and by virtue of any understanding or agreement between them so to do, then they are joint wrong-doers and the jury may find against any or all of such defendants. On the part of the defendants this instruction is given:

You are hereby instructed that the plaintiff herein cannot recover in this action for the mining and extracting or selling of any ore in the upraise or winze appearing upon the maps, if without the territory described as a certain portion of ground adjoining the Gold Pass No. 1 lode mining claim containing .432 of an acre and marked upon the map, plaintiff's exhibit, in green or any other part of the claim without such tract.

Given January 16, 1899.

Good Record in Sinking the Central Eureka, Cal., Shaft.

TO THE EDITOR:—The report that we were sinking the shaft of the Central Eureka mine at the rate of 50 feet per week was a little misleading. It is true we have sunk and completed 15 feet of shaft in two days, but our regular work is 5 feet per day. In order to do this, every man must be proficient in his business and work with all the strength and energy that is in him. All work is done by contract; and if the contractors complete 100 feet of shaft inside of thirty days, they receive $100 premium. I have tried this several times with different crews of men, and it always proved a success.

All the conditions in this mine are favorable for rapid sinking. The shaft is sunk in the fissure, which is gouge and crushed, foliated slate. The ledge is in the contact, and the hanging wall, which is smooth and hard, forms the east side of the shaft and needs no spiling, the ends and footwall being lagged.

The shaft is 5′x10′ in the clear and divided into three compartments; 12″x12″ Oregon pine is used in timbering the shaft, and for skip tracks we use 4″x12″ with 2″x4″ scantling nailed on top, and on that ⅝″x2½″ track iron. Ladders are made of 2″x4″, with ¾″ iron rounds. An 11″ air pipe is also carried down.

The contractors do all labor, putting in all timbers, tracks, ladders and air pipes, sinking and making a complete shaft for $8 per foot; they pay for all powder, fuse, caps and candles. There are nine men on the contract and all share alike, working three on a shift in eight-hour shifts. All the ground is blasted, though some of it could be picked; but it is cheaper and quicker to blast it. There is very little water to contend with, most all being sent up with the dirt.

The strike made in the shaft at the 1160-foot level was about as reported in the Amador *Record*. The shaft is being sunk alongside the ore body; and, until a station is cut and drifts run, nothing will fully determine how extensive this ore body is. The shaft is now 1260 feet deep. WM. R. THOMAS,

Sutter Creek, Cal., March 29th, '99. Supt.

Experiences of a Working Miner.

NUMBER IX.

Written for the MINING AND SCIENTIFIC PRESS.

When Mr. K—— was general manager of the W—— mine it was almost all a man's life was worth to apply for a job. Every stranger was looked upon with suspicion. Not knowing of this, and paying but little attention to the conspicuous signs about the premises—"Positively no Admittance," "Beware of the Dog," "Keep Out" and other cheerful legends of the sort—I struck Mr. K—— for a place. He looked me all over carefully and said, "What do you want to do?" "Want to work," was my reply. "Work at what?" came next.

"Well," I answered, "I would like to beat a drill—at least that's what I came here for; but if you have anything better than that I am ready for it."

"Know anything about a mill?" he inquired.

"Oh, yes," said I, "I know all about running quartz mills."

"Do, hey? Well, I don't want you."

This was certainly not encouraging and beyond my understanding, so I said "Why not?"

"Don't want fellows around who know so much," said he, in a most positive manner.

"You surely don't want men around who do not know anything," I ventured.

"No," said he, "not exactly that. I need men who know enough to learn something, but who don't know it all."

"I want to work," I replied, "and I can be the worst numbskull you ever saw, if necessary. I heard you had a process at this mill which is out of the ordinary, but I didn't come here to work in the mill, but in hope of getting a job in the mine."

"Yes," he answered, "my process is secret and I don't dare to have it patented, for that would give the whole business away."

"That's so," I said, confidentially. "What is the particular advantage of your process—high extraction, I suppose, and cheapness?"

"Yes, sir," he replied, "you have hit it exactly. It's dirt cheap as a process, and would you believe it I extract a higher percentage than the assay."

"Great Scott!" I exclaimed in feigned wonder. "Is that possible. I have heard of such processes, but never came across one myself before. Why don't you have it patented and sell the right to use it on a royalty. It would bring you an immense income."

"Yes, I know," he answered thoughtfully, "but you can't trust them—you can't trust them."

I didn't stay at the W—— mine, but the natural result followed after spending considerable money: the financial backers of the concern got tired of this secret process business and quit. To-day the ore of this mine is being worked by a well-known process and paying, but Mr. K—— is not manager. A somewhat similar case came to my notice two or three years ago at P——, where a mill was built to work ore running up into the hundreds of dollars per ton. The mine was closely guarded and no one was permitted to enter. The mill was a marvelous aggregation of furnaces, kettles and rolls, the purpose of which could only be guessed at. Numerous reputable assayers had tested the "ore" from this mine, but none of them could get anything out of it. The metallurgist of the mine, however, showed numerous buttons—big ones, too, but he had a "secret flux" that did the business. It is scarcely necessary to say the gold had been previously introduced in the flux and the alleged ore contained no gold at all. It has been my experience that these fellows who have secret processes which "return more than the assay," and assayers who use "secret flux," are universally fakirs who have nothing of value, and use this scheme to dupe moneyed people. It is not a hard matter to form a "trust" on commercial commodities, but rather difficult to secure and hold a "corner" on knowledge. Sometimes these concerns, which are conducted on such conservative lines that the "No Admittance" sign is in evidence all over the place, have back of it a fear of criticism rather than that some visitor may learn secrets which may prove to his advantage elsewhere.

One of the secrets of successful mining is the ability of the manager to see into the future and anticipate the requirements of his mine. The G—— mine was worked for some years and produced a large sum of money. The flow of the golden stream seemed without limit, and the owners spent money lavishly everywhere, except at the mine. In time the mine got too deep for the hoisting plant, and the volume of water increased with the deepening of the shaft and the extension of the levels. At length it was apparent something must be done to take care of the water; so the old pumps were fixed up as well as their age and condition would permit. New pumps were needed, and a new engine would be required to run them, and this would cost several thousand dollars, and money for the purpose could not be spared. The ground was heavy and the deep shaft needed repairing; but to stop all other work and cut off the bullion supply was suicidal. There was no immediate danger of complete collapse, anyhow; so the bucket was reduced in size to clear the settling timbers, and things still went well. In a month or two it could plainly be seen that the timbers were pressing closer to the bucket; so a bucket of still smaller diameter and greater length was put in and all again went well, though this latter change made it a little inconvenient in loading such a tall bucket; but tall miners were hired who could reach it, and the mine still worked. The timbers crept closer day by day, until, it being no longer practicable to reduce the size of the bucket, some of the most threatening timbers were cut out sufficiently to let the bucket pass; but an end came to that, also. The pumps gave trouble again, and soon the expense was greater than the income. The weak treasury was unable to stand the pressure, and the mine was shut down and remained closed for years. It was again opened through a new shaft, the vein was developed under the old workings, and it is a larger and more profitable mine to-day than at any time under the old management. There are several ways of handling a mine, and you are at liberty to choose which of these ways is the better.

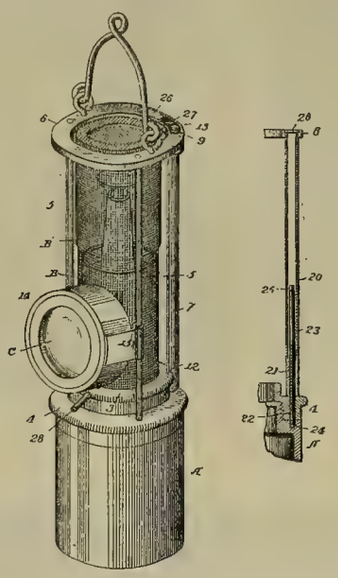
Not long ago I ran across the president of a mining company who told me he was paying a mill man a large salary for saving the gold in his sulphurets. He said, in answer to several questions, that amalgamation only was the treatment to which the ore was subjected, and that the mill contained, beside the power, only stamps and plates. Then he showed me the ore, and insisted that it was a fair sample of all of his ore, and there was not a single speck of sulphuret in any of it—a white, rather porous quartz, containing a little iron oxide, but absolutely no pyrite or other sulphide mineral, and remarkably free milling. This is simply another class of fakir, who wants something for nothing. MINER.

Latest Mining and Metallurgical Patents.

Patents Issued March 28, 1899.

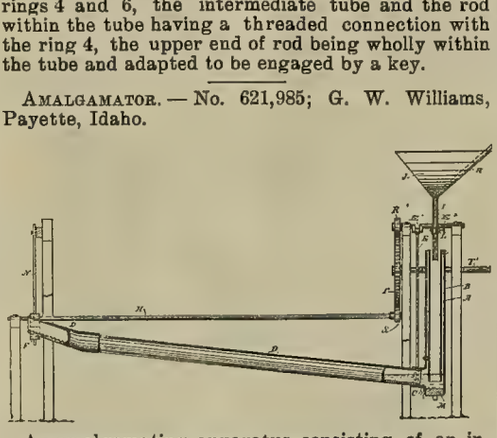
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

MINER'S LAMP.—No. 622,076; H. J. Richards, Wilkesbarre, Pa.



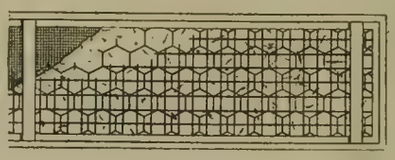
In a safety lamp, the combination with the oil cup and the gauze tube, of the ring 3 to which the tube is connected, the ring being provided with a notch 12, the ring 4 between the ring 3 and the oil cup, the tube engaging the notch 12 and resting on the ring 4 and the locking rod within the tube, the rod having a threaded portion engaging the ring 4 and an extension engaging a socket in the oil cup; also the combination with the oil cup and gauze tube of the rings 4 and 6, the intermediate tube and the rod within the tube having a threaded connection with the ring 4, the upper end of rod being wholly within the tube and adapted to be engaged by a key.

AMALGAMATOR.—No. 621,985; G. W. Williams, Payette, Idaho.



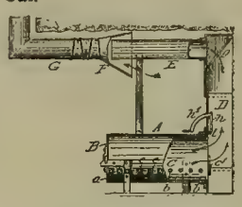
An amalgamating apparatus consisting of an inclined suspended pipe, containing mercury, means for giving a vertical motion to one end of it, a simultaneous horizontal motion to the opposite end, means for delivering the material to be acted on into the lower and receiving end of the pipe, it having its discharge end inclined upwardly to a greater degree than the general inclination of the pipe, a vertical feed pipe connecting with receiving end, a hopper or tank from which the feed pipe leads, and a water pipe discharging into the tank to agitate the contents to prevent packing.

CONCENTRATOR.—No. 621,986; G. W. Williams, Payette, Idaho.



A concentrator consisting of a sluice of essentially upright sides, eider-down cloth superposed upon blanket material and fixed to form a bottom for it, a second narrower sluice of similar form adapted to fit within the outer one, a bottom therefor formed of superposed screens of different mesh, and side strips beneath whereby the screens are raised above the fibrous surface of the outer bottom and an intermediate underflow is formed.

THAWING APPARATUS.—No. 622,053; J. W. Livermore, Selma, Cal.



In a thawing apparatus, the combination with a furnace of a heating chamber having a closed back, an opening in the back communicating with the furnace, a hinge connection between the furnace and chamber, whereby the chamber can be adjusted from vertical to horizontal and a hood to cover back opening when the chamber is horizontal, a perforated bar on one section, and a perforated guide on the other, the bar and guide being adapted to receive a pin for locking sections at any adjustment.

The Field of the Arrastra.

Written for the MINING AND SCIENTIFIC PRESS.

The old Mexican arrastra is looked upon as a rather slow machine for this age of progress and activity; but while admitting that the arrastra, as constructed and run by the Mexicans, who introduced it into this country, is a slow affair, the modern arrastra has a legitimate field of usefulness, and is by no means to be despised. On pages 32, 86 and 97 of the current volume of the MINING AND SCIENTIFIC PRESS are articles describing the construction and operation of arrastras, and that feature need not be discussed here. To secure the greatest efficiency in an arrastra, it should be run as an auxiliary to some type of crushing plant, either stamps or rolls, and the latter are probably preferable, as being somewhat lower in first cost for a given capacity. When ore has been crushed with rolls or stamps to, say, a maximum size of three-eighths or one-half inch, it is in good condition for the arrastra. If the ore is hard and flinty, it should be crushed still finer, say, to one-fourth inch at the maximum. When fed to the arrastra it crushes readily, when, on the same ore broken by hand to walnut size, the capacity of the arrastra is still quite small. The preliminary preparation of the ore by passing it through rolls increases the capacity of the arrastra greatly. By the employment of a screen sufficiently fine, the ore may be ground to an almost impalpable powder, but it is not advisable to grind it any finer than necessary to free the gold. By using water, steam or electricity for power, two good-sized arrastras in connection with five stamps or a set of rolls, with drags properly arranged so as to sweep the entire surface of the bed, will crush and properly amalgamate a larger amount of material than ten stamps, and do it cheaper and better. The arrastra is particularly useful in the treatment of ores in which the gold is "rusty," or covered with any film, as this coating is removed by the attrition of the drags, and the gold will then freely amalgamate. A third basin, provided with agitators instead of drags, would be found a desirable addition to such plant, as then the charge could be sluiced directly into the third basin, which occupies the same relation to the plant as the settlers do to a pan mill. The charges being drawn from the arrasta beds alternately, the cleaning up could be accomplished more quickly and satisfactorily in the settler, and the process becomes continuous. This arrangement is inexpensive, as the mine owner can build most of it himself.

A BICYCLE trust has been formed with a capital of $50,000,000, for the alleged purpose of reducing the cost of production, and not for raising the price on the wheels.

Placer and Quartz Gold Mining in San Miguel Co , Colorado.

The altitude of some placer mines would interest miners who get out gold only at altitudes varying from a few feet above sea level to 4000 or 5000 feet. In Colorado are placer mines worked at an altitude of over 10,000 feet. On this page is depicted the operation of two giants at Keystone placers on the San Miguel river in San Miguel county, Colorado. One would think that 10,000 feet above the sea a hydraulic miner could get dump enough without having to resort to the use of a hydraulic elevator, but one of those devices has been installed at the Keystone placers since the accompanying view was taken, for the use of which we are indebted to the courtesy of that enterprising newspaper, the *Journal*, published at Telluride, Colorado.

The San Miguel gold placer deposits are partly the results or fragments of former channels of that stream. Considerable work has been done, mostly by ground-sluicing. Unlike some of the big hydraulic mines of California, where an enormous amount must be expended before a dollar is produced, but which subsequently yield great returns, the San Miguel placers do not justify great expense in preliminary work. They are essentially "poor mar's diggins;" panning and rocking have been the principal means of getting out the gold; and while men have made fairly good wages that way, any attempt to work the bars on a big scale has not been financially satisfactory. San Miguel placer gold is rough and grainy; it runs about 30% silver and has a value of about $14 per ounce. In the vicinity of Telluride is being done a great deal of lode development, although deep snow interferes considerably ; in ordinary years work goes on continually. A view is presented herewith of the Butterfield mill, in Bridal Veil Basin, at an altitude of 11,000 feet, and also of the Gold King mill, Turkey Creek Basin, which has been steadily stamping out gold for eighteen years. At the Bessie mill, in Turkey Creek Basin, is found one of the most complete plants in southwestern Colorado. The process is one of roasting and amalgamating, the free milling ores of the San Miguel district being first treated in that way in the Bessie mill. The mill is 161x90 feet, 116 feet high. A 100 H. P. electric motor furnishes the power. The roaster daily capacity is 250 tons. The ore is handled automatically throughout. It passes into a 12x22 crusher, thence through a dryer, and through high-speed rolls, leaving them through a screen of ½-inch mesh; thence through a roaster, and then through another set of rolls, ground to a 20-mesh screen, and through another roll, which it leaves through a 40 to 60 mesh, thence to the mill, and over the amalgam plates. It goes from $7 to $10 on the plates. The cost of mining and milling is $1.02 per ton. Near Telluride, the metropolis of that region, is Pandora, a view of which is herewith given. In the background to the left is the mill of the Smuggler-Union. During 1898 there were treated in that mill 75,000 tons crude ore, from which was shipped 810 carloads of concentrates. Its capacity is over 200 tons per day. On the right of the picture is the building in which is the Kirby process for treating tailings. On the railroad track in the foreground is the engine room of the Meldrum Co., from whence compressed air is sent to drive the drills in the big tunnel beingrun in that vicinity.

THE GOLD KING MILL, TURKEY CREEK BASIN, SAN MIGUEL CO., COLO.

A surface tram runs from the mine in the distance to the mill in the foreground.

THE BUTTERFIELD MILL, BRIDAL VEIL BASIN, SAN MIGUEL CO., COLO.

HYDRAULIC GIANTS AT KEYSTONE PLACERS, SAN MIGUEL CO., COLO.

PANDORA, NEAR TELLURIDE, COLO.

The Genesis of Petroleum and Asphaltum in California.

NUMBER X.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

Reservoirs for oil and asphaltum are created as follows: The porosity of limestone is created by chemical action, the changing of limestone into dolomite. The porosity of sandstone by the solvent action of water leaching out the cementing material, such as lime, silica, iron, etc. The capacity of shale for holding oil or bitumen by the mechanical bending and cracking of the strata, the cracks affording storage room.

Limestone.—The Trenton limestone is very productive under certain circumstances. In its normal condition it is a compact rock, and then it contains neither gas nor oil; but over large areas the limestone has been dolomitized and so transformed into a porous and cavernous rock, in which the gas and oil are contained.

The dolomitization of the Trenton limestone is probably occasioned by the removal of carbonate of lime by the solvent action of water charged with certain minerals, and as the Trenton limestone contains originally a small percentage of magnesia, it gradually becomes dolomitic in character, and, on account of its reduced bulk and crystallization, porous and cavernous.

When water has taken possession of shale in the shape of quarry water, or the shale is saturated with water, it is nearly impossible for oil to eject the water and enter the shale; the reverse is also true, when oil has taken possession of the shale it is nearly impossible for water to enter the shale. This is undoubtedly owing to capillary attraction of the fluids in the shale. When the surface of a capillary tube is greased it exerts but little capillary attraction upon the water, and when a capillary tube is moistened it exerts but little capillary attraction on oil. Other rocks act the same as shale, the finer the grain of the rock the greater the capillary attraction, and the more difficult it will be for oil to replace water or for water to replace oil.

Shale occupied by water makes a good encasement for oil and asphaltum.

The retention of petroleum and pissasphalt in the porous and seamed rocks cannot be affected without the accumulations or reservoirs having a cover or impervious encasement. This impervious encasement usually consists of unfractured shale, or other close-textured rocks, or porous and fractured rocks cemented and sealed with indurated bitumen or other minerals.

When the outcrop of bituminized sand is exposed to the atmosphere for a long time, the bitumen contained in it loses its volatile parts by evaporation and oxidation, turns brown and is easily pulverized between the fingers. The sand separates from the bitumen and the bitumen is easily ground to an impalpable powder. This brown asphaltum extends to but a short distance below the surface of the stratum. Beneath the brown coating of bituminized sand, the deposits receive a coating of hard asphaltum, made hard by evaporation and oxidation. The condition of the bitumen in the seamed and cracked shale resembles that which is in the sand. This concreted surface is impervious to the flow of pissasphalt and petroleum oil, and frequently sufficiently tight as to inclose natural gas. In fact, all porous or seamed rocks, when the base of the saturating petroleum is asphaltum, becomes water and petroleum-tight, by reason of the petroleum becoming concreted by oxidation and evaporation; the same as when a tree is wounded by a cut or puncture, the impissated sap soon closes the pores so that little sap escapes. The surface of the bituminized sands and shales is hard, increasing in fluidity as it enters the deposit or is removed from atmospheric influences.

In some deposits, a short distance from the surface will show a petroleum oil of 10° Beaume, decreasing at 1000 feet to 32° Beaume.

If rather stiff maltha is melted and poured into a hole in a sheet of iron $\frac{1}{16}$ of an inch in diameter, so that it will form a thickness $\frac{1}{16}$ of an inch on each side of the sheet, the sheet being $\frac{1}{16}$ of an inch thick, it cannot be removed with a pressure of water equal to fifty pounds to the square inch. The prodigious pressure necessary to force maltha through the interspaces of sand or irregular seams of shales for a distance of several hundred feet can hardly be imagined. In fact, the salvation of most of the accumulations of petroleum oil in California is owing to this induration of petroleum by oxidation and evaporation.

This impervious coating also protects the oil reservoirs from the entrance of surface water.

The petroleum oil in passing through the sand or shale collects the silt and carries it forward. This also assists in forming a cover, filling up the places through which the liquid hydrocarbons attempt to escape.

Under great pressure the petroleum oils are constantly alert to take possession of any space created by the uplifting or other movements of the earth, and if these oils are concreted into asphaltum by oxidation and evaporation they retain possession. The oil occupying the surface of the water in a formation has an advantageous position to perform this work, as the formation is more fractured in these parts than in the synclines and the dips of the anticlines.

The cut shows strata of bituminized sand on a ridge running north and south between the Coja creek and a branch of the Baldwin creek, seven miles west of Santa Cruz, California. The bituminized sand lies nearly horizontal and extends from canyon to canyon through the ridge. The dip of the shales and sandstones of the surrounding country shows that this is the apex of a large dome, covering an area of some twelve square miles. Overlying these strata of bituminized sand is a close-textured shale 40 feet thick and underlying the same is a porous and incoherent sand.

C. S. I. CO.'S BITUMINOUS ROCK MINE, SANTA CRUZ CO., CAL.

The Coja creek, lying immediately west of this deposit, is 200 feet deep and must have taken many thousands of years to form. Redwood trees, proving by their concentric circles to be several hundreds of years of age, are growing in the bottom of the creek. The impregnation of the sand with bitumen must have occurred before the gulch on either side of the deposit commenced to form through denudation, otherwise the liquid bitumen would have run out of the porous sand. From the horizontality of the surface of the porous sand which underlies the bituminous strata it must have been filled with water, forming a horizontal plane upon which the bitumen floated. This also must have occurred before the denudation of the gulch on either side. The petroleum must have been under considerable pressure, as it has thoroughly saturated the sand between the porous sand and the overlying shale, and where porous places have existed in the shale petroleum has been forced into them.

Notwithstanding the thousands of years which this bituminized strata has been exposed to the elements the bitumen in the interior parts of the deposit is at present liquid, its liquidity being preserved by the concretion of the bitumen on the top, bottom and sides of the deposit, stopping evaporation, oxidation and leakage. In these strata of sand, when bituminized, they contain gold in considerable quantity, whereas in those portions which are not bituminized but little gold exists. It would seem that the gold in the bituminized sand was protected from the solvent action of mineral water, the presence of the bitumen in the sand stopping the percolation of mineral water, whereas in the sands not bituminized this percolation is permitted and the gold is dissolved and carried away. But further examination will be required to be positive that such is the case.

Sand rock, sand and sandstone are composed mainly of rounded or broken grains of quartz of varying form, color and fineness. The material cementing the grains are either argillaceous, bituminous, silicious or calcareous, or a mixture of any of these four substances. Some of these sands contain cementing material, some in such a small quantity that they are friable. When found beneath the earth's surface they are seldom found in an incoherent state. When they are porous they are occupied by either natural gas, petroleum oil, or water (generally of a mineral character), or both of these fluids and gas.

The buoyancy of the oil in associated water is the force which impels the oil upwards. The oil is carried so far upwards that it sometimes escapes at the surface in the form of tar springs or seepages, and is lost, or it accumulates in porous or seamed strata beneath the surface of the earth. For the reception of the petroleum, oil or gas, the sandstone strata is at first made porous by the solvent power of water, which removes the calcareous and silicious cementing material.

(To be Continued.)

The Telluride Ores of the Black Hills of South Dakota.

Written for the MINING AND SCIENTIFIC PRESS.

In the northern Black Hills is an area covering several hundred square miles throughout which occurs gold ores of uniformly high grade, which, owing to their mineralogical characteristics, may be called telluride ores. They contain both gold and silver, and usually carry more than $20 per ton, and in some cases the value reaches hundreds of dollars per ton. These ores occur in shoots of varying size, from 30 to 200 feet wide, a few inches to 20 feet or more in thickness and often 800 to 2000 feet long. The ore shoots are bedded deposits, occurring in part as silicious impregnations, and in some instances the original rock (quartzite) is simply impregnated with the gold and silver and other accompanying minerals. They are found in the sedimentary rocks of the Cambrian, the lower deposits being in a quartzite, or lying immediately over it, forming the basal member of this series, which rests unconformably on the Archæan. The Cambrian has here a thickness of 250 to 300 feet and is succeeded upward by the limestones of the Carboniferous. There are two important beds of quartzite in the Cambrian and locally others of less importance. The telluride ores occur at several geological horizons, and in some localities there are two or more ore-bearing horizons. The limestones are also mineral-bearing, in them occurring two distinctly different classes of ore deposits: First, galena and iron sulphide ores, and, as secondary products of their alteration, lead carbonate and other lead minerals; limonite and, sparingly, hematite, with chloride of silver and gold. Second, flinty silicious concretionary masses carrying native gold; some of these ores are rich and are shipped to the smelters or other works for treatment.

These ore deposits are always associated with eruptive dykes, which without doubt furnished the channels along which mineral solutions from great depths reached the strata in which the ore shoots occur, and deposited by infiltration or impregnation the gold, silver and other minerals found in these ore deposits. They may be called contact deposits, as that is the form in which they are found, though it is doubtful that the overlying or underlying sheets of either sedimentary or eruptive rock had any considerable influence on the ore deposition. The formations in which these ore bodies occur were at one time a solid continuous sheet, covering the northern Black Hills and, possibly, the entire region, though there is a noticeable thinning out of the several beds southward, particularly in the western southern hills. Erosion has removed vast amounts of these sediments, and the areas are now separated, and some of them are, as islands, isolated from all others, and are merely remnants of the once continuous beds and are found capping hills and ridges. The sediments of the northern hills have been tilted, folded, crushed and faulted. The principal intrusives are rhyolite, trachite and phonolite. The latter appears to be associated with a number of the ore deposits, and as telluride ores are found associated with phonolite at Cripple Creek, all phonolite dykes are given close attention wherever found in these districts.

Terry's peak is the dominant mountain of the northern hills, though there are several other important peaks near it. These are Green mountain, Bald mountain and Sugar Loaf. In each of these mountains occur important ore deposits of the character above described. Terry's peak is an immense laccolite and has thrust sheets of eruptive rock into the sedimentary beds in all directions from the central mass, crushing, splitting and tilting the rocks of the Cambrian and sometimes separating them from the Archæan. Many other laccolites occur in this region, but no others on so large a scale. Several miles northwest of Terry's peak is Crow peak; a huge mass of sanidin trachite has thrust itself up through the sedimentary strata, but has only lifted the sediments, which are seen dipping away from the neucleal mass in all directions; but no evidence of laccolite can be observed, nor are there any later dykes cutting the formation, nor are there ore deposits in connection with this uplift.

A complete description of these ore deposits and their geological associations and the relation of the eruptives and their influence on ore deposition would be very interesting, though not more so, perhaps, than a brief history of the efforts made to success-

fully treat these telluride ores, which for years defied all attempts in that direction. No expense was spared, and the best and most skillful metallurgists of the time were employed, but for years all efforts were only partially successful.

The first discoveries of ore in this field were made in the earliest days of mining in the Black Hills—1876-'77—and the first mines of this class to attract attention were those of the Portland and Trojan groups on Green mountain. Numerous other discoveries were made later and a large amount of work done over a district not less than ten miles long by three miles wide, though the development of more recent years has greatly extended this area and it is very probable that it will be found that mines of the class described are co-extensive with the intrusion of the sediments by the eruptive dykes. Long after the discovery of the Green mountain mines, Ruby Basin, Golden Reward, Carbonate and Ragged Top were found. In the early days, however, lead carbonate and galena ores containing silver were mined, milled, smelted or shipped from the Galena district, and later the same thing was done at Carbonate; but at neither of these places was any attention given to the telluride ores, though these ores occur in both of the districts mentioned.

The first operations on a scale entitled to be called commercial were those of the Portland Mining Co., whose property is located on Green mountain. The development of this mine exposed a large amount of high-grade ore, but free gold was an unknown quantity. A stamp mill was erected and elaborate preparations made to work the ores. The mill was also provided with pans and a modification of the Washoe process was tried; but the raw ore would not amalgamate, and it was determined to calcine the rock. A large kiln was built for this purpose near the mine and the ore was dumped into the kiln mostly in large masses 6 to 10 inches in diameter. Pine wood was abundant at $4 to $5 per cord. The calcining of the ore made it possible to extract from some lots as high as 50% and even 60% by amalgamation, but the loss was so great that a change was determined upon. The stamps were torn out and thrown in the mill yard, and then followed several experiments with cannonball pulverizers and other machines of similar character, which were worse than useless, for the ore is extremely hard and dense. Then a pulverizer of the Cornish roll type was tried, having a revolving screen, and fed through hollow trunnions. This machine stripped its iron gears promptly, and steel gears were ordered, which lasted longer than the iron gears; but the machine was not a success, chiefly because the rock was not broken small enough before being introduced to the pulverizer. Pulverizers were all discarded and the stamps replaced and grinding pans added to the plant. These latter made a noticeable improvement in the saving, but entailed a proportionately greater expense. At last, in '84, all further experiments at the Portland were abandoned.

Later the Buxton Co., a few miles distant and having a similar class of ore, constructed a stamp mill, built a roasting furnace somewhat similar to the kiln at the Portland, but took a step in the right direction by making no further attempt at amalgamation. In this mill the Supt., O. P. Ankeny, installed the bromine process. After fine crushing (wet) in the battery, the pulp was charged in a lead-lined barrel with bromine and the charge revolved until a complete dissolution of the gold was effected. It was then drawn off into a vat, and from that to a settler, and the gold precipitated from the bromine solution by the introduction of sulphuretted hydrogen under the false bottom of the vat, the gold being precipitated in the form of a brownish black powder, which was collected, filtered, dried and melted into bars. This process worked fairly well, but failed to extract a sufficiently high percentage of silver, and was also quite expensive, and was finally abandoned. As will be seen, the bromine process was but a step from a complete solution of the vexatious problem.

The advent of the railroad into the Black Hills in '86 brought about an important change. The following year the railroad was constructed to within a short distance of these mines, and new capital naturally drifted into the country, and, as an outcome, these ores, which for years had defied all attempts to successfully treat them, were soon submitted to a series of experiments, as a result of which they are now worked extensively and to a high percentage of extraction. The processes which have wrought this change and brought into circulation millions of dollars in gold, extracted from these no longer rebellious ores, are the barrel chlorination process, which approximates closely the bromine process introduced by Mr. Ankeny, the cyanide process and the pyritic smelting process. The difference in cost in the operation of these three successful processes is very slight, and all save a high percentage; which will be the most enduring, time only can tell.

The experiments of the earlier days cost no less than half a million dollars, to say nothing of the enormous loss in tailings, and in some cases while experiments were in progress at the Portland mine the mercury "floured" and "sickened" so badly that not only the gold, but the quicksilver, as well, was lost.

W. H. S.

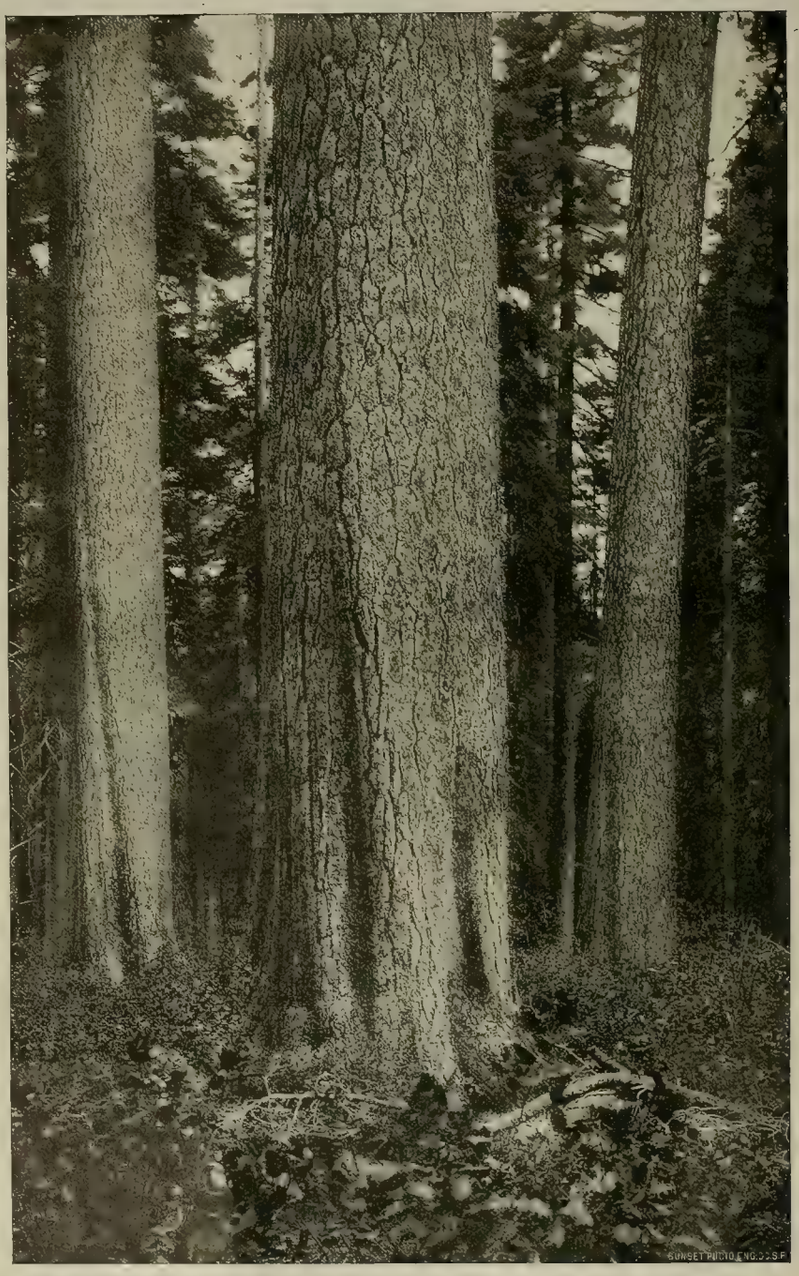
The Forests of the Sierra Nevada.

California people are becoming aroused on the subject of forest conservation and restoration. There are nature lovers here and there who have made touching appeals for the trees; artists who have cast their prayers in the form of impressive views of tree grandeur and forest sublimity and charm, and industrialists who have argued convincingly for moisture conservation and future timber supply. All these friends of our forests have no doubt accomplished much to lead in the state of interest which now rules the public mind, and they must therefore be content with the success of their pioneer work, even if the present rush of popularity should drown their pleading words in the deep sound of a public demand.

Little less than this it really amounts to now. The Miners' Association in their demand that the streams shall not fail; the various municipalities in their protest against anything which may endanger city water supplies; the trade organizations which look forward for general activity and prosperity, have all combined for systematic work for forest protection—work to be continued until its ends are reached. In the northern and southern parts of California the same spirit is being clearly manifested, and the same influences invoked to the same accomplishments. It is a promising time for California forestry—not so much in what has been done as in what will almost surely ensue.

The engraving on this page is in harmony with this spirit. It is a characteristic view in the sugar pine forest of the Sierra Nevada, this especial point being on the McCloud river, in the extreme north of the State, and is illustrative of the great pine and fir region of the Sierra Nevada, which lies along the axis of this great mountain range, from Kern to Shasta counties, and about the inland peaks of the northern Coast Range. Its noblest trees are the *Pinus Lambertiana*, or sugar pine; the *Pinus ponderosa*, the great yellow pine of California; *Picea nobilis*, *Picea amabilis*, and the giant white cedar (*Libocedrus decurrens*).

Botanists divide the great Sierra forests into three belts, depending upon species and altitude. On the lower or foothill belt grow the oaks and *Pinus Sabiniana*. The 6500 square miles of this region extends to an altitude of 2000 feet. The middle forest zone reaches to an altitude of 4000 feet, with an average width of fifteen miles. Here are fine but fewer oaks; here the great yellow pine appears, often 200 feet in height and girthing 20 or 25 feet. Here are the black pine, the red and yellow firs, the fragrant Sierra cedar, and some sugar pines. The third forest zone lies above 4000 feet, extending to 8000 or 9000 feet above the sea, and forms a great mass of varied coniferous forest. The yellow and the sugar pines, the giant firs, spruces, and sequoias rule supreme. Above 9000 feet Alpine species of pines and junipers carry the fringes of the forest to the snow line.



IN THE SUGAR PINE FOREST ON THE McCLOUD RIVER, CALIFORNIA.

Among all the noble conifers the sugar pine (*Pinus Lambertiana*) is easily the first. Single specimens have been measured that were 300 feet high and 40 feet in circumference. Douglass measured one fallen trunk whose circumference was 58 feet. But this most valuable timber tree of the Sierra does not easily reproduce itself, is subject to many enemies, and is rapidly disappearing.

All the mountain counties of California have share in this great forest region. The central regions, being more accessible by rail, and nearer to the markets in city and mine, have their lumbering interests more widely developed and have consequently trenched most deeply upon their timber resources. The most heavily wooded portion of the Sierra forests, aside from the districts around Mount Shasta, are mainly in rough, mountainous country, and in most cases are difficult of access. It is hard to explain to those who have not spent months in the high Sierra or Coast Range the immense reproductive powers of the coniferous forests when given a chance, and also the absolute necessity of some protection. Take the Placer and Nevada districts of the Sierra as an illustration. The forest problems in this district, which is one of the highways along which cattle and sheep are driven into the fastnesses of the Sierra and back into the valleys, are assuredly as difficult and numerous as those of any other part of California. If the leading species will reproduce themselves there, or if some species are gaining foothold, or if a little care and attention would enable the young trees to overcome all obstacles, it seems certain that immense areas in the Sierra elsewhere could also be reforested. The enemies of the California forest are sheep, cattle, the old trees which die, and, felled by the winter storms, break down hundreds of the younger trees, and fires.

AN Idaho journal says the prospecting fever is the only one in the world that leaves in its wake prosperity and plenty, builds cities and railroads, and makes the desert blossom as the rose.

Mining Summary.

ALASKA.

Eureka creek, near Dawson, bids fair to become a Bonanza. Claims 0, 2, 10 and 12 on the left fork are yielding handsome pay. A nugget weighing a fraction over $27 has been found on 33 below upper discovery, Dominion. Nuggets of that size are not common beyond the dome. Sulphur creek is showing up well all along the line. A rich strike is reported on the hillside claim, adjoining 11 above on Last Chance. The creek and hillside claims from lower discovery to 77 below are turning out good. Pay has been located on the benches adjoining creek claims 70 and 77 below, left limit. From Thistle creek it is reported that on 182 above a pay streak 18 feet deep, width yet undetermined, has been located, the pans running from 25 to 85 cents. Bedrock is 16 feet, while the gravel, including pay dirt, is 12 feet.

Kotzebue sound is still one Northern gold field unheard from during the winter. Over 800 miners are wintering there.

ARIZONA.

(Special Correspondence). — The Crowned King mine in the Bradshaw mountains southeast of Prescott is being pointed to as an anomaly in mining, because of the discovery of free-milling ore on the 500 level. It is cited as the "first case on record" where a vein changed abruptly from a very base ore to a free-milling ore with depth. While this condition actually exists it is rather misleading. At the surface and for some distance below it, the Crowned King vein was oxidized and quite free, but lower iron and zinc sulphides appeared in abundance and the ore became very base, but a small portion of its gold being free. The occurrence at this time of quartz carrying large amounts of free gold and very little sulphide mineral is of purely local character and signifies nothing in particular.

Prescott, A. T., April 1st, '99.

The Helvetia group is thirty-one miles southeast of Tucson. It comprises thirty-eight claims, and has been bought by Boston, Michigan and Chicago men; a company has been organized in New Jersey, capital $5,000,000. It is claimed that an expenditure of $250,000 will equip and bring the mines to a production of 120 tons of 9% ore per day, or 21,600 pounds of copper. A 60-ton smelter is to be built. Under present conditions mining has cost $2.31 per ton; under modern equipment, it is estimated, this can be reduced to $1.50, including delivery. The cost of smelting is now estimated at $4, which can be reduced to $3.50. One of the men employed to report on the property says that copper electrolytically refined ean be laid down in New York at less than 6 cents a pound.

Yuma *Sun*: S. M. Smith and H. W. Blaisdell have gone to the King of Arizona, near Yuma, to look after erecting the mill and cyanide plant.

CALIFORNIA.

Alpine.

There are three stamp mills in this county, all of which are idle.

Amador.

On good authority it is asserted that work at the Alma mine, Jackson, will not be resumed very soon.

It is rumored that a full force will soon be at work again at the Amelia mine, near Jackson.

At the 1300 level good rock has been encountered in the Zelia, near Jackson.

Amador *Dispatch*: Power drills have been placed in the east shaft of the Kennedy mine, at Jackson.——At the Pocahontas, at Drytown, crosscutting at the 315-foot level is in progress; also in the California mine on the 400-foot level. The crosscuts are being driven through the slate to the east. The quartz taken from the crosscuts supplies the 10-stamp mill. Sinking will commence April 15th. It will be sunk to 800 feet.——The Butte Mountain Co., Mr. Marsh Supt., have the ledge in their tunnel; it shows no free gold, but prospects well, and is heavily charged with sulphurets.——H. Osborne, the owner and promoter of the Peerless mine, on the Badarraco ranch, says work will be resumed soon.

Amador *Dispatch*: Copper ore has been found on the ranch of E. Fink on Stony creek west of Jackson. There is said to be a large vein of the ore.

Butte.

A new industry is being developed at Chico from paint deposits recently discovered. A company to manufacture these paints has been formed.

Calaveras.

(Special Correspondence).—Some mines of promise are being opened up in the Salt Spring valley. The mines are scattered along this valley between the Bear Mountain range and Gopher ridge from the vicinity of Valley Spring to Pine Log and beyond, a distance of fifteen miles or more. The mountain ridges are composed chiefly of diabase. Along the east side of the valley are large and almost continuous outcrops of serpentine, and west of this is black slate of the Mariposa formation and amphibolite schist, with intruded dykes of a gray rock probably allied to diabase, but later than the massive diabase of the neighboring mountains. The gold-bearing veins occur at contact of these dykes and slates, or wholly in the dykes themselves. In the serpentine rocks, and near them, are found copper ores. The mines of Copperopolis are on this belt, two and one-half miles southeasterly from Pine Log.

Copperopolis, April 2nd, '99.

Supt. Lucas has found good ore in the Garner mine, near Big Bar bridge, on the Mokelumne river.

The Angels mine at Angels is to be run by electricity, furnished by the Blue Lakes Co.

Citizen: It is reported on good authority that the Lamphear mine in Spring gulch, one mile from Mokelumne Hill, which has been idle so long, will start up the 1st of April.

Amador *Republican*: It is reported on good authority that the Sheep Ranch mine is to be equipped with a new hoist and a mill and the mine to be reopened. The shaft is about 1200 feet deep.

Del Norte.

Copper ores are found near Low Divide, ten miles east of Smith River Corners, near Bald mountain. The belt runs northward into Oregon. The formation is serpentine.

Del Norte *Record*: The Ocean Beach placer mine below Crescent City has been closed down.

El Dorado.

The Taylor mine has been equipped with a cyanide plant for treating sulphurets and tailings.——The Josephine mine near Volcanoville is again being worked after a long idleness.

Placerville *Nugget*: G. B. Rymal and G. Jones recently took out $1600 from a pocket on their claim on Pilot hill.

Fresno.

Miners can still make small wages drifting the gravel bars on the San Joaquin river, above Pollasky.

Humboldt.

Yreka *Journal*: Extending southward from the Siskiyou county line into Humboldt county is a mineral country of which little is known; the development is limited owing to its inaccessibility except on foot or horseback.

Inyo.

A. J. McCarthy of Los Angeles, Cal., is putting a cyanide plant in at Pigeon Springs to work tailings.—— E. Smith has struck water in a shaft recently sunk at Big Pine and will make a mill run.

Kern.

Randsburg *Miner*: The Yellow Aster Co. is building a machine shop near the mill.——The Eureka mill has been bought by Kinyon Bros. The larger proportion of the dump at the Kinyon mine will pay to mill, and when the mine cannot supply enough ore it will be kept running on the dump.

Los Angeles.

On Mount Gleason, seven miles southwest of Acton, are bodies of magnetite, on which little development has ever been done. In the vicinity are gold-bearing quartz veins, containing free gold and iron sulphurets said to be high grade in gold. These latter have considerable development, but have never paid for some reason—perhaps not altogether the fault of the mines.

Los Angeles *Times*: The Santa Fe Railroad Co. has commenced sinking two new oil wells near Fullerton.——The Puente field is steadily developing. A large gas engine is being put in to furnish power for pumping. Natural gas will be the fuel used.

Los Angeles *Mining Review*: The Red Rover Co., at Acton, will equip and develop the old Topeka mine, near the Red Rover.——The Escondido mine, seven miles from Acton, is being reopened. It was worked years ago to the water line and abandoned. The rock was worked in arrastras.——There is activity all over this much-neglected district, but a great deal of the work is of superficial character.

Marin

It is reported negotiations for the copper mine near Dog Town, in Union gulch, are in progress.

Nevada.

Union: A new hoist and pumping plant is to be installed at the Brunswick mine, near Grass Valley. The friction will be 7 feet in diameter with 12-inch face. The drum will be 4 feet in diameter. The friction will be separately keyed on the shaft. There will be a paper friction 18 inches in diameter and 12-inch face, the drums to be run by a 7-foot water wheel. The rope sheave will be 7 feet in diameter. The pump will be a 12-inch Cornish plunger.

Republican: The Grand Victory M. Co. expects to begin work at their mine at Fall creek shortly.

Placer.

At the Crandall mine near Auburn is a 5-stamp mill of 1100 pounds which falls 105 times in a minute; water is brought 2131 feet and has a fall of 240 feet. The concentrates will be shipped to Selby's for reduction. If the returns are as good as expected fifteen stamps will be added. The main tunnel is in 500 feet on the Cox & Denton (known as the Crandall ledge). At the face the ledge is 6 feet wide. It is an east and west ledge and dips to the south. The company owns five veins—the White Goose, Clough, Crandall, Hunter and Sacramento. At the mill these veins are nearly parallel, but they meet at no great distance on the east. Twenty men are employed.

Colfax *Sentinel*: A number of hydraulic mines have been able to commence work, owing to rain.——The water in the North Fork of the American was higher last week than since the flood of '90.——River bar mining will be profitable the coming season. The flood has lowered the tailings in the North Fork about 2 feet. Nearly the entire bed of the river is held by location from the Yankee Jims bridge to a point opposite Gold Run. For the past two years the floods have been insufficient to move the tailings. Three years ago miners on river bar claims cleaned up $3 per day for the season; some of them made runs that returned $8 per day to the man.—— Supt. McAulay is piping in the McCall pit at the Mayflower mine, near Forest Hill. A permit was secured in '97, but the water supply has not been adequate until now. The restraining dam is located in Black Oak canyon. Several men are employed in the drift mine. ——The Big Gun hydraulic mine at Michigan Bluff is working. It is owned by A. Dixon and others.——The flood carried away the boarding house at the Cash Rock river mine, on the Middle Fork of the American river.—— At the Red Point mine, near Damascus, there are fifty-nine men on the payroll. The main tunnel is now in 12,700 feet. An average of 108 cars of gravel are mined per day. Seven horses are used in hauling trains.—— Supt. H. F. Adams of the Derby mine, between Centerville and Sunny South, says the new lower tunnel is in over 900 feet.

Placer *Herald*: The Bouks are taking out good ore at their mine near Bloomer Cut. The vein averages 14 inches.——The rock at the 600-foot level of the Hathaway mine, near Ophir, proves richer than any other part thus far opened up.——The Gold Blossom, near Ophir, is working a large force of men.——The Herman mine, six miles north of Deadwood, has been shut down for thirty days. The pumps cannot handle the water.——The Morning Star at Iowa Hill employs sixty-five men and yields its regular dividend.——The old shaft at the Coppertown mine will be cleaned out and sunk deeper.——The Evening Star mine with all its machinery on Rock creek has been bid in by H. Bernnardt. This mine was sold a year ago by J. Heenan for $5000. Since then a plant costing $7000 has been placed there.

Republican-Argus: A good strike is reported from the Pine Tree mine, near Newcastle. The vein is 4 feet wide and carries galena and free gold.

Plumas.

Bulletin: Work is to be resumed on ten mines of the Elizabethtown Gravel M. Co , on the Kellog ranch near Quincy, about April 1st. The company has a 60 H. P. boiler, 40 H. P. engine, a hoist, a 10-inch Cornish pump and three steam steam pumps in reserve. There is a double-compartment shaft 100 feet deep with a tunnel 120 feet extending towards the channel. C. R. Merriam is Mgr.

Riverside.

Johnson & George, lessees of the Good Hope mine, four miles southwest of Perris, are working some of the most valuable ore that has ever been found in that mine. They have been offered a large sum for the ore taken out so far this month, but have refused it.

San Bernardino.

(Special Correspondence).—The Gold Bar mine is developing into a promising property. A. G. Campbell, who owns the Boomerang and other claims on the opposite side of the ridge from the Gold Bar, bought the latter mine some time ago and has developed it. The fissure ranges from 1 foot to 20 feet in width, with a pay streak from a few inches to 10 feet in width. The ore is partly free near the surface, but in depth is heavily charged with the sulphides of iron, copper, lead and zinc. The ore is worth $20 to $40 per ton. The Gold Bronze mine, operated by C. A. Stilson and others, is a continuation of the Gold Bar, though having a different strike, the vein curving between the workings of the two properties. The ore in each is similar and the vein characteristics the same in both.

Vanderbilt, March 31st, '99.

At Ivanpah, the Ivanpah Copper M. Co. is reported to be daily smelting about six tons of copper, 95% fine.

San Diego.

The Ruby 5-stamp mill at Banner is being removed to the Ranchita mine south of Banner.

Union: At Hedges the Golden Cross M. Co. has but fifty stamps in operation in the 100-stamp mill, and a spirit of economy pervades the camp. There are 200 men on the payroll. No new discoveries have been made in that section lately. Receiver C. W. Pauly is kept busy in directing the affairs of the company.——J. K. Vanatta of Colorado Springs, Colo., one of the new owners of the Elevada mine at Banner, who with others purchased the mine several months ago, has organized the Smoky City M. Co., with a capital of $250,000. The mine had been partially developed and men were put to work cutting the tunnel already started 379 feet below the main shaft and is now in 200 feet. Mr. Vanatta stated that the ore averages about $20 a ton. It is probable that an electric dynamo and hoist will be put in.

Shasta.

The Frue mine, on Coffee creek, is being developed under contract.

Free Press: W. M. Dale has purchased from A. R. Meyers the Lucky Spot mine, one mile west of Cow Creek smelter.——The Blue Jay mine, on Coffee creek, which attracted a great deal of attention a year or two ago by reason of the rich pockets found near the surface, is now producing milling rock. The development disclosed a sulphide vein in the lower tunnel. ——Four men are employed at the Eureka Tellurium mine.——The Washington mine, near French gulch, is being worked by M. Sheehan, who is working on the lower tunnel; he has taken out some good rock of late. The 5-stamp mill is being run constantly and is operated by the company, who work leasers' rock for $3 a ton.——It is said that there is hardly a foot of ground in the Flat Creek mining district not included in a mining location. One day recently seventeen notices of location of quartz claims in that district were recorded. Of that number, W. Candrick has eight claims, C. D. Galvin has six, E. V. Cartner two and H. D. Crandall one.——The Golinsky-Clendenin copper mine, near Kennet, is working twenty to twenty-five men. They are driving a crosscut tunnel 200 feet below the croppings, now in 55 feet. Mr. Kemp has let a contract to G. Bjork to drive 100 feet.

Democrat: The Gambrinus mine, at Whiskeytown, started up this week. A tunnel 100 feet below the old workings will be run to drain the mine. There is now in the mine 500 feet of tunnel. There are several veins on the property, ranging from 2 inches to 4 feet in width.——The main shaft on the Mount Shasta mine is now down 250 feet, and a gasoline hoist is used, but the owners intend to put in a hoist of greater power. An average of twenty tons of ore a day is shipped to the Keswick smelter. Some of the ore runs as high as $400, the lowest $25.——Work will be resumed on the Dun Bros. mine, on the apex of Nigger Hill, a mile west of the Keswick smelter. The main prospect shaft is down 80 feet and will be sunk to 300. This mine has yielded high-grade ore; the gold values are principally in sulphurets.

Searchlight: Fifteen stamps are dropping at the Uncle Sam, near Kennett, and according to Gen. Mgr. Dakin 700 tons of rock were crushed with very satisfactory results. Since March 15th new ground has been opened and the returns from that source are encouraging, some of it going to $10 per ton. The mill and the mine are being worked with three shifts.

Sierra.

The Bonanza M. Co. has conveyed all of its property at Sierra City to the Mining & Investment Co., and all suits against the former have been dismissed and litigation settled up. Mgr. Pinney is having the 40-stamp mill repaired.

The Comet mine, in Jim Crow canyon, is being developed by Eastern capital, G. F. Taylor Mgr. Considerable money will be spent on the property this summer. A large vein has been found in the tunnel which prospects well.

Siskiyou.

A quartz vein carrying galena, on the ridge between Fox and Boulder creeks, four miles west of Callahan, has several superficial cuts on it.

Yreka *Journal*: The Aromas Co. at Salmon river has a small force employed until the ditches are fixed up again.——The Salmon River Co., which bought the Klein mine at Salmon river, keeps a full force of miners at work.——The Chicago M. Co. has purchased several mines in the Cottage Grove district, on Klamath river near the Humboldt county line, where there is abundance of water all the year round, and rich placer ground.—— The Oregon G. M. & M. Co. has purchased the Ah Ock mining property and ditches at Happy Camp.

Trinity.

Redding *Free Press*: It is reported that the ledge was struck in the Chloride-Bailey mine near Junction City in a crosscut some time last week, at a point between 250 and 300 feet below the old workings. The Chloride-Bailey is owned in San Francisco by O. O. Howard Jr. and F. E. Ware, owners of the Mount Shasta mine, and others.——The Temple tunnel at the Integral mine, twenty-two miles northeast of Trinty Center, has been closed down. They are working six men, two shifts, in the Castella tunnel. The latter is now in a distance of 2165 feet.

Tuolumne.

It is rumored that the owners of the Rawhide mine, four miles west of Sonora, and the App mine at Quartz mountain, are endeavoring to sell these properties, to which particular attention has recently been attracted by reason of litigation between the owners, W. H. Martin, John Ballard and W. A. Nevills. Litigation has been suspended pending the result of the negotiations now in progress. The price asked for the consolidated properties is said to be $2,000,000.

Banner: Thirty stamps are now dropping at the Black Oak mine near Soulsbyville. The shaft will be sunk 250 feet deeper, making it 1000 feet deep.——It is reported that Jas. and Jos. May have cleaned up a $10,000 pocket in their claim below Saw Mill Flat near Columbia.——A rich bed of gravel has been discovered on the Brunson ranch, below Chinese Camp. The supply of water is less than is required to do the work at present. The gold is coarse and high grade.

The Gerrymander mine at Sonora is about to resume operations. The shaft now 115 feet deep will be sunk to 315 feet. A contract for 200 feet will be let. An addition to the mill is contemplated the coming season.

Democrat: Pocket mines have been discovered near O'Byrnes' Ferry. Recently a miner and a sheepherder went to work and in a short time took out $600, and since have taken out from $10 to $30 every few days. A number of claims have been located. The district is on government land.

Independent: At the gravel mine near Crystal Palace Cave, owned by Abel, Napoleon & Smith, $400 worth of nuggets were picked up after the heavy rains from the gravel which had been piled up during the dry season.——The Columbia E. & T. Co. are setting up their machinery on the Jolly ranch, about 500 yards north of the first workings. ——The ditch from the Philadelphia Diggings, near American Camp, to the south fork of the Stanislaus, a distance of seventeen miles, has been completed and hydraulicking commenced. The scarcity of water heretofore was a great drawback. Twelve men are employed.

COLORADO.

CLEAR CREEK COUNTY.

Mining Gazette: Dickson Bros. have started work on their Cumberland. It mills about $30 per ton and the vein is 3 feet wide.——Hawk Bros. are stoping ore from the Little Cora that runs in mill sample six ounces gold per ton. The vein is thought to be the extension of the Whale.

Silver Standard: The extension of the Pomeroy tunnel through Gray's Peak is again being agitated. —— Considerable ore was shipped from the Pelican this week.——Large shipments of ore have been made from the Smuggler this week.——Davis & Alan have commenced work on the King and Queen lodes in Brune gulch.——C. Hansen had a mill run of 189 sacks of ore from the Corroy City last Saturday which gave 276½ ounces silver per ton.——There is a large quantity of ore at the Dunderburg awaiting shipment.

GUNNISON COUNTY.

(Special Correspondence).—A suit involving a one-eighth interest in the Vulcan mine, near Gunnison, in which J. A. Heimbaugh and J. M. McDougal were the principals, has been settled out of court, Mr. Heimbaugh having purchased the McDougal interest for the sum of $7500 cash and the dismassal of the two suits pending against the McDougal interest. One suit was pending in the District Court of this county and the other in the

Court of Appeals. This will end what promised to be a very bitter and hard fight through the courts.

The mine has not resumed work since the recent trouble, a pump man and two men in the mine, catching up some bad places where it had to be retimbered, being the only ones employed.

The Good Hope and several other properties near it, that were affected by the recent Vulcan trouble, have again resumed work and will, as soon as the snow is off, increase the force of men and also the output.

A deal has just been consummated whereby the Midland property has fallen into the hands of Denver people, who are able to put it on a paying basis, as the property is a good one. They have good ore and plenty of it and a Huntington mill of about fifteen tons capacity. The mine is shut down at present, but will start up as soon as supplies can be gotten to the mine, which will be about a month, on account of snow.

The mines at Pitkins and North Star are only working few men, as they have everything full of ore and cannot haul it out, on account of the soft snow, which is the case with about all the mines in the silver-lead belt. There are a number of good properties in the belt that will be opened this year and will add much to the output of wet ores from this county for '99.

Great activity is expected in the early spring in the extreme northern part of the county, where a good many promising copper properties are situated. Most all of them carry good values either in lead, silver or gold. There are some good zinc properties in the same belt, and, with the present price of that metal, they should not be overlooked.

Gunnison, Colo., March 26th, '99.

(Special Correspondence).—The Graflin tunnel will resume work at once, Mr. Graflin having returned from Chicago and all arrangements perfected whereby the tunnel will be pushed forward, and, unless all signs fail, before next winter it will be one of the big mines of this county. While in the East he also made an arrangement whereby he will work another property near Vulcan, where he already has a force working, and is confident that he will ship ore before thirty days. I did not learn the name of the new property acquired, but it is across the gulch from the Vulcan mine and a little farther down.

Lincoln Ball has returned from Denver and will push work on his several properties near Ohio City, and will have plenty of silver-lead ore to ship when the snow is gone.

G. W. Griffey has returned from Iowa, he secured the needed funds to push forward the DuBoise tunnel to cut the several large veins that they will reach in the next few hundred feet. He will also work the big vein discovered last fall on the east side of the gulch. The vein was found in a crosscut and is said to be 30 feet wide and will run $15 in gold. It is but a short distance to a good mill site, where water power can be obtained for all purposes at the foot of the gulch where it enters Cebolla creek.

A contract for 400 feet of work has been let to Pueblo people on the Iron Silver mine near Gothic. This property belongs to the Copper Creek M. & M. Co. When finished it will give them 1400 feet of development on the mine. The company owns fifteen claims in the vicinity. The property is a low-grade silver mine that will likely need concentration.

The Mgr. of the Doctor mine was in from Aspen this week and says his company will put in a concentrating plant this year having a capacity of seventy tons daily. Much of the dump material can be worked over at a profit. The mill will be built on the old town site of Moscow, where water power is to be had.

It is reported that a Mr. Brown will succeed the old foreman, Mr. Likorish, at the Vulcan mine. It is said that a good deal of dead work must be done to put the mine in good condition. The mine will soon start up again and ship high-grade ore. The mine will also ship large quantities of sulphur, which is from 85% to 97% pure.

Gunnison, Colo., April 1st, '99.

LAKE COUNTY.

The total production of Lake county for '97 was $6,447,073.65; for '98, $8,160,647.32. The county produced $4,117,533.48 in silver—nearly one-third of the entire output of the State. In lead Lake county leads production, being credited with $1,304,803.72—nearly one-third of the output of Colorado. The county produced $665,274.48—more than half the output of the State.

Salt Lake *Tribune*: A mining enterprise backed by large capital has been closed at Leadville. The Valley, Forest Rose and Dispute lodes on the western slope of Little Ellen hill have been leased by a syndicate of Chicago capitalists with the intention of putting in a new plant of machinery and sinking the shaft 500 feet. The lease is for three years.

Leadville *Miner*: There is an undeveloped field west of Leadville near Walta, Tennessee Park, Strawberry and Little Union gulches in which are vast deposits of mineral.——The Winnie D. shaft is down 275 feet in fine mineral. Drifts are to be run on the contact.

MINERAL COUNTY.

Denver *Post*: The Nelson tunnel is under the Last Chance shaft and 15 feet of ground separates them, which will be rapidly drilled to allow the large body of water in the upper workings to drain itself. This has been the cause of light shipments.——The Alpha, one of the Sunnyside group, has uncovered a body of high-grade ore on the 200 level, carrying silver, lead, zinc and a small percentage in gold.

SAN JUAN COUNTY.

Silverton *Standard*: A number of mills are to be erected the coming season as a result of successful experiments in mills that are now operating on low-grade ores. The largest of the proposed mills will be for the Tiger mine in Arrastra basin, to concentrate 100 tons of ore daily.——T. J. Hurley, president of the Occidental M. Co., says a reduction plant will be erected on or near the Occidental mines the coming summer.——J. H. Shockley, Supt. of the Four-Metals M. Co., has a number of samples from the Lackawana mine for experiment to determine what kind of plant will be necessary.——The Veta Madre people have plans and specifications for a mill on Galena mountain.——J. H. Collins, president of Gold Bug-Repeal M. Co. on Bear creek is of the opinion that the veins of concentrating ore on Cement creek can be more profitably milled than ores at Bear creek and will probably build a plant on the property in Cement creek.——The Red and Bonita M. Co. is contemplating the building of a mill on its Cement creek properties.

IDAHO.

J. H. Martin is superintendent of the work being done by W. A. Clark of Montana on the Sunset at Wallace. Three shifts are being worked there and the tunnel is being run as fast as possible with hand drills. An air compressor will be put in. From the mouth of the tunnel to where it is calculated the vein will be cut is about 2600 feet.

It is the understanding that the Bunker Hill & Sullivan will erect a concentrator in Government gulch this year to work the ore from the Silver King.

The men employed clearing away for the erection of the Big Buffalo mill in Winslow canyon have walked out on account of a reduction of wages from $4 to $3 per day. The erection of the mill will be delayed until other men can be secured.

The drift on the Sixteen to One at Wallace is now in 30 feet from where the ledge was cut and the body of clean ore continues 3 feet in width. Slow progress has been made drifting, the amount of clean ore making it necessary to prepare room to store it, as it will be impossible to ship any for a month or more yet. The ore assays 66% lead and forty-five ounces silver. It is reported that $250,000 has been offered for the mine: $10,000 down and the balance in different payments. As there was more than enough ore in sight to make the first payment and there would be time to take out the balance before it became due, the offer was refused.

Statesman: It is reported that the Philadelphia Co. has bought from G. A. Williams and others a number of claims on Grimes creek and will commence operations soon with W. O. Taylor, Supt. It is understood that $40,000 was paid for this ground. They will put on one or perhaps two dredges.——The Warm Spring dredge was operated at an expense of 2 cents a yard, from 1500 to 2500 yards being handled a day. The average yield was $420 a day, while on one day $1000 was cleaned up. The creek has been prospected on both sides for a long distance, and there is enough ground to keep the dredge running for many years.

Caldwell *Record*: The dredge near G. Paul's place is handling 2000 yards of gravel daily. It is equipped with electric lights. One man controls the entire plant from his position at the bow of the boat.

The Empire State-Idaho M. & D. Co. is proposing to run a tunnel from Government gulch at Wardner into the Last Chance ground, cutting deeper than any of the present works and which would necessitate building a new concentrator on that side of the ridge. It will be a mile in length and may be as much as a mile and a half. While it will be surpassed in length by the two-mile Kellogg tunnel of the Bunker Hill & Sullivan M. & C. Co., it will be longer than any other tunnel in the Cœur d'Alenes, the next being the 300-foot tunnel of the Mammoth and the Standard and W. A. Clark, each one about a half mile long.

Lewiston *Tribune*: The bonding of the Great Eastern copper property for $60,000 could not be divulged until now. The property lies eighty miles up Snake river and forty miles below the Peacock group. The mine has been penetrated for 50 feet. Shipments to different smelters returned 23% copper.——The sale is reported of the Star group of mines on Rabbit creek, in the Mallick district, to the De Lamar syndicate. J. J. Bennett of De Lamar and D. B. Huntley, Mgr. De Lamar mines, will go to the property and make an examination and tests of the properties. The bond includes four quartz, two placer claims and two water rights. The ledge is 60 feet wide through the four claims, widening at one place to 140 feet. The assays run $5 to $87.

MONTANA.

Counsel for the Boston & Montana Co. asserts that the company, at the present price of copper, is earning $30,000 gross and $17,000 net per day; putting the present price of copper at 16⅝c, a gross of $30,000 a day would be 180,000 pounds a day and 56,760,000 pounds a year of 312 working days. Seventeen thousand dollars net per day would yield $5,304,000 for the year, about $36.50 per share. Seventeen thousand dollars net on $30,000 gross would show operating expenses of 43¼%, and that expenses of 16⅝c gross per pound would show a production cost of about 7⅞c.

Inter-Mountain: Reports from Silver Lake, the scene of the Washoe Copper Co.'s tunnel which is being driven into the lake to secure water for the proposed new smelter at Anaconda are discouraging. Quicksand was encountered and also a large body of water. Different kinds of pumps have been tried, but without success. There is talk of abandoning the tunnel and starting a new one away from the canyon bed.

Helena *Independent*: The Mantle mine, located on Cataract creek, near Basin, is now being operated by J. Madden, under lease, who is building a steam stamp mill, which is expected to be crushing ore by April 1st. Developments on the mine are being rushed.——The main shaft in the Hope mine at Basin has reached the 600 level, a station has been made and the crosscutting commenced. The ore is the same character as that found in the upper levels.

NEVADA.

The Mineral Union, Ltd., is building a leaching plant at Good Springs, Lincoln county; capacity, 100 tons of ore daily. H. Hirsching of Denver, Colo., is Mgr.

The new Searchlight district is now ready to ship gold ore.

Vulcan Copper Mining and Smelting Co. is the title of a company incorporated under the laws of West Virginia to operate in Santa Fe district, Esmeralda county, where the company recently purchased a group of mines. The general office of the company is in Chicago, Illinois. The ore is a carbonate of copper and carries a small percentage of gold and silver. The mines are thirteen miles northeast of Sodaville. A smelting plant is to be built.

There are several changes in the mining law made by the recent Legislature, the most important being intended to simplify the method of making a location. The form of the notice is not essential, provided the stakes are properly set; the time for completing the location work is extended from 90 to 120 days, and it is no longer required that affidavit be made to the performance of assessment work.

The hydraulic pumping plant at the C. & C. shaft as reconstructed resumed working last Saturday. On the 4th inst., Mgr. Ross wired: "Water is 118 feet below 1750 level and 144 feet below the Sutro tunnel drain boxes and being lowered at the rate of 6 inches per hour. The elevator is working steadily without vibration."

The lowering of the water is noticeable at the Combination shaft, 3400 feet distant to the south, and at a winze in the Hale & Norcross, 720 feet to the northward.

Under date of the 6th Mgr. Ross sent the following: "Shut down the elevator three hours last night; water rose 21 feet. At 6:30 this morning the water was within 10 feet of the lowest point reached, or 132 feet beow the 1750-foot level and 158 feet below the Sutro drain boxes. Will run the elevator only enough to keep the water to about this point until water is drained from bonanza stopes. The water going down slowly at all points when measured. Elevator is running quite steadily."

It is understood to be the intention that when the water has been lowered to a point 200 feet below the Sutro tunnel connection, the present limit of the elevator, there will be a delay rendered necessary to install new extensions for lowering the water an additional 200 feet. While these changes are being made the pump will hold the water at the first 200-foot point.

Virginia *Chronicle*: A marble and granite quarry is added to the industries of Humboldt county in the vicinity of Winnemucca.

Pioche *Record*: Searchlight is close to the California line in Lincoln county. Considerable ore is being produced. Five mines are being worked and a mill is being built. There are about 150 men employed and California capital is developing the mines.——The camp of Pioche to-day offers opportunities for smelting propositions, as the ore is a combination of silicious iron, lead and lime gangue.——The old Silver King district is forty miles north from Pioche in the Patterson mountains. It contains large deposits of galena.——The Stateline district, recently discovered in Lincoln county, has a number of producing mines. Salt Lake capital is being invested.

NEW MEXICO.

White Oaks *Eagle*: The shaft of the Old Abe at White Oaks is now down 1050 feet and from 850 to 900 feet is all in ore, and at 1050 the pay streak was found by running a short drift. A number of seams from the vein have been followed and pockets of free milling ore have been found; also gold masses weighing seven pounds. The mine has a 20-stamp mill. Water is pumped a mile through 3-inch pipe. The company also owns a coal mine which supplys fuel for the works and is sold to others in the neighborhood.——An interesting occurrence of gold in gypsum is reported from the Old Abe mine at White Oaks.

OREGON.

Baker City *Republican*: Rich ore has been found in the Devil's Dream and the Maiden's Dream, two mines seven miles from Sumpter, now under bond to W. L. Vinson of Seattle.

SOUTH DAKOTA.

The Deadwood and Delaware pyritic smelter at Deadwood treats 700 tons of charge every twenty-four hours and is one of the largest if not the largest pyritic smelter in the world treating gold ore exclusively.

Pioneer *Times*: The Sunset shaft in Ruby Basin is down 300 feet in sandstone, and it is thought will soon reach ore-bearing quartzite.——Work on the Diamond mine on the Two Bit side of the Lexington hill has been suspended on account of water. The shaft is on a fissure in porphyry. The owners expect to sink to quartzite. It is thought the vertical vein will lead to a rich shoot of ore in the quartzite.——J. D. Hardin of Deadwood says that within sixty days work on a reduction works on Redwater creek, north of Black Hills and about eight miles from Spearfish, will be commenced.——The Delaware shaft in Ruby basin is down 410 feet and sinking going on.——The shaft recently started on the Gold Edge Co.'s ground in Strawberry gulch has reached a depth of 40 feet following a vertical vein that now reaches across the shaft. The ore is similar to that in the Gilt Edge and Dakota Maid and samples from $6 to $7 per ton.

UTAH.

Salt Lake *Tribune*: A strike has been made in the New Guinea claim of the Tidal Stream Co.'s ground, in the Erekson district, West Tintic, Tooele county. Samples assayed 52% lead and 69 ounces silver, one carrying as high as 4018 ounces silver. The vein has now been followed 160 feet, all in ore.——The new mill of the Daly-West, at Park City, made its first run April 1. It has a capacity of 100 tons per day and will be in steady operation.——It has been reported that the control of the Mercur M. Co. had been sold to Boston parties.——The Four Aces, at Silver City, is said to have uncovered good ore in the north drift on the 630-foot level. There is also a good streak of lead and silver exposed in the south drift, same level.——The Phœnix group at Bingham has been bonded for $125,000. A large amount of ore is in sight.——As a result of the recent sheriff sale of a part interest in the Yosemite No. 2, that property has passed to the control of Genter, Airis & Bamberger. They propose to put in pumps and necessary machinery and work the old property on its merits. It would be a good thing if other old Bingham properties with a record would fall into the hands of men able to operate them. There are many formerly good producers, now lying with old works caved, that never had openings deeper than prospect holes.——Since D. J. Cook & Co. took the upper workings of the Winnamuck under lease a month ago, the mine has been put in order, aside from handling a large amount of ore. Two hundred and fifty tons of second class went to the Dewey mill. There are twenty-five tons at the mine awaiting cars. Part is first-class and part was run through a jig at the Winnamuck mill.——A strike in copper, gold and silver in the Salt Valley country, on the Grand river, north of Moab, is attracting attention. Within a few weeks rich ore will be shipped.

Eureka *Republican*: The Grand Central mine is temporarily shut down, pending the installation of the new hoisting plant.——Ore shipments from Tintic for week ending April 1 were eighteen cars of concentrates.——Fourteen miners are now employed in the Eureka-Hill mine. Work is now confined to prospecting with fourteen Burleigh drills.——The Eagle-Blue Bell mine is reported in good condition. A winze is being sunk on the 130 on a 5-foot vein in which there is 18 inches of ore running from $80 to $120 in gold and six ounces silver, from which a ton and a half is being taken out at each shift. Drifting is also in progress on 200.

Park *Record*: There has been an increase in the force at the Daly-West mine recently. Ore is being hoisted steadily, and the mine is looking well. As development work progresses, greater ore bodies are uncovered.——Woodward & Loofbourow, who have a two years' lease on the West Ontario group, are drifting on the vein and taking out good ore. They have been working all winter, and will ship when the snow disappears and teams can travel the mountain roads.——Bunce & McClaren, who have been working all winter on a lease on Crescent ridge, have a 3-foot vein of carbonate ore, and several tons ready for shipment.

WASHINGTON.

(Special Correspondence).—A mineral field which is beginning to attract attention is known as the White Horse district, in Snohomish county. In this county more than twenty lodes having veins of ore from 2 to 10 feet in width have been discovered.

The character of the ores in different parts of the district differs, as do also the formations in which they are found. On Gold mountain, which is probably the richest section of the district, the lodes are less than 600 feet apart, on an average, in a belt more than a mile wide. The ore contains gold, copper, silver, and in one case at least, quicksilver.

There has been but little development work done, but surface assays give from $3 to $31 in gold, from a trace to five ounces silver and 5% to 14% copper.

The country rock is a variety of slate with some hornblende, and the mineral veins accompany dykes of porphyry. They are vertical, have a strike due east and west and are well defined and continuous, seven claims having been located on a single lode with distinct outcrop on each claim. These deposits are easy of access and ores can easily be treated.

Gold mountain rises from the east bank of the Snake river to a height of 3000 feet, and some of its mineral veins outcrop from water level to the summit of the mountain and down the opposite side. Just across the river from Gold mountain is a level plain, on which Darrington, the postoffice of the district, is situated, being only 565 feet above sea level. This plain is well suited to the purpose of townsite, smelting plants, etc. A supply of pure water in abundance for all purposes is near and easily available. It is forty-five miles to Puget Sound, thirty-two miles to the Seattle & International R. R., at Arlington, and twenty miles to steamer navigation on the Skagit river, with a wagon road to the last named point.

The district is well adapted to every purpose of a mining camp, being easy of access, and having many natural facilities and abundance of ore.

Except at a few of the highest locations in the district, the snow never accumulates to a depth to interfere with mining operations, the temperature very seldom falls as low as zero and work could be conducted without interruption throughout the entire year.

Darrington, Wash., March 28th, '99.

Spokesman-Review: At the Lone Pine, Republic, a new shaft is to be started and sunk 500 feet. This will be the first deep shaft in the camp.——An assay of 3 feet of quartz on the Insurgent gave a value of $63.45 per ton in gold. The quartz in all of the ledges appears to be of the same character.——A new shaft on the Gopher at Republic has discovered a large vein of ore 18 feet from the surface.——The Agnes shaft at Republic is 60 feet deep, a crosscut will be run to the vein.——The Standard has a tunnel in 40 feet. There are 3 feet of quartz in the face. The shaft is down 75 feet. The tunnel is being run for drainage and ventilation. It will be driven 50 feet to the bottom of the shaft.——The shaft on the Rebate at Republic is being sunk with three shifts, it follows the foot wall and the vein has not been crosscut. Within 30 feet of the surface it was 11 feet

wide.——Three shifts are working on the Tom Thumb shaft. It is 140 feet deep. No ore is being taken out.

WYOMING.

Laramie *Republican*: Extensive work will be done upon the Heidrich mines, in Jelm mountain district, the coming summer. Last September an agent of the Rothschilds secured a bond upon the prospects for $15,000.

FOREIGN.

BRITISH COLUMBIA.

What is said to be the biggest ore contract ever made in Rossland is reported between the War Eagle Con. M. & D. Co. and the Canadian Smelting Works at Trail. The agreement is to run for two years, during which time a minimum of 300,000 tons of ore is to be shipped, which will amount to a gross value of $10,000,000. It is expected that the shipments will amount to not less than 500,000 tons, however, which will be worth over $16,000,000. At present prices the ore will net $14 per ton. The rate at which the contract was taken is said to be approximately $6 per ton. The smelter at Trail, now owned and operated by the Canadian Pacific Railway, was built by F. A. Heinze of Butte, Mont., when he secured the contract to smelt 75,000 tons of the Le Roi ore. He received about $11 per ton on that contract, being a rate much higher than that specified in the present instance. Heretofore the smelter at Trail has confined its operations largely to handling gold-copper ores. During the past year, however, it has expended considerable in improvements, and has added a furnace for the treatment of silver-lead ores of the Slocan district. The entire output of the Rossland district, with the exception of the Le Roi mine, is treated at Trail. The Le Roi product is being treated at the plant owned by the company at Northport, Wash.

It is generally understood at Sandon that all the mines will close down as soon as the eight-hour law goes into effect. The intention of the mine owners is to pay the men off and close down until some arrangement can be made with the men whereby they will accept $3 per day for the eight-hour day, instead of $3 50 as formerly for ten hours.

The Rambler & Cariboo G. & S. M. Co. will pay at its office in Kasio a dividend of 1 cent per share. This is the third dividend of the company, but the first in many months. It means the addition of the Rambler to the list of dividend payers in the Slocan. For the present dividends will be 1 cent per share monthly.

A gold bearing quartz vein is reported as occurring near the water front of the city of Victoria, some of the rock assaying $32 per ton.

The mine owners of southern Kootenay have reason to believe that the miners will insist upon the eight-hour day and the same rate of wages as was formerly paid for ten hours, and this they say means a general shut down of the mines until cheaper men can be secured.

Two carloads of ore shipped from the Bosun, at New Denver, Sunday, make 340 tons this year, and upwards of 700 tons since the property was purchased.

The cross vein in the main tunnel of the Marion is 4 feet wide, with ore scattered through it.

The Payne M. Co., Ltd., has purchased the Telephone claim, three-quarters from M. R. W. Rathbourne and the remaining quarter from P. Burns. It adjoins the Two Jacks of the Payne group.

The total ore treated by the Dundee mill at Ymir is 750 tons.

As to the Tamarac mine, 200,000 shares of treasury stock have been sold in England at 19½ cents per share, making a sum of $39,000 placed to the credit of the company for development work.

On the Little Cariboo in Camp McKinney a drift is being run at a depth of 55 feet from the shaft to crosscut the vein. The shaft is 60 feet deep and passed through the vein some time since and the crosscut is now being run back to catch the ledge.

The tunnel on the Shannon-Dolphin was approaching the vein. Another vein lying below the one for which the tunnel is being driven has been stripped for over 100 feet. A shaft has been started.

Work has started on the Fontenoy, Camp McKinney, under the direction of the Dunsmuir syndicate of Victoria. They will continue the shaft, which was already 80 feet deep on the vein. The claim is to be equipped with machinery.

Spokesman-Review: The recent strike on the Neepawa, Ten Mille, was made 150 feet deep on a ledge parallel to the Enterprise. Between 700 and 800 feet of tunnel work has been done.——The winze being sunk near the mouth of the No. 2 tunnel on the Bosun, near New Denver, after going through 15 or 20 feet of broken ledge matter, is in the ledge firm and solid and of greater width than any of the upper workings. Work on the No. 3 tunnel is going ahead. The opening will tap the ore body 150 feet lower than No. 2. Forty tons were shipped from the mine Sunday, making 300 tons since the 1st of January.——The Payne mine shipped 470 tons last week. Other shippers were the Queen Bess with 226 tons and Last Chance 140. Shipments for the week reached 1049 tons.——Two and a half miles north of Greenwood, in Providence camp, is the Combination claim, one of the early locations of the camp. Last fall the shaft was continued to a depth of 65 feet, when it was decided to run a crosscut tunnel to tap this ledge at depth. A contract was let to run 300 feet; it is now into the hill 86 feet. The contract will be finished with Burleigh drills. The rock in the tunnel is hard black lime, only a foot a day being made by two shifts.

Spokane *Chronicle*: A large ore body is being developed in the Velvet mine, on Sophie mountain, at Rossland. The ore body is now blocked out 273 feet long, 160 high and 10 to 20 feet in width. The shaft is down 240 feet. Two steam drills are now being put in. The new 60 H. P. boiler is in position.——A controlling interest in the Giant mine at Rossland has been bought by Montreal capitalists. It is believed the new owners will resume development. The Giant is situated outside the city limits of Rossland. Two large veins have been opened on the property, one running east and west and the other north and south. A shaft has been sunk on the east and west vein 115 feet. A 35-foot shaft has been sunk on the other ledge and a 120-foot tunnel run.

CANADA.

Superior *Telegram*: A revival in mining matters is taking place at Port Arthur, particularly in silver.——The Golden Star M. Co., in the Seine River district, has paid a second dividend of 1%. March 20th it was voted to pay a third dividend of 1% April 15th.——The Sawbill district on the upper Seine river is tributary to Port Arthur, via Bonheur, 130 miles west. There the Hammond reef is located, 500 feet wide, with a 10-stamp mill and thirty more decided upon. The Sawbill mine has ten stamps and a main shaft down 250 feet. There are fifty freight teams employed between Bonheur and the mines, thirty and forty miles inland.

LOWER CALIFORNIA.

A French syndicate is operating a group of copper mines near Santa Rosalie. They own a line of steamers for transportation of their product and employ a large number of men.

Personal.

HENRY P. LOWE, of Denver is in New York City.

A. A. BLOW, M. E., is on his way from London to Denver, Colo.

M. B. Silver of San Francisco has returned from Sonora, Mexico.

J. COPELAND is operating the Gold Bluff mine at Downieville.

AUGUSTE MATTHES, M. E., has returned to Denver from Arizona.

THEO. B. COMSTOCK of Tucson, Arizona, reached London, March 20th.

G. AARONS of Australia is in Colorado to investigate various mining districts.

F. W. WILMANS, Supt. of the Bonanza mine at Sonora, Cal., is in San Francisco.

W. T. CORNWALL, representing the Denver Fire Clay Co., has returned from Mexico.

H. R. AYERS has been appointed Supt. of the Compania Industrial at Chihuahua, Mexico.

R. A. PARKER of San Francisco, Cal., expects to return from Boston, Mass., about May 1st.

A. R. WILFLEY, inventor of the Wilfley concentrator, is visiting the Comstock, Virginia City, Nev.

JAS. W. NESMITH, Pres. Colorado Iron Works Co., has returned to Denver from the City of Mexico.

F. ROBB has gone from the Anchor concentrator to take charge of the Daly-West mill at Park City, Utah.

JACK CARR, an Alaskan mail carrier, has broken the record from Dawson to Skaguay, coming out in ten days.

VAN F. FURMAN has returned from a European trip and has an office in the Boston building, Denver, Colo.

W. J. MILLER, former Mgr. Denver Engineering Works Co., recently returned to Denver, Colo., from the East.

JOS. MCGILLIVRAY, a veteran California miner, has returned from the Klondike. He walked out from Dawson.

J. L. JOSEPH, Supt. of the Gerrymander mine at Sonora, Cal., has returned to the mine from San Francisco.

J. G. FORRESTER has returned to the Bullion-Beck Champion mill, after an absence of two years, and will again be in charge.

W. S. WARD of Denver, Colo., has been appointed Colorado's representative of mines and metallurgy at the Paris Exposition.

L. CHEVRILLON of New York is examining the White Cloud copper mining property near Lovelock, Nev., for prospective Eastern buyers.

DR. WOODRUFF, Pres. Tuscarora Chief M. Co., Tuscarora, Nev., is in San Francisco buying mining machinery, including a cyanide plant.

JOHN W. MACKAY nas been inspecting the Allison Ranch mine, near Grass Valley, Cal. Mr. Mackay is president of the Allison Ranch Co., and P. Kerwin Supt. at the mine.

FRANKLIN FARRELL, present Pres. and Mgr. Parrot Copper M. Co., is about to take charge of the new Arizona copper property, the United Verde Extension M. Co. at Jerome.

JAS. W. NEILL is the Mgr. of the $10,000,000 U. S. M. Co., recently organized at Salt Lake City, Utah, to operate in Bingham, Utah. It cost $2508 to file the articles of incorporation.

R. C. TURNER, until recently Supt. of the Excelsior mine near Sugar Pine, Tuolumne Co., Cal., has accepted a position as Supt. of the Plumas Development Co.'s property at La Porte.

SENATOR PERKINS of California and Senator Fairbanks, president American organization of the high joint commission, will go to the head of Lynn canal, Alaska, next month to investigate the boundary question.

JOHN E. PHILLIPS of Denver and Cripple Creek recently made a trip to Silver City, N. M., and secured an option on a group of properties adjoining the Santa Rita mines. He reports the possibility of a sale of the latter to an active company.

Industrial Notes.

—Hay is $55 per ton at Ballarat, Cal.

—Lumber demand has advanced in the Hawaiian islands, and coast prices likewise.

—The receipts of the U. S. Government for March exceeded expenditures $13,721,224.

—Eureka, Cal., is shipping redwood lumber direct to Honolulu, U. S. A., and Melbourne, Australia.

—At Santa Cruz, Cal., the Big Creek Co. has ordered an additional electric plant, sufficient to furnish 275 more H. P. than at present, making a total H. P. of 675.

—The Southern Pacific Co. has reduced the wages of its section men in northern California. They now get 16 cents per hour for eight hours per day, five days per week.

—The February earnings and expenses of the Santa Fe Ry. Co. show the proportion of operating expenses was 61%; proportion for the eight months of the fiscal year is still high.

—An auxiliary pipe 42 inches in diameter will be included in the plans and specifications for the Cedar river, Seattle, Wash., water supply system, increasing the total cost of construction $125,000.

—Hereafter the S. F. & S. J. V. R. R., the Southern California R. R. and the Santa Fe Pacific R. R. will be known as the Santa Fe Pacific Co., including the mileage west of Albuquerque, N. M.—1750 miles.

—At Sacramento, Cal., the Sacramento E. G. & Ry. Co. has made a thirty-year contract with the Yuba E. P. Co. for the exclusive use of 5000 H. P. to be delivered at the power house of the former company.

—At Buffalo, N. Y., last Saturday, every employe of the Buffalo Smelting Works, the local branch of the Calumet & Hecla M. Co., received an envelope containing a bonus of 10% of the wages earned during the last year.

—At Seattle, Wash., W. B. Baker has conveyed to the Snoqualmie Falls Power Co. all the property acquired by Mr. Baker in the establishment of the big power plant at Snoqualmie Falls. The revenue tax on the deed was $1000.

—The General Electric Co. has entered suit in the U. S. Circuit Court at Los Angeles against the San Joaquin Electric Co. of Fresno, Cal., to recover apparatus valued at $90,000, and $10,000 which it claims to have lost through the action of the defendant company.

—The San Francisco establishment of Miller, Sloss & Scott, the largest hardware concern on the Pacific coast, was almost destroyed by fire on the night of the 31st ult., involving a loss of $250,000, insured. On the following day they bought out the firm of Hawley Bros., corner Beale and Market Sts., San Francisco, and at once resumed business.

—The Sunset P., M. & M. Co, Skykomish river, Snohomish county, Wash., will install an electric power plant to supply power for an electric railroad, twelve miles long, for manufacturing purposes at Index, and for lighting purposes at Snohomish and Everett. The head works and central location of the new power company are at Sunset Falls. N. Rudebeck of Everett is Sec'y.

—Leon Sloss, of San Francisco, has obtained the contract for carrying the mails from San Francisco via Ounalaska, St. Michael and all points along the Yukon to Circle City and Dawson, 4408 miles, and back, three round trips, sailing from San Francisco about June 1, June 20 and July 5. The contract is not to be required to carry more than five tons of mail matter each way on any one trip.

—A telegraph line from Skaguay to Dawson will be constructed by the Canadian Government this season. The construction party, in charge of F. Richardson, assistant electrician of the Canadian Pacific, left Ottawa to begin work March 4th. The distance of the proposed line is 600 miles; estimated cost $250 a mile, or a total of $150,000. It is expected that the line will be in operation by Nov. 15th, '99.

—The Oxnard-Hamilton beet sugar properties, which include factories at Chino and Hueneme, Cal., and Grand Island, Neb., have been sold to a corporation organized under the laws of New Jersey, capitalized at $1,000,000. The Clark factory at Los Alamitos, Cal., is not included. It represents an investment of $1,000,000. Present indications are that the beet lands of the Los Angeles section will net a two-thirds yield. Upon this basis the Chino factory will handle 66,000 tons, the Hueneme 75,000 and the Los Alamitos 50,000. The Clark factory will turn out approximately eighty tons of refined white sugar daily, or a trainload for the market each twenty-four hours.

—The Formosan Government has asked for an appropriation of $20,000,000 for the construction of a railway through the island, and for the improvement of Kelung harbor. The Japanese cabinet has given its approval, and as a railway and harbor are urgently needed, it is believed the diet will pass the bill. There is at present in the island a railway sixty miles long, running from Kelung to Teckcham (Hsinchik). It was commenced in 1887, and was completed in 1891. It was owned by the Chinese Government, but on the taking over of the island by the Japanese it passed into the possession of the latter Government. The proposed railway will extend south from Teckcham to Takow, a distance of 175 miles.

—The last California Legislature passed an act authorizing the Governor to appoint three commissioners—one from the central, one from the northern and one from the southern part of the State—to constitute the California Paris Exposition Commission, not more than two members of which shall belong to the same political party. This commission is to have exclusive charge of the expenditure of the $130,000 appropriated by the act for the purpose of collecting, forwarding and maintaining an exhibition of California products at the Paris Exposition in 1900, and for preparing and distributing suitable literature descriptive of the State and its resources, industries and capabilities; also, for the purpose of returning exhibits to the State. The commissioners are required to give bonds to the amount of $10,000 each. They must be experienced in exposition work, and shall be allowed for their services $5000 each and actual traveling expenses. Certified vouchers are required to be returned to the Controller for all expenditures by the commission. The act takes effect immediately, but $105,000 of the sum appropriated will not be available until Dec. 1st, '99.

—Pacific ocean soundings are to be made by the United States steamship Ranger, from Guam to Manila, to supplement those already made from the United States and Hawaii to Guam. The course to be covered is about 6000 miles, with deep sea soundings taken at ten-mile intervals. These soundings will be made with a detachable sinker and No. 11 piano wire; this wire is .03 inch in diameter, has a breaking strain of a little over 200 pounds, and it weighs 1.3 pounds to the 100 fathoms, or about thirteen pounds to the mile. The sounding machine used automatically registers the fathoms paid out, and has a reel run by steam with a capacity of 600 fathoms of wire. The sounding rod, invented by Capt. Sigsbee, is a brass tube 10 inches long and 2¼ inches outside diameter, passing freely through a globular iron casting weighing sixty pounds. The sinker is held on the tube by a catch and loop, and when bottom is struck the lower part of the tube is forced into the mud until the sinker rests on the bottom; the catch is then released, and the released tension on the sounding wire is at once recorded on the hoisting machine. The wire is then pulled in, with the tube and sample of bottom, leaving the sinker behind it. As rises of temperature above 70° may affect the gutta percha insulation of cables, it is important to obtain the temperature at great depths. This is done by a mercury thermometer with a cylindrical bulb and straight stem, protected from pressure by being hermetically sealed in a strong glass tube. This thermometer is pivoted with a tendency to upset, and in descending the mercury bulb is down and is kept there by the pressure of a small threaded rod surmounted by a propeller. Just above the bulb the stem is contracted and slightly flattened with a kind of S bend. When the sounding weight strikes the bottom the lifting of the wire reverses the action of the propeller, releases the thermometer, and the latter tumbles bulb up. This reversal breaks the mercury column at the contraction, and the mercury already in the stem falls to the bottom, and, expanding it, records the same temperature existing at the time of reversal and preserves this record until the thermometer is set for a new observation. The upsetting of the thermometer also releases valves in the top and bottom of metal cups attached to the thermometer and admits samples of the deep sea water.

Catalogues.

MANY of the catalogues now issued by large manufacturing concerns are of superior practical value to treatises written for the same class of readers and charged for. From such a catalogue can often be secured more practical information than is sometimes contained in a pretentious book sold at a stated price. While still styled "catalogues," many of these trade publications are really of great value, the advertising being merely incidental. In the last two years have been received in this office hundreds of "catalogues," superbly printed, elaborately illustrated and replete with up-to-date information, technical data on the subject they represent to such an extent as to really make the advertising part of it a "bye-product." Of such a class is Catalogue No. 5, from the Gates Iron Works, 650 Elston Ave., Chicago, which, treating the topic of "Crushing Rolls," manages to give so much information on that manner of crusher that any one wanting to know about crushing rolls could probably do better to ask for a copy of such a catalogue to be sent to his address than to pay for a technical work on that subject. And this may in general be said of a large number of trade "catalogues," of which the one referred to is a type. If the manufacturers of mining machinery continue to issue such fine specimens of typography, which compare favorably in style and finish with the best magazine work, and fill their pages with valuable technical details, they will trench upon the business and occupation of the mutable many who have been writing text-books on mining and metallurgical matters. It has now got to the point that, in place of leaving it to the office boy, as was the style fifteen years ago, the business of preparing and issuing the sumptuous work of modern art known as the "catalogue" is now usually delegated to the smartest man in the establishment. Several firms in San Francisco, Denver, Chicago and elsewhere have of late years issued "catalogues" of mining machinery that have cost thousands of doliars, and which treat of every conceivable form of mining. Some of them constitute veritable text-books on practical gold milling, the different processes, the most economical methods, valuable tables and technical matter, mostly furnished gratis to any one sending his address, though in some cases a small charge is made; this to head off the "collector" of catalogues, for there are collectors of catalogues, as well as collectors of stamps, autographs, etc. About the first thing the average compiler of a good book on mining and milling now needs is to get a good assortment of "catalogues." These and a file of the MINING AND SCIENTIFIC PRESS gives him all the necessary data. The rest is merely a question of composition, printing, binding and paper. The labor involved in the

preparation of a large trade catalogue is considerable. To such an extent has the catalogue issuance grown that a big mining manufacturing concern usually issues a series, each one of which treats on a different subject. One—the Risdon of San Francisco—has issued the 17th; of such a series, Fraser & Chalmer's latest is No. 53; Denver, Colo., firms and those of other places have also issued a large number. Still, even these are excelled in quantity by the electric companies. The latest one received from the Westinghouse Electric Co. was No. 209.

Commercial Paragraphs.

HENSHAW, BULKLEY & Co. of San Francisco, have a contract to put a $25,000 pumping plant in Honolulu, to daily deliver 5,000,000 gallons.

THE Gates Iron Works recently shipped machinery for a 75-ton concentrating mill to Silverton, Colo., for the Boston & Silverton M. Co.

PHILIP SCHUCH JR. has organized the Standard Gold Extraction Co. of Cripple Creek, Colo. It is the purpose of the company to erect reduction works.

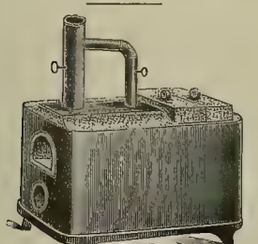
JOHN S. WORTHINGTON & Co. of Denver, Colo., now represent Park Bros. & Co., Limited, steel and copper manufacturers, of Pittsburgh, Pa.; also A. Leschen & Sons' Wire Rope Co.

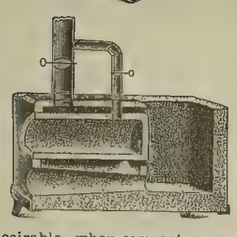
THE Hendrie & Bolthoff Mfg. & Supply Co. of Denver, Colo., recently shipped six Norwalk air compressors to Cripple Creek district, being two to the Ajax, one each to the Mary McKinney, Isabella, Anchoria-Leland and Tornado mines.

JEAN F. WEBB & SON, until recently residents of California, have opened an office in the Boston Bldg., Denver, Colo., for the purpose of introducing the pneumatic cyanide process for gold extraction, of which they are patentees. They have perfected patents from the governments of the United States, South African Republic, New Zealand and Australia.

ALMARIN B. PAUL of San Francisco has been appointed special agent by the Gold & Silver Extraction Co. of America, Ltd., for the MacArthur-Forrest Cyanide Process for California north of, and including, Mono, Madera and Merced counties. Mr. Paul was the first to introduce the process in California and Nevada and worked it on a large practical scale, and with success, giving his results to the mining world through the MINING AND SCIENTIFIC PRESS. For a time Mr. Paul controlled a large territory in California and Nevada; but some differences coming up between him and the company respecting royalty, Mr. Paul withdrew. Recently the company and Mr. Paul have come together again. It is understood that there is now a very material reduction from when Mr. Paul first had it, to such an extent as to justify a revival in that line. His office is room 27, Crocker building, San Francisco.

A New Assay Furnace.



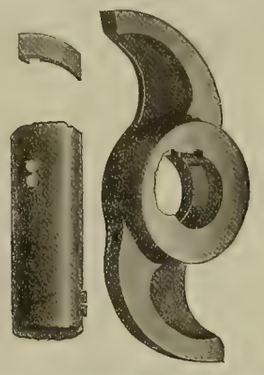


It is desirable, when compactness and economy of fuel is an important consideration, for the assayer or prospector to have his assay furnace as self-contained, portable and convenient as possible. To meet this demand Messrs. Wm. Hoskins & Co. have put on the market combination furnaces, on the latest of which, illustrated above, letters patent were granted Feb. 7th, this year, an illustrated description of which appeared on page 179 of the issue of Feb. 18th, '99.

This furnace has the advantage of a cold crucible introduced into the crucible chamber, and which in no way interferes with work in progress in the muffle. It utilizes the surplus heat both in the muffle chamber and the crucible chamber, yet both sections of the furnace are independently and positively heated. The gases and air are so thoroughly mixed in the combustion chamber, which, it will be noticed, is tapered, that crucibles in the crucible chamber are uniformly heated, avoiding the tendency to crack, due to a direct application of the blast. Gold may easily be melted in the crucible chamber while cupellation or scorification is going on in the muffle. This furnace is made in two sizes. For further particulars write the manufacturers, Messrs. Wm. Hoskins & Co., No. 81 South Clark street, Chicago, or apply to any of the dealers in assayers' and chemists' supplies.

Canda Self-Locking Cam.

The Canda improved self-locking cam for stamp mills is shown in the accompanying illustration. The device consists of fitting into the bore of the ordinary stamp cam an eccentric wedge chamber, such as can be formed by the continuous revolution of a boring tool, this chamber occupying only a portion of the width of the eye of the cam, of a circular wedge key within this chamber and a slot or recess in both key and the cam, to enable the studs or projections on the cam shaft to engage the wedge key and hold it in position. These cams, by reason of the position of the studs on the cam shaft, are interchangeable; each of the series of cams will take any one of the angular positions as determined by these



studs. This feature is deemed important, as when breakages occur the delays incident to the stopping of mills, cutting keyseats, removing cams from shaft, etc., are reduced to a minimum. The fastening is also essentially self-tightening under a working load, will not work loose, and mills are not forced to stop to key up cams, as is often the case when the ordinary tapered key is used. Nor is dependence placed in the shearing stress as with the ordinary key, for the circular eccentric wedge takes hold upon the shaft, and the studs are thereby relieved of the major portion of the shearing stress to which they would otherwise be subjected.

It may be pointed out that the frictional adhesion between the shaft and the concentric face of the circular wedge is so great that the wedge may be said to be practically in compression. The cams may, however, be readily loosened by striking the arm a slight blow on the reverse side. The introduction of this fastening does not affect the strength of the cam, as the full width of the hub is retained; nor is the hub subjected to strains all out of proportion to the work to be done, as often occurs where the ordinary driving key is used.

Of the apparent advantages noted above, none, however, are more important than the feature of being readily adjusted to the ordinary existing cam shaft. This fitting may be done by hand, if necessary, with a ratchet drill, after which the studs may be driven into place. It is not necessary to procure a shaft of any special type, nor are any special machines or tools required to bore the cams; all the machine work may be done on an ordinary lathe or boring mill. This fastening may also be applied to gears, pulleys, etc., and, in fact, to all parts of machines that rotate under load in one direction. The cams are manufactured by the Chrome Steel Works, Brooklyn, N. Y. H. D. Morris Co., 143 First street, San Francisco, are the local agents.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING MARCH 28, 1899.

622.108.—VEHICLE POLE—F. M. Bird, Wenatchee, Wash.
621,998.—DRAWING STEAM BEER—Farley & Jackson, S. F.
621,914.—BOOT HEEL—Ford & Starr, S. F.
621,920.—BATH TUB—F. Johnson, Seattle, Wash.
622,156.—HONEY EXTRACTOR—A. Kuschel, S. F.
622 053.—THAWING APPARATUS—J. W. Livermore, Selma, Cal.
621,836.—CAR COUPLING—J. J. Malloy, Portland, Or.
622,188.—LAMP SOCKET—M. Meyberg, Los Angeles, Cal.
622,074.—BOTTLE STOPPER—C. V. B. Reeder, Evergreen, Cal.
621,945.—TOY HORSE—F. Ritter, Portland, Or.
622,021.—VIOLIN—R. & E. Sample, Los Angeles, Cal.
621,862.—CAR NUMBERS—H. J. Small, Sacramento, Cal.
621,863.—PRINTING TELEGRAPH—S. J. Small, Seattle, Wash.
621,880.—WHIFFLETREE—H. E. Westly, Spokane, Wash.
621,985.—AMALGAMATOR—G. W. Williams, Payette, Idaho.
621,986.—CONCENTRATOR—G. W. Williams, Payette, Idaho.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Recent Mining Incorporations.

Chloride-Bailey G. M. Co., San Francisco; capital stock $500,000, all subscribed; H. Wilson, O. O. Howard Jr., H. G. Dodds, R. R. Bigelow, F. E. Ware.

Altamont M. Co., San Francisco; capital stock $500,000, subscribed $62,000; W. P. and W. G. Scott, Soulsbyville; T. A. Fisher, P. H. Reardon, J. C. Doherty, San Francisco, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DEVICE FOR DRAWING STEAM BEER.—Frank E. Farley and John H. Jackson, San Francisco, Cal. No. 621,998. Dated March 28, 1899. This invention relates to a device for drawing effervescent liquids and separating therefrom the carbonic acid gas so that the liquid can be drawn in a comparatively solid form without too much foam. It consists essentially of a closed casing having a discharge faucet or draw-off cock at the lower end and a pipe connecting this casing with the cask or reservoir containing the liquid to be drawn. Through this pipe the liquid charged with gas is brought into the upper part of the casing and delivered upon a divergent distributing plate over which it passes and thence it is delivered to pass through a series of screen surfaces interposed between the reception and the delivery pipes. This separates the liquid from the gas to such an extent that the liquid can be drawn from the lower faucet with no more gas than is requisite to give it the required sharpness.

AMALGAMATOR.—Geo. W. Williams, of Payette, Idaho, assignor to the Williams Concentrator and Amalgamation Co. No. 621,985. Dated March 28, 1899. The object of this invention is to so construct an amalgamator that it will bring all the particles of fine valuable metal, amalgam or floured quicksilver intimately and continuously in contact with the mercury and concentrate the particles thus gathered to a point from which they are easily collected. It consists essentially of an inclined suspended pipe having a connection whereby a vertical oscillation is given to the lower end and a horizontal oscillatory motion to the upper end. A feed pipe delivers the material to be acted upon into the lower end of the pipe, where it comes in contact with mercury, and it rises gradually through the inclined pipe to be discharged at the upper end, the shaking motion forming a most complete separation of the finer from the heavier and more valuable particles.

CONCENTRATOR.—Geo. W. Williams, of Payette, Idaho, assignor to the Williams Concentrator and Amalgamation Co. No. 621,986. Dated March 28, 1899. This invention consists of a combination of screens with blanket, eider-down cloth so arranged with relation to each other that a large number of small openings are formed in which the fine gold black sand can reach the eider-down cloth and be retained thereby, while the peculiar disposition of the screens with relation to each other causes an undertow or current passing below the meshes of the screen rather than an overflow in the manner of ordinary riffles.

Recently Declared Mining Dividends.

Bunker Hill & Sullivan M. & C. Co., Idaho, April 1, $21,000; April 4.

Rambler & Cariboo G. & S. M. Co., Slocan, B. C., 1 cent per share.

Republic mine, Washington, $35,000; payable April 15.

Sacramento M. Co., Salt Lake, Utah, ½ cent, $5000; April 2. Total to date $87,000.

Boston & Colorado Smelting Co., regularly quarterly dividend 1½%; April 1.

Pennsylvania M. Co., Grass Valley, Cal., 5 cents per share, regular monthly dividend.

Anaconda M. Co., Montana, $1.25 per share, $1,500,000; payable May 3.

A MINING DETECTIVE.—"Confidential," operating in California, Arizona and Colorado. I am prepared to investigate as to habits of employes on duty (also off duty) in mine and mill, particularly the art of stealing gold specimens, amalgam, ores, etc., from mining companies. Best of references. Reasonable terms. Address "Confidential," M. & S. P. Office, San Francisco, Cal.

Side-Dumping Ore Car,

All Steel Construction,

WITH ANACONDA SELF-OILING WHEELS AND AXLES.

THE BEST CAR BUILT.

Cars Built to Meet Any Requirements.

American Engineering Works,

204 Dearborn St., Chicago, Ill.

POSITION WANTED by experienced cyanide man in charge of a mill. Technical graduate. Good chemist and assayer. Speaks Spanish. Salary moderate. Address K. C. N., Mining and Scientific Press.

MINING ENGINEER WANTS POSITION. Thorough chemist and assayer: practical experience of stamp milling, chlorination and cyanide processes. Three years' experience examining and reporting on mines. Familiar with Mother Lode. Any capacity; moderate salary. Address "B. L." this office.

AN EXPERIENCED MILLMAN

Desires position in a mill; has had several years' practical experience; understands concentrators and assaying. Address "Millman," care Mining and Scientific Press.

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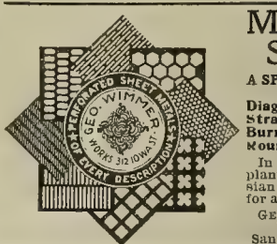

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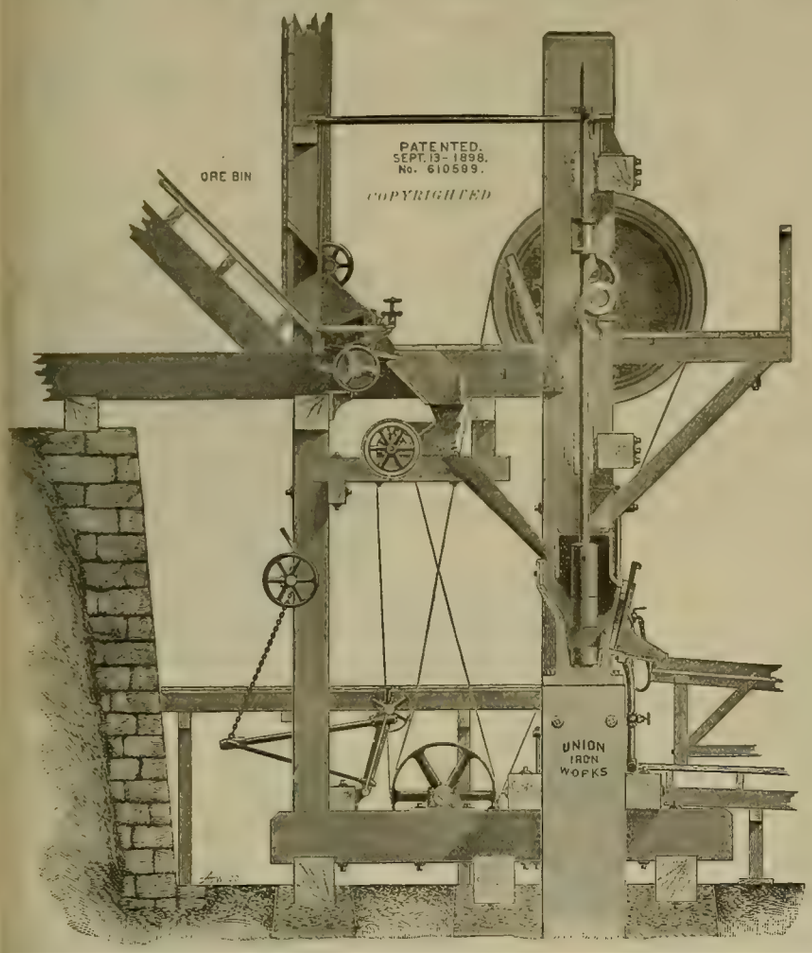

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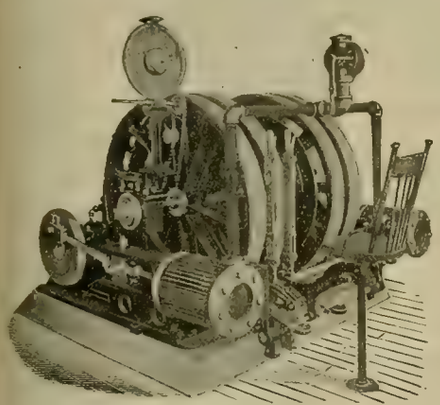

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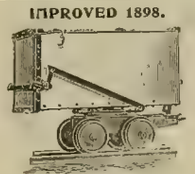

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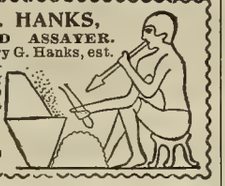

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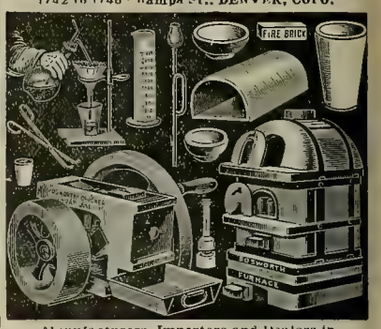

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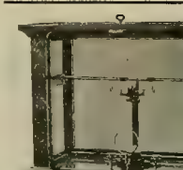

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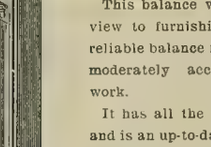

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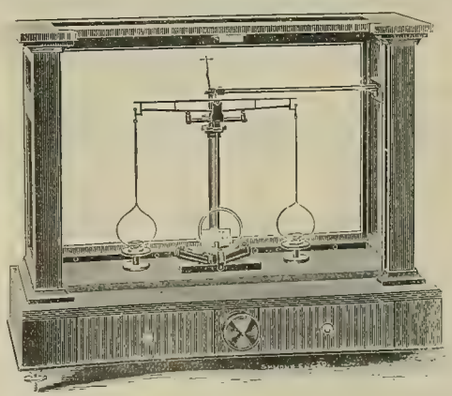

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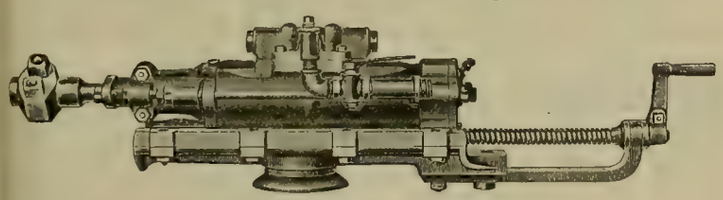

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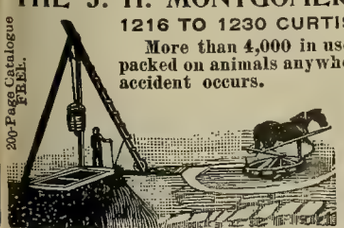

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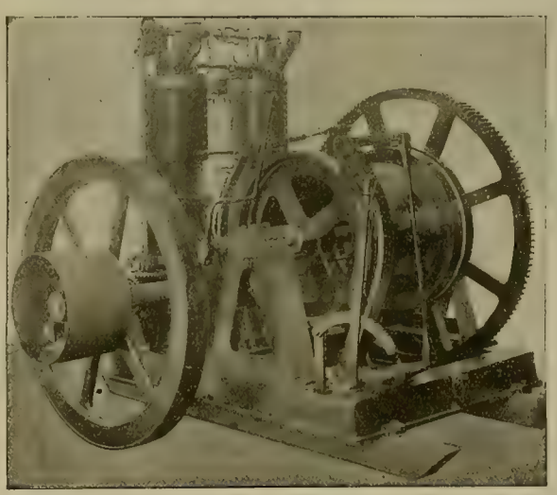

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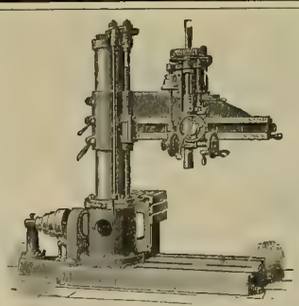

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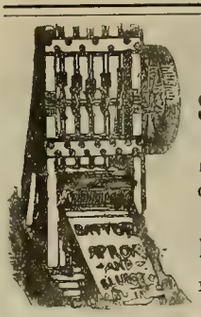

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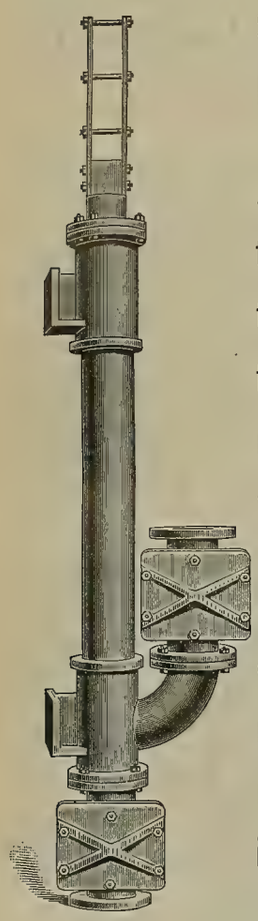

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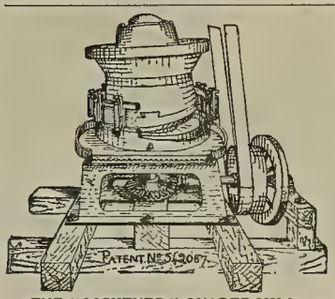

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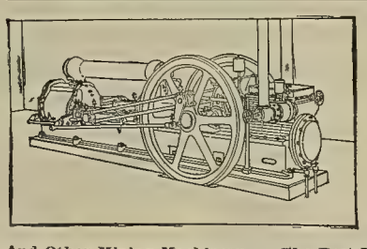

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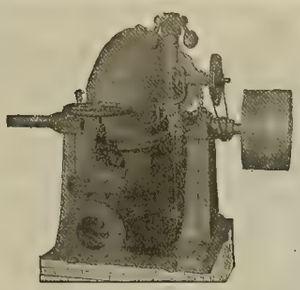

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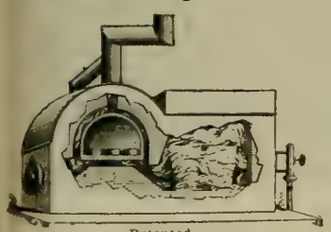

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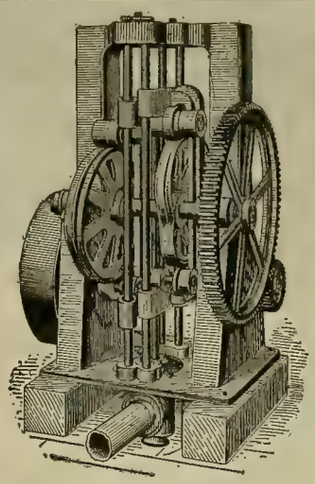

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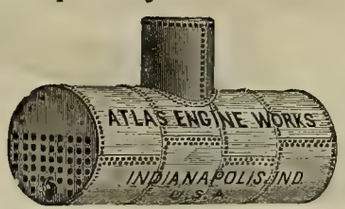

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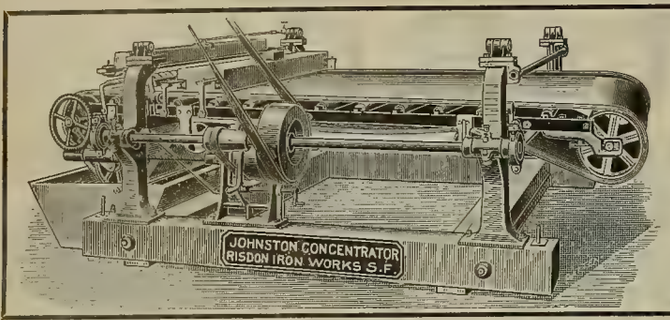

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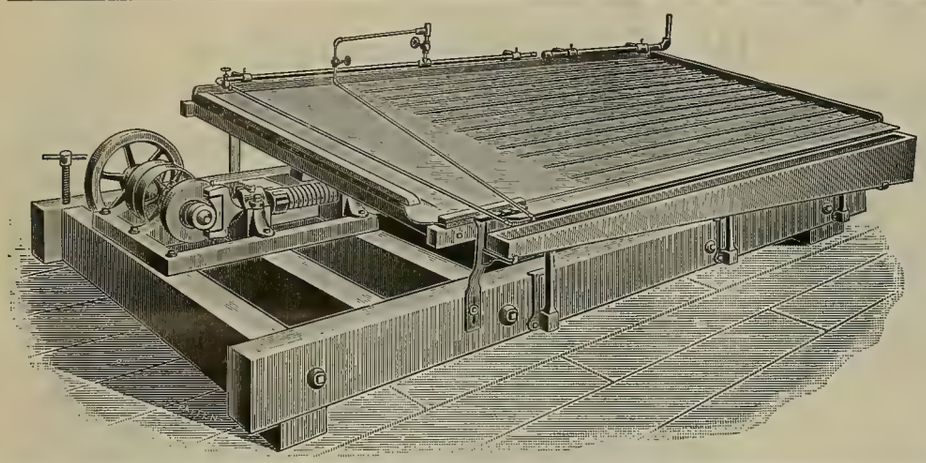

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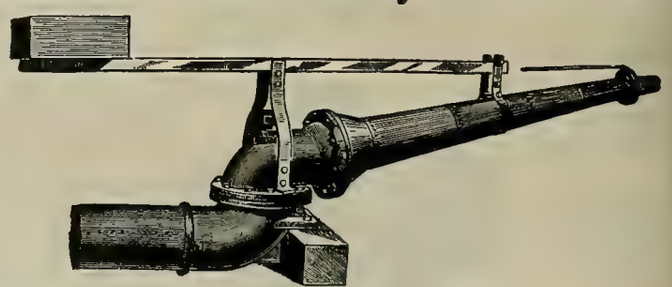

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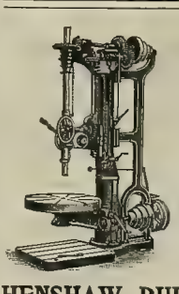

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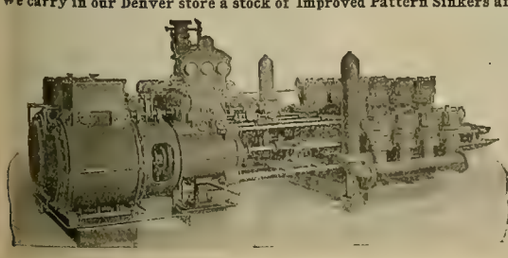

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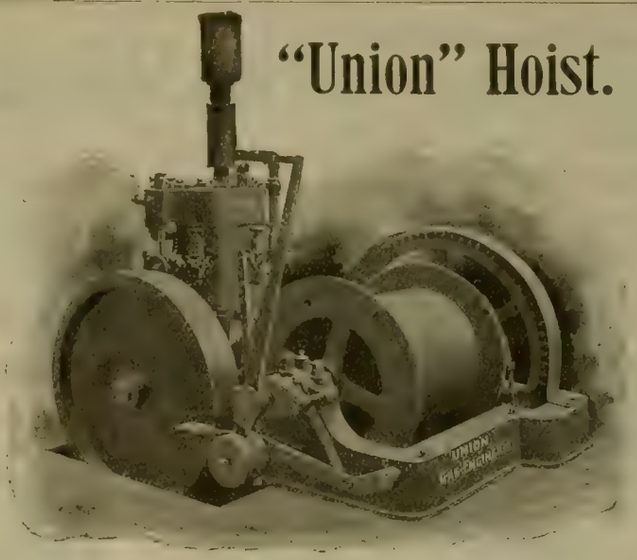

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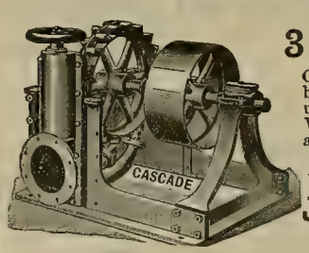

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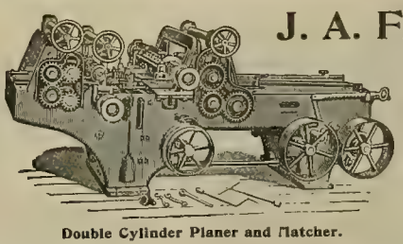

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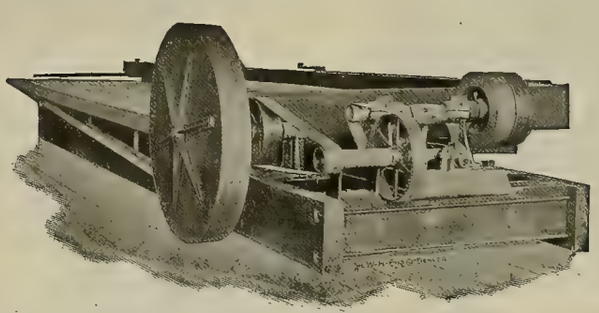

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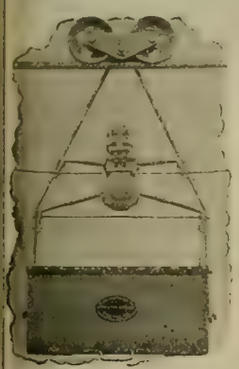

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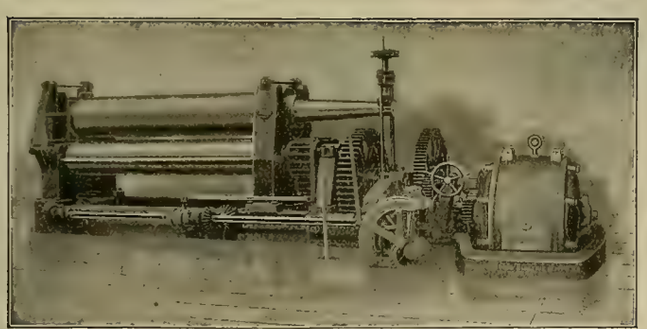

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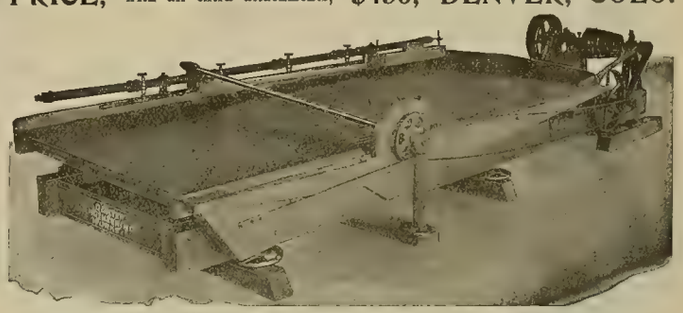

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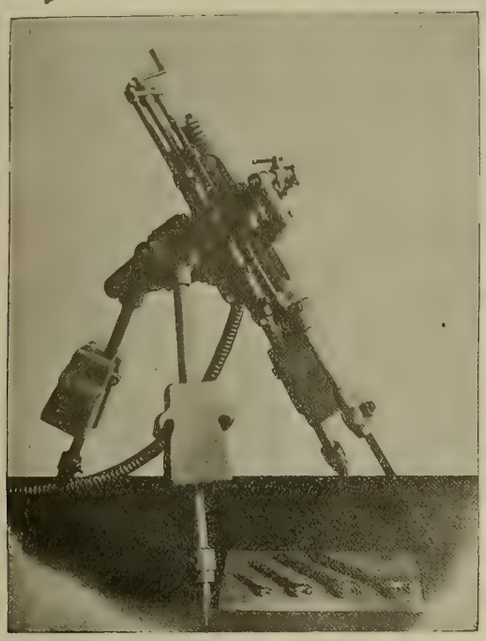

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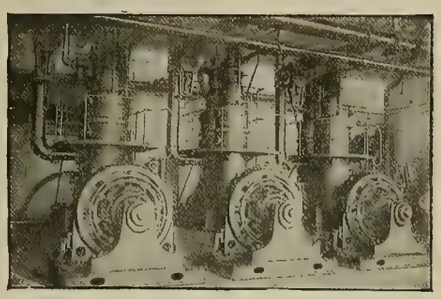

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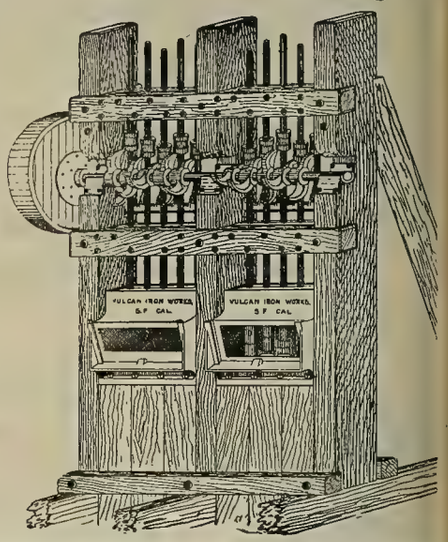

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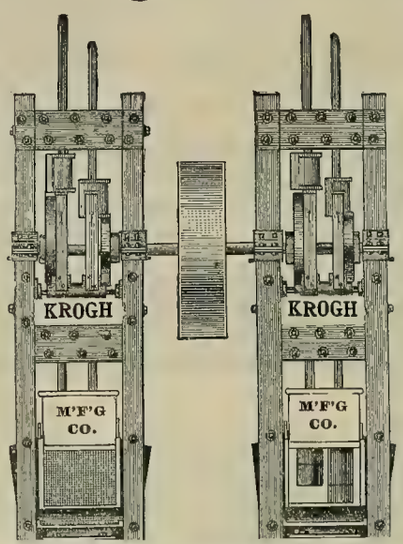

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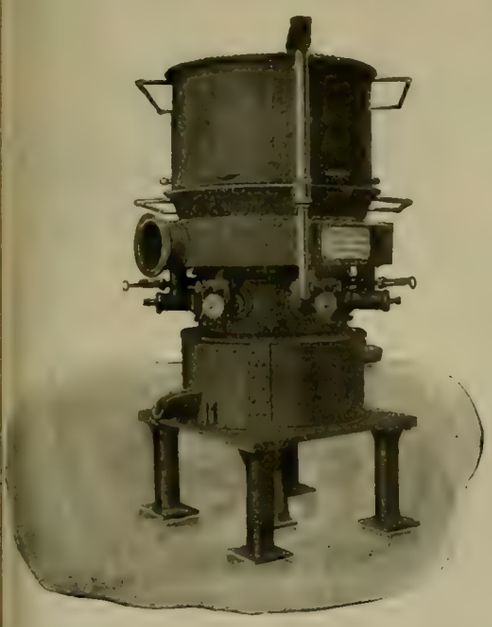

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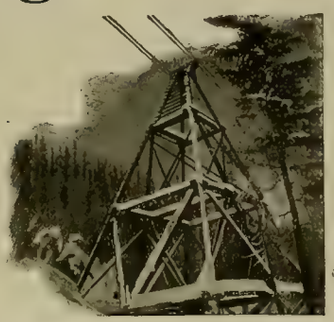

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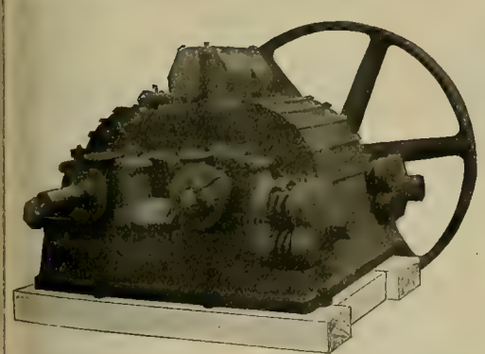

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SAN FRANCISCO, April 6, 1899.

SILVER. — London, 27⅝d; New York, 59¾; San Francisco, 59¾; Mexican Dollars, 48@48½. New York exchange, sight, 15; telegraphic, 17 cents premium.

LEAD.— New York reports "unchanged," $4.35; brokers' price, $4.15.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 7c; bar, 7¼c.

COPPER.—New York reports Lake "strong for special" at $18; brokers' price, $18.25@18.50. Local, bar, 24c per lb.

IRON.—American, soft, $22@24 per ton; Scotch, $27. Local bar, 2½c per lb.

STEEL.—12½c per pound.

TIN.—Pig, 30c per lb.; Bar, 35c. New York reports firmer, $24.35 bid, $24.50 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8½c.

QUICKSILVER.—Local, $42.50@43; export, $39@39.50; carload lots, special rates.

PLATINUM.—London, 63½s per ounce; York, $16.25; San Francisco, $16.75.

RED LEAD AND LITHARGE.—One ton and over, at one purchase, 6¼c; 500 lbs. and less than one ton, 6½c; less than 500 lbs., 7c.

POWDER.—F. o. b., San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1* 60%, carload lots, 13¼c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

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Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 2c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4¼c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9½@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1⅝@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c @ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less, Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 18c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3 30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia.)	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, April 6, 1899.

9:30 A. M. SESSION.

550 Belcher	40c	600 Mexican	70c
600 Best & Belcher	52c	700 Ophir	$1 20
200 Caledonia	40c	400 Savage	33c
500 Challar	35c	500 Sierra Nevada	$1 15
1250 Con. Cal. & Va.	$1 95	300 Union Con	53c
100 Crown Point	23c	250 Utah	15c
500 Gould & Curry	42c	150 Yellow Jacket	41c
400 H. & N	35c		

2:30 P. M. SESSION.

400 Mexican	70c	500 Belcher	40c
100 Gould & Curry	43c	100 Confidence	90c
100 Best & Belcher	57c	100 Utah	16c
200 Challar	35c	300 Overman	16c
800 Potosi	30c	200 Union Con	55c
200 Yellow Jacket	42c	300 Andes	17c

Books Received.

Second Edition Chemical and Metallurgical Hand-Book; 336 pages of boiled-down information for chemists, metallurgists and mining engineers, by J. H. Cremer, M. E., and G. H. Bicknell, M. S., of Cleveland, Ohio; devoid of advertising, excellently bound in flexible leatherette, and conveniently indexed. In its scope and arrangement the work is worthy of recommendation. It is designed largely for workers in and with iron and steel, but contains much of general value to the mining world. The tables are more than ordinarily elaborate and complete. Price $3, postpaid.

"*Prospecting, Locating and Valuing Mines.*" A practical treatise for the use of prospectors, investors and mining men generally; with an account of the principal minerals and country rocks; ore deposits; locations and patents; the early development of mines; earthy mineral products; coal; gold gravels and gravel mining; measurement of water and artesian wells; with fifteen plates. By R. H. Stretch, E. M. The Scientific Publishing Co., 253 Broadway, New York. Published in two styles: library, cloth, 12mo., $2; pocket, 16mo., flexible cover and special paper, $2.50. The book contains 380 pages, and has considerably more of value than is ordinarily found in a work of that class. The author does not seem desirous of airing his own knowledge but presents for fair consideration a good many things sometimes lost sight of, carefully and justly avoiding the discussion of themes that usually yield nothing but ultimate dissent or disagreement. There is very little discussion, a good practical compilation of facts and correct statement of conditions. It shows careful editing, and sufficient knowledge of the subjects discussed to make it of value.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.
EDW. N. BREITUNG, Marquette, Mich.
Cable address Edbee Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

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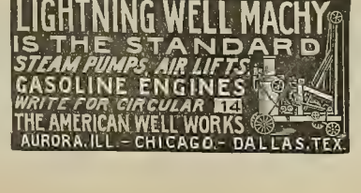
Codes used: Clough's, Moreing Neal.



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Miners, Investigate!
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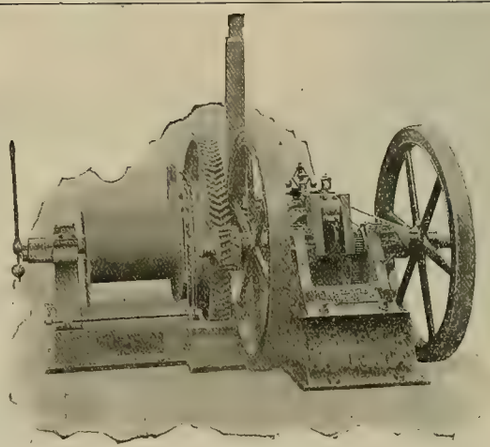

FRESNO, June 25, 1898

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The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

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Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

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Bankers, Importers, Exporters and Commission Merchants.
Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.
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Representative for:
Vivian & Sons, Swansea; The Elliott's Metal Co., Wales; The MacArthur-Forrest Process (Cyanide).
OFFICES: VANCOUVER AND VICTORIA, B. C.

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ORES CRUSHED AND SAMPLED. MILL RUNS.
Prices on Application.

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SIMPLE, EFFECTIVE AND TIGHT.

Can quickly and easily be reground at any time. Works equally well in either a horizontal or vertical position. Try them. Jobbers on the Pacific coast can furnish them. Manufactured by

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CINCINNATI, O.

Assessment Notices.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of March, 1899, an assessment (No. 17) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of April, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 28th day of April, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the seventh (7th) day of March, 1899, an assessment (No. 66) of ten (10c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 33 Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the tenth (10th) day of April, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the second (2nd) day of May, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33 Nevada Block, No. 309 Montgomery street, San Francisco, California.

HEAD CENTRE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1899, an assessment (No. 7) of twenty (20) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of May, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

DEWEY, STRONG & CO. SCIENTIFIC PRESS PATENT AGENCY PATENTS 330 MARKET ST. S.F.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1899, an assessment (No. 6) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 1st day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

G. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California. Office hours from 1 to 3 P. M.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of March, 1899, an assessment (No. 18) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of April, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOYONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3rd day of April, 1899, an assessment (No. 24) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of May, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 29th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

JAMISON MINING COMPANY, Rooms 50 and 54, No. 120 Sutter street, San Francisco, California, March 21st, 1899. SEMI-ANNUAL DIVIDEND NO. 3.

At their meeting of March 21st, 1899, it was resolved by the Board of Directors of the Jamison Mining Company to pay to the stockholders of the company from the surplus funds in the treasury, a dividend of Eleven Thousand Seven Hundred Dollars ($11,700), being three (3) cents per share on the capital stock of the company.

The dividend will be payable at the office of the company on the 15th day of April, 1899, to all stockholders of record on the 5th day of April, 1899. Transfer books will be closed at the close of business on the 5th day of April and reopened on the morning of the 17th of April, 1899.

SAM. W. CHEYNEY, Secretary.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the GWIN MINE DEVELOPMENT COMPANY will be held at the office of the company, No. 1209 Claus Spreckels Building, San Francisco, California, on TUESDAY, the 11th day of April, 1899, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer books will close on Saturday, April 8th, at 12 o'clock noon.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels Building, San Francisco, California.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.
CAPITAL, - $550,000.

The Original Cyanide Process.

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Gold Medal, Columbian Exposition, 1893.

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Samples assayed and fully reported upon. Particulars upon application.

Advisory Board in the United States: Geo. A. Anderson, General Manager; Hugh Butler, Attorney; W. S. Ward; J. Stanley Muir, Technical Manager.

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Mining, Mill, Driving, —AND— Locomotive Headlights.

SIZES ON HAND:
24-inch,
20 "
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12 "
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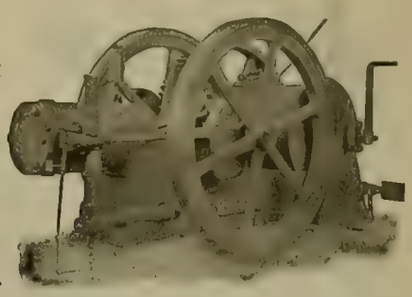

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(Patented in United States, South African Republic, New Zealand, Victoria, New South Wales, South Australia; other patents pending.)

Supplies the solution with the oxygen required for perfect extraction. Prevents settling, packing and channelling. Heats the solution and prevents freezing in winter. Doubles the capacity by requiring less than one-half the usual time. Saves the highest percentage of values at the lowest cost per ton. *"Mill rights" sold direct to users; no royalties.*

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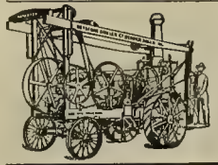

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Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes.

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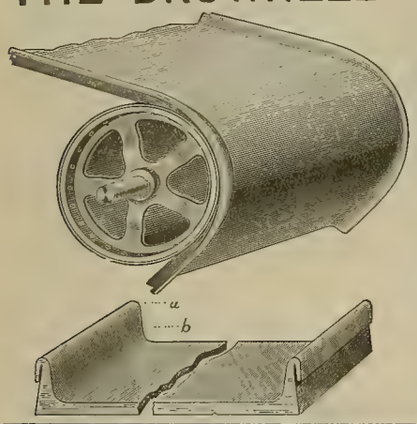
WORKS: Point Isabel, Contra Costa Co., Cal.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Inventors on the Pacific Coast will find it greatly to their advantage to consult this old experienced first-class agency. We have able and trustworthy associates and agents in Washington and the capital cities of the principal nations of the world. In connection with our scientific and Patent Law Library, and record of original cases in our office, we have other advantages far beyond those which can be offered home inventors by other agencies. The information accumulated through long and careful practice before the Office, and the frequent examination of patents already granted, for the purpose of determining the patentability of inventions brought before us, enables us to give advice which will save inventors the expense of applying for patents upon inventions which are not new. Circulars and advice sent free on receipt of postage. Address **DEWEY, STRONG & CO., Patent Agents, 330 Market St., San Francisco, Cal.**

THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.



It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

RAWHIDE GOLD MINING COMPANY,
JAMESTOWN, TUOLUMNE CO., CAL., Feb. 21, 1897.

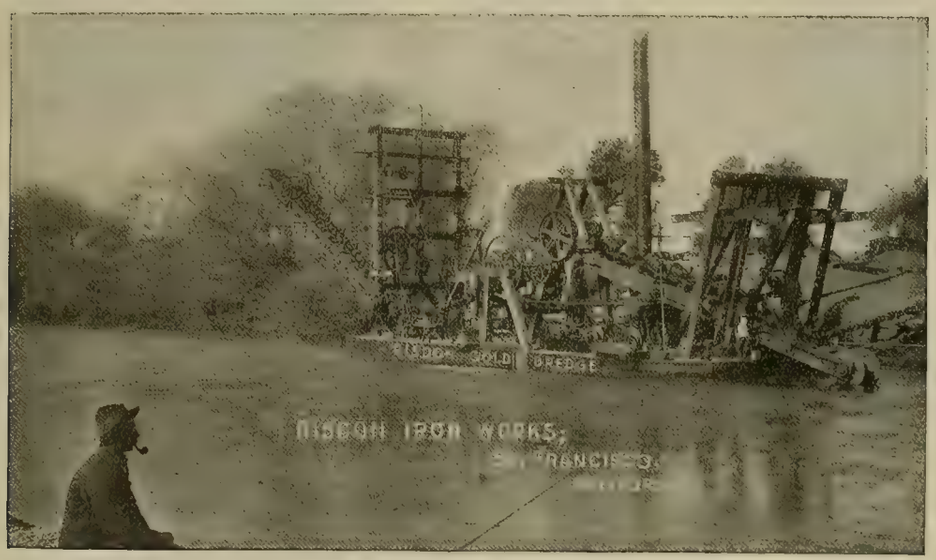
J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

AMADOR CITY, CAL., Feb. 18, 1897.

MR. J. S. BROWNELL—DEAR SIR: I take pleasure in saying that I have used your Patent Lipped flange belt for several years while connected with this company, and I consider them the best that we have used. The quality of rubber in the flange seems to be the best, and we are not bothered with the flange cracking and thereby destroying the life of the belt. At present we are using 14 concentrators, and have in use several kinds of belts. We consider your Patent Lipped flange the best. Yours very truly, THE CONS. SOUTH SPRING HILL G. M. CO.
By JOHN R. TREGLOAN, Superintendent.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.
(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.



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And COMPLETE EQUIPMENT for Placer Mines
OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.
We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.
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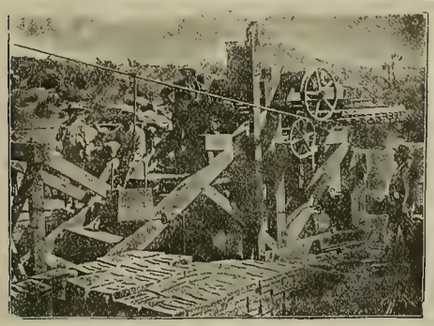
WE ALSO BUILD

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.



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LOADS MECHANICALLY. DUMPS AUTOMATICALLY. Send for Ropeway Pamphlet No. 20.

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A COMBINED POWER-SHOVEL AND CABLEWAY.
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Cableways,
Double Rope Tramways,
Wire Rope Transmissions,
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Suspension Bridges,

DESIGNED, FURNISHED, ERECTED. Write for Estimates.

CALIFORNIA WIRE WORKS, - 330 Market St., San Francisco, Cal.

THE BARTLETT CONCENTRATING TABLE.

One of these Machines will take the place of TWO or THREE Belt Concentrators of any make and do as good work.

Separates ALL the minerals from each other at one operation.
Gives THREE CONCENTRATES on the one Machine at the same operation.
The Machine is especially adapted to the separation of Zinc and Lead.

SIZE OF MACHINE.....4 ft. by 8 ft.
WEIGHT.....1000 Lbs.
CAPACITY.....10 to 30 tons per 24 hours.

CAN BE SET UP ANYWHERE.

REQUIRES NO SPECIAL FOUNDATION.

THREE CLASSES OF MACHINES ARE MADE.

Table A is adapted to concentration from 2 into 1 to 8 into 1.
Table B, 6 into 1 to 16 into 1.
Table C, 12 into 1 to 32 into 1.

Parties desiring tests made can send 500 lbs. or more, charges prepaid, and a run will be made and reports forwarded of the results, free of all charges, except for the assays, which will not exceed $10.00.

Price of the Table $300 Complete, f. o. b. Cars, San Francisco, Cal.

Licensee for the Manufacture and Sale, **PARKE & LACY CO.,** 21 & 23 FREMONT STREET, San Francisco, Cal.

AGENT FOR
KNOWLES PUMPS and PULSOMETER PUMPS,
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CALIFORNIA STATE

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

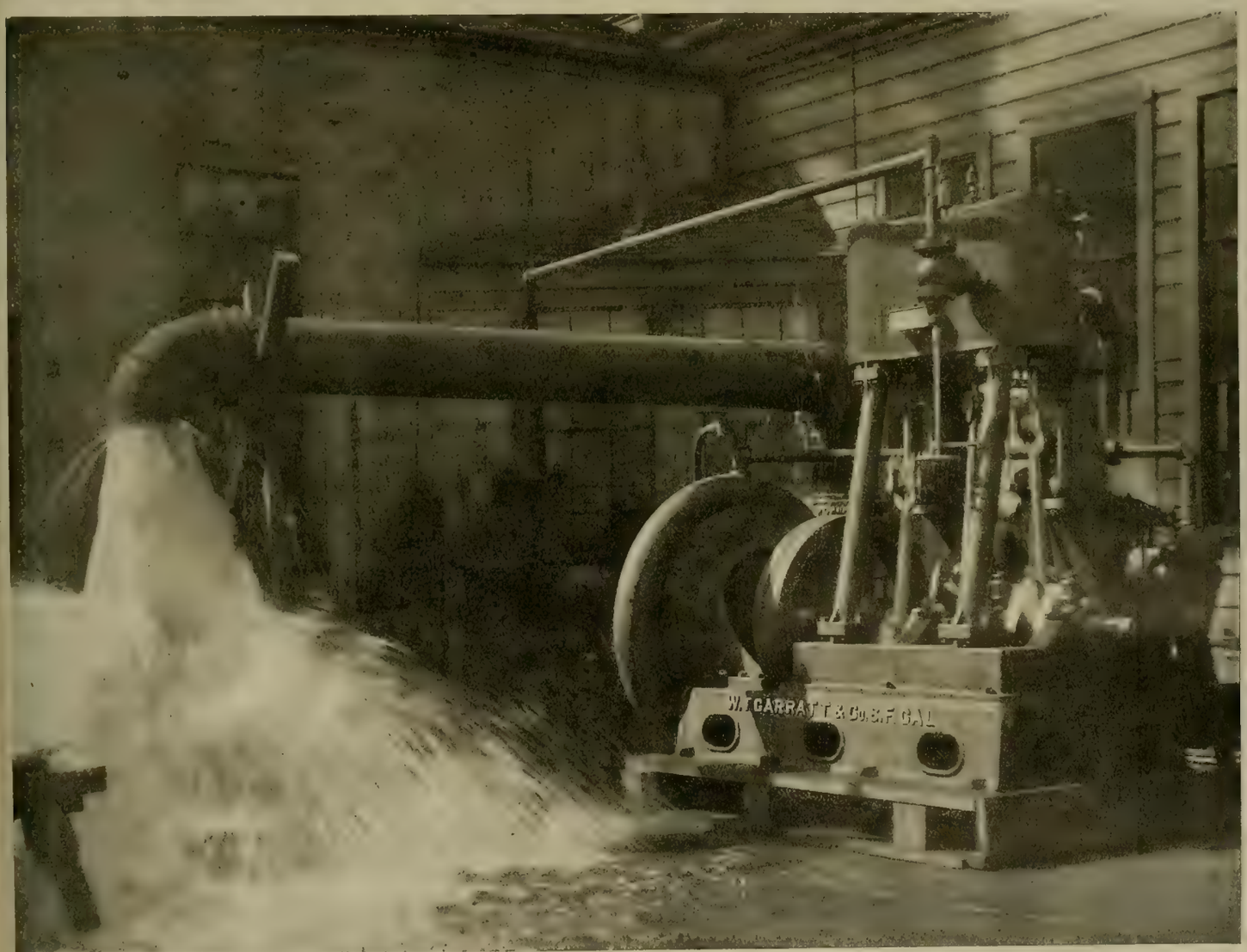
No. 2023.—VOLUME LXXVIII. Number 15. SAN FRANCISCO, SATURDAY, APRIL 15, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Irrigating Pumping Plant.

The accompanying engraving illustrates one of six irrigating pumping plants recently built by W. T. Garratt & Co., at their Fifth and Brannan streets works, San Francisco. The photograph from which the engraving was made was taken while the machinery was in action during a capacity test just before shipment. Two of the plants have a working capacity of 10,000,000 gallons per day each, against a head of 40 feet; two a capacity of 3,000,000 gallons per day each, and two a capacity of 1,500,000 gallons per day each, against a head of 50 feet. The plants are to be used in irrigating large areas of already improved and cultivated lands. The engines are the vertical cross-compound condensing type, and, together with an independent air pump and condenser, are mounted on cast iron bed plate of box-girder form. The pumps are the Richards centrifugal single suction, with balanced runners, mounted on same base and with direct connection to pump.

Tests made at the works under pressures equivalent to heads of 40 and 50 feet developed high efficiencies for the combined apparatus. It was generally believed at one time that centrifugal pumps could do satisfactory work only under exceedingly low heads; but experience has shown that they are well suited to handling water economically up to 100 feet, especially where large volumes are to be moved. It is interesting to note how generally these pumps have of late years been coming into use, particularly in the irrigated districts of California, wherever the necessity of artificial irrigation has been made so urgent by inadequate rainfalls.

Such pumps are simple in their mechanism, are without complicated valve gearing or sliding contact between metal surfaces—features which adapt them to rough usage and the handling of all kinds of liquids, however impure from sand, mud or other foreign substances. The pump illustrated has its bearings entirely protected from any cutting or grinding substances the water may contain. The packing is inside the main bearings, and there is no contact with the water passing through the pump.



CENTRIFUGAL SINGLE SUCTION PUMP FOR IRRIGATION.

South Dakota has a new mining law which becomes operative July 1st, '99. It embodies some good features not common in other States. It has provided for increasing the width of quartz locations from 300 to 600 feet and requires that the owner post in a conspicuous place on the mining claim notice of any mortgage or other incumbrance before employing men on the property. He must also post a duplicate of his location certificate, signed by the register of deeds of the county in which the claim is located, within ninety days after filing the certificate. The minimum penalty for non-compliance with these requirements is $100 fine, and the maximum penalty $1000 fine, or imprisonment, or both. Legislation of this character is calculated to decrease mining litigation, for wholesale location of the same ground by several different parties is almost impossible. It conceives that a miner locates a claim believing in its value, and the law protects him, but also requires him to show evidence of his faith and honest intention to actually hold and develop the property.

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J. F. HALLORAN.....Publisher

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TWO INTERESTING FACTS.

In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.—*American Newspaper Directory.*

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others.—*American Newspaper Directory.*

THE newest thing in street-car traffic is an electric push button on the latest make of street cars. To those who have found difficulty in catching the conductor's eye when desirous of alighting, the new signal will be a convenience.

A SCIENTIST of some standing asserts that chemically pure water is poison to the human stomach, upsetting some hitherto accepted theories regarding distilled water by the argument that in distillation the water loses sundry salts that it greedily abstracts from the animal tissues when it is swallowed, thus constituting a protoplasmic poison. If this view be sustained, "absolutely pure water" is more dangerous than ordinary water impregnated with impurities absorbed from the atmosphere or collected in its flow.

THE trusts continue to multiply in number, variety and extent. "Economy of production" has ceased to be the shibboleth. The watchword of most of those artificial trade combinations now seems to be suppression of competition and supreme control of the industrial field. These matters have been commented upon in these columns, and it is noticed that universally leading conservative publications in similar comment arrive at similar conclusions. All that is going on now has occurred before, and the immutable laws of business must insure a repetition of results.

IN the great rush for copper mines and prospects in which promotors and capitalists are now indulging, gold properties are either brushed aside or lost sight of entirely. They seem to fail to realize that the copper market is a most uncertain quantity. The price of copper is higher now than it has been since '78, and there is no positive assurance that the present high prices will be maintained. Gold, however, is quoted to-day at the same price it was twenty years ago, and it is not unsafe to predict that the price of gold will be maintained through the copper boom and for a long time after it has subsided and been forgotten. The tremendous inflation in the value of copper stocks and the fancy prices being paid for copper mines and prospects will surely result in disaster, and the reactionary effect will not be to the advantage of the mining industry, for mining, as an industry, will be blamed for the collapse. The investor will not stop to consider his own folly, but will emphatically express his opinion of mining generally and it may be surmised that his remarks will not be wholly complimentary.

ON the opposite page appears an official request from the Commissioner General and the Director of Exploitation of the U. S. Commission to the Paris Exposition of 1900 that needs immediate observance on the part of all in this west half of America who in any way contemplate a business exhibit at next year's Paris exhibition. The urgency of time and the necessity for prompt action by public and private exhibitors have already received editorial comment, and the official request on page 399 serves to emphasize this important matter.

GAS ENGINE makers and users are interested in the present effort in San Francisco to reduce the price of gas from $1.75 per 1000 cubic feet to $1.10. Cheaper gas would have considerable influence in power distribution. In Boston coal gas of 18 candle power, containing less than 10% carbonic oxide, is proffered for 75 cents per 1000 cubic feet for use in gas engines. It is figured that the tariff would make the price to be $1\frac{1}{2}$ cents in engines up to 100 H. P., $1\frac{1}{10}$ cents in engines from 100 to 200 H. P.; and 1 cent per H. P. hour in engines of more than 200 H. P.

THE recent war with Spain has had many effects, beneficial and otherwise. Among the many far-reaching results of the former class is the removal by Congress of the old line and staff distinction in the navy, and the recognition of the engineer. It is a triumph of skill, intelligence and merit over the old hide-bound quarterdeck dictum that the engineers were inferior to line officers. It is official recognition of the fact that the modern warship is a big engineering workshop, and that the men who know how to build and run the works are of equal importance with all others, afloat or ashore.

IT may seem strange that the MINING AND SCIENTIFIC PRESS should at this late day publish a description of the construction of a rocker. The article on this subject which appears elsewhere in this issue was prepared at the request of a subscriber. In looking over the files of the paper no cuts of the details of construction of this useful mechanism of the placer miner were found, and the drawings accompanying the text were made particularly to illustrate the article. While it is one of the earliest devices employed for saving gold in California, it still has its field of usefulness.

THE death of S. J. Field, ex-Justice of the U. S. Supreme Court, deserves a word of respectful remembrance and appreciation. He was a man of great aid and value to the miners of California and other States. To him more than any other one man is due even the little recognition in Federal law that is given the American miner, who gives more and gets less than any other class. It was Judge Field who first put in force the idea that the men who know what they want and how to get it should have voice in the preparation of laws governing their property rights, and, for the first time in human history, the laws enacted by the California miners for local rules and regulations were made the base of the statutes on that subject and so interpreted by the highest tribunal on earth, of which Judge Field was a member longer than any other man.

THE action of the California Legislature in regard to the mining law is in decided contrast to that taken in South Dakota. In the former case all local requirements, good or bad, are swept aside, and the proposition reverts to the unsatisfactory Federal statutes. It reopens the way for the multi-location fiend, and, requiring no work for nearly two years, practically brings legitimate prospecting to a standstill. The Dakota law enforces upon the prospector what would be considered in California great and unnecessary hardship, but it protects the prospector who is honest in his intention and shuts out that class who rush in and stake or monument scores of claims and then sit down waiting for some one to buy them out—begging a premium for laziness. But few prospectors can afford to develop more than three or four claims. Why the legal requirements—Federal or local—prescribing the manner of locating a mining claim should be less plain or be less exacting than the laws defining the manner of appropriating the agricultural lands of the public domain is hard to understand. That the Federal mining laws are unsatisfactory no one will deny, but why would-be mine locators complain of the hardship and injustice of the requirements of a law, which if faithfully followed out will protect him in his holdings, is even more difficult of comprehension. No such plaintive cry is heard from the farmer who locates agricultural land. It is true, he is denied the right to wholesale appropriation of such lands, but he knows that if his filings and subsequent procedure are within the requirements of the law he will be able to secure a patent without difficulty and his title is perfect. Few mining claims have any considerable intrinsic value when located, but many of them develop into very valuable property, and then is the time, if any defect exist in location, record, or other matter affecting the title, that trouble and litigation follow. Such being the case, why should not the miner not only secure himself by complying with the exact letter of the law, but demand a law which will insure to himself or his assigns the same security in his possession as the agriculturist finds?

Answering Some Questions.

A dyke is a vein-like mass of eruptive rock intruded from great depth and cutting older rocks, whether sedimentary, metamorphic or massive. They may conform with such older rocks in strike and dip or may cut across them. A granite dyke may intrude an older granite formation. A true fissure vein is a vein which has formed in a fracture of the earth's crust which extends to unknown but certainly to great depth. All fissure veins are true veins. The term "false fissure vein" indicates nothing. A gash vein is the result of the erosion of a lens of quartz or other mineral, the lower portion only remaining. They occur most commonly in mica schists and rocks of similar character. Most fissures are formed as the result of a tremendous compressive stress in the rocks, thought by some to be due to the cooling of the interior of the earth and a consequent attempt of the outer crust to readjust itself to the new condition. Under this stress rocks along certain lines are often wrinkled, as it were, the incipient stage of folding which results later if the stress continues. Should the strain continue after folding has taken place, a point is eventually reached when the rigid rock masses are no longer able to withstand the strain and a fracture results. Displacement nearly always follows, but the amount of movement is sometimes scarcely noticeable. In other cases it reaches many thousands of feet. These movements are seldom violent but continue over a long period of time. Mineral solutions ascend along the planes thus made and a fissure vein is formed. This is the true fissure vein. A plane of weakness having been established, dykes are also often thrust in along the same plane or near it. In some instances the dyke has been intruded first, the vein forming subsequently. In the early stages of the formation of the vein the strata are bent and twisted and many open spaces and zones of crushing are formed. Should the stress upon the rocks find relief elsewhere or cease entirely no fissure would result, though mineral solutions might pass upward along this zone of compression and folding and many lenses of ore might result. As these lenses usually succeed each other in a given direction, often overlapping, they practically constitute a vein, and in some instances may be called a true vein. When the torsion of the rocks has resulted in the formation of lenses of quartz or ore at considerable distances from each other, and the upper portion of one of these deposits is removed by erosion, the remaining lower portion constitutes the gash vein described above. A contact vein is an ore deposit lying between two unlike formations as limestone and quartzite. Some years ago a contact was looked upon with great favor but as the genesis of ore deposits is becoming better understood those prejudices in favor of particular forms of deposit and certain kinds of wall rocks are disappearing.

Concentrates.

AN inch of rain on an area one mile square would amount to 17,424,000 gallons.

THE register of any U. S. Land Office cannot act as attorney for an application for patent.

THE laws of Utah do not permit of the existence of two corporations of the same name in that State.

OF the 750,000 miles of telephone wire in operation in the United States, about one-half is underground.

U. S. TARIFF collectors hold that imported ferrochrome is unwrought metal and must pay a duty of 20% ad valorem.

GAS engines work all right at high altitudes. One is in daily use at a mine near Georgetown, Colo., over 10,000 feet above the sea.

A GOOD hydraulic giant, 14 feet long, will weigh from 1000 to 1300 pounds and should throw 500 inches water under a 265-foot pressure.

TO FREEZE a quicksand for the purpose of sinking a shaft an uncongealable liquid is employed, a saturated solution of water and calcium chloride.

THE Simmer & Jack is the present leading gold producer in South Africa. During '98, at the Robinson, the daily duty per stamp was 4.35 tons.

ON the 13th inst., the Standard Oil people took control of the Parrot, Montana, copper property, they now owning 168,000 of the 230,000 shares.

THE specific gravity of protoxide of antimony is 5.778; a cubic foot weighs 361 pounds. The figures for platinum, rolled, are 22.06 and 1379, respectively.

ONE POUND troy weight equals 22.7944 cubic inches distilled water, barometer 30 inches; one pound avoirdupois weight equals 27.7015 cubic inches, same.

"STUCCO" is the mortar covering placed on the exterior walls to protect the material of the wall from weather effects, or to secure a smooth finish for imitating stone.

THE distinction between the obligation of a surety and a grantor is that the surety undertakes to pay if the principal does not, while the grantor agrees to pay if the principal can not.

PROBABLY the best conductor of electricity is annealed silver. As between two conductors the poorer can be made of equal efficiency with the better by being of larger mass or diameter.

A NEW mineral found in Algeria analyzes osmium-iridium, 4.85%; titaniferous iron, 2.15%; copper, 1.78%; palladium, 0.89%; platinum, 9.64%. This mineral is said to be found in nuggets in clay.

IT is by the prevention of crystallization that the addition of a small percentage of manganese to steel adds to its value in welding. Manganese increases the tensile strength of iron, and diminishes its fusibility and ductility.

THE best thing for a "working miner" to do regarding Yukon and Alaska mining companies, "limited," or "unlimited" is to let them alone. They are all right as far as they go, but they don't go very far in "a working miner's" direction.

THE Ute Indian reservation is 15 by 60 miles, south and east of Durango, Colorado. It will be opened to white settlement and occupation at noon May 4th, '99. The land office is in Durango. The Denver and Rio Grande railroad is the only line reaching the reservation.

AVERAGING a lot of assays is not generally of satisfactory result. Mill returns are often disappointingly lower than the "average." Such assays show the fact of presence of gold, but not what mill returns may be confidently looked for from treatment of large quantities of ore.

THE prophecies, predictions and claims of what he is "going" to do, by Nikola Tesla, the New York electrician, are interesting—to readers of "science progress" in Sunday newspapers, but have considerable Keeley flavor. Like the San Francisco Stock Exchange, Mr. T. seems to lack a leader.

THE simultaneous operation of a telephone and telegraph circuit over one wire is to be considered feasible. Such experiments have been made, the latest noticed being over the D. L. & W. R. R. Co., between their New York office and points in New Jersey, and are reported to have been successful.

A PATTERN made of yellow pine, and weighing one pound, will weigh when cast in iron 13⅓ pounds; zinc, 12½; copper, 16; yellow brass, 15½; gun metal, 16. A pattern for cast iron should be made ⅛-inch longer per lineal foot; brass, 16-inch; lead, ⅛ to 3-16-inch; tin, 1-12-inch; zinc, 3-16 to ¼-inch.

DURING the week the Canadian Government passed an order preventing any person employed by that Government from staking out or recording mining claims on dominion land in the Yukon territory. It was also decided to exempt from the realty tax the gross output of any mine up to the amount of $5000.

A CRACK in a piece of metal is best prevented from extending farther by drilling a hole where the crack ends: if not drilled at just that exact spot the crack is likely to continue on beyond the hole. How to find the exact spot is aided by instructions in this column in the issue of March 25th, '99.

THE terms and conditions of a mining lease should be in exact detail, and so worded as to be capable of thorough understanding. Of course, it should be in writing, duly attested and recorded. There is no authority of law under which public lands may be leased by the Government for mining purposes.

THE California mineral land bill is not dead but sleepeth. It is always just going to pass Congress, and some day may surprise its friends and enemies by getting through—about the time that the conditions that called it into necessary being have passed away by reason of most of the mineral area having been absorbed by corporate craft.

IN '98 the Boston & Montana Copper Co.'s gross receipts were $7,448,600; the total expenses were $4,058,957; sixteen dividends were paid, aggregating $2,400,000. The electrolytic plant has a monthly capacity of 4,000,000 pounds. It is understood that the company would enter the Standard Oil combine at $450 per share, which on the company's '98 earnings would be equivalent to a 5% investment.

THE apparent reason for the existing difference in price between copper produced in the Lake Superior district and electrolytic copper from Montana, Arizona and elsewhere is not due to any special superiority. Most, if not all, the former product is sold ahead, and is more the subject of street speculation. It is not a matter of quality, but the invariable speculative tendency that causes the difference in price.

COMMISSIONER GENERAL, FERDINAND W. PECK,
ASSISTANT COMMISSIONER GENERAL, BENJAMIN D. WOODWARD.
SECRETARY OF THE COMMISSION, FREDERICK BRACKETT.

UNITED STATES COMMISSION
TO THE
PARIS EXPOSITION OF 1900.

CHICAGO, AUDITORIUM BUILDING. NEW YORK, EQUITABLE BUILDING. PARIS, 20 AVENUE RAPP.

CHICAGO OFFICES, April 4th, 1899.

To the Mining and Scientific Press:

Will you please state that all who desire to exhibit in the Paris Exposition of 1900 are requested to immediately notify this office, if they have not already done so, in order that they may be considered in the allotment of space which will soon be made. While there are many applications on file in every line of industry, it is desirable that the American Sections be not only representative of this country but also represent the largest possible number of producers. Both our commercial interests and national pride demand that our works be entered in this most important International Exposition. It is estimated that fully 60,000,000 people from every part of the globe will attend, and it will be an opportunity to greatly increase our foreign trade and to demonstrate that the United States is supreme in the arts of peace.

* * * * * * *

Respectfully,

Approved: JOHN H. McGIBBONS,
FERDINAND W. PECK, Director of Exploitation.
Commissioner-General.

IT is one of the proudest prerogatives of an American citizen to continuously spell his name in any way that suits his sovereign fancy, being responsible, as in all other things, for an abuse of the privilege. Nor is there any law to prevent an individual from relocating his own mining claim under a different name, though, naturally, such actions justify suspicion. There are many things on which the statutes are silent.

THE recent law regarding assaying passed by the Arizona Legislature enacts that the Territorial University shall do an assaying business, charging from $1 to $2.50 for each assay. The bill is No. 68, and is entitled "An Act to Encourage Prospectors." From the prospectors' point of view it is all right, but it is tough on the Arizona assayers to have the Territory where they pay taxes come into business competition with them.

THE cost of producing copper is differently stated by different authorities. It is understood that at Butte, Montana, the average cost is about 7 cents per pound; at Houghton, Mich., 6 cents. Franklin Farrell who takes charge May 1st of the United Verde Extension G. S. & C. Co., Jerome, Arizona, is credited in Boston with having "placed himself on record" as saying that that company "will produce copper at a cost of not over 3 cents per pound."

LACK of transportation facilities form an almost insuperable bar to mining operations in some localities. In Plumas county, Cal., at the De Long mine on the north fork of Feather river, where a large river mining scheme is now under way, the machinery is carried from the railroad terminus by wagon, thence over steep trails to a point opposite and above its destination and then lowered down the mountain side to the river many hundred feet below.

TO TEMPER and magnetize steel rods should (if desired to be straight) be made so while soft, then heated red by daylight, plunged into water vertically, cleaned so that the tempering color can be easily seen, and the temper drawn on an iron plate to a deep orange color, and then cooled in water. To magnetize lay the ends of the rods alternately on the north and south poles of a permanent or electro-magnet. The magnet of a dynamo or motor may thus be utilized.

TO RENDER textile fabrics uninflammable phosphate of ammonia is recommended. The solution should be weak—from 20% to 30%. Garments, etc., dipped in this solution, when dry will be found so fire protected that no amount of contact with fire will set the substances in a blaze. The surface may present a charred aspect, but there will be no flame and the combustion will not spread. In the case of washable material the solution should, of course, be applied after each washing.

ONE recommended way to smelt electrically consists in using black lead or plumbago crucibles, which, being conductive to the electric current, and of high resistance, may (according to recent electrical authority) "be made the means of producing the heat within themselves." It is simply necessary to stand the pot on a heavy copper plate connected to one pole of a dynamo, another copper plate acting as a cover for the pot, which should fit neatly, and to which the other pole of the dynamo is attached.

AT the works of the Mannesman Tube Co., Germany, is in use a wire flywheel, made up of a cast-iron hub to which are attached two steel plate disks or cheeks 20 feet in diameter. The peripheral space between the two disks is filled in with seventy tons No. 5 steel wire, wound around the hub. It is said that the tensile resistance thus obtained is superior to that of any casting. This flywheel turns at a speed of 240 revolutions per minute—a peripheral velocity of 2.8 miles per minute. The length of wire on such a constructed flywheel is estimated to be about 250 miles.

IN the manufacture of a dynamo good results are had from making the armature with slots parallel to the shaft in which the current-carrying wires are placed, for, by reducing the distance that the magnetization has to be forced through copper and air, it reduces the number of turns of wire necessary to the field, hence the weight. It also protects the wire from mechanical injury, and affords a positive action in the driving around of the armature core by the conductors, for it is on them the turning force is exerted. Mica is best used for insulating from each other the segments of the commutator.

IN using oil fuel for boilers the approved way of starting the sprayer or atomizer is to light a handful of oil-saturated waste, and put it in the furnace in front of the sprinkler. The steam valve of the sprinkler should be the first opened, and the oil valve opened last. The reverse of this rule is to be observed in stopping the atomizer. When oil gets into the furnace without prompt ignition its vapor creates an explosive gas that is ready to do damage on short notice. Familiarity should never lapse into carelessness, and unless atomizers are carefully attended to, the attendant is liable to sudden and serious injury.

KAOLIN, or China clay, is not uncommon in this country. It is found in several localities in this west half of America. One notable deposit is between Silver Cliff and Rosita, Colo. Most clay results from the decomposition of feldspars in granitic or volcanic rocks. Iron manifests its presence by imparting a red, yellow or drab tint; with pure or white feldspar, and no iron, the clay is of a milky whiteness and is kaolin. Chinese "chinaware" was made from decomposed felspathic porphyry dykes. The Colorado clay mentioned was made by the decomposition by solfataric and other aqueous action of the flows of volcanic rhyolite.

SUPT. COOK of the United Globe mines, Globe, Arizona, has what seems to be an effective arrangement for saving the flue dust which might be of use to our British Columbia inquirer. At the United Globe there are two furnaces in blast, one 88x96 feet, the other 42x120. The flue dust saver is a cylinder 8 feet inside diameter, 72 feet long, laid horizontally on the roof of the smelter, just behind the stacks, and connected with them by 3-foot pipes. The tops of the stacks being closed the smoke is forced into the cylinder, the collected dust being carried to one end of the chamber where it falls into a press on the feed floor and is there compressed into bricquettes.

SECTION 1159 of the California Civil Code provides that all notices relating to mining claims "may" be filed with the county recorder. This section is in force, but it is not obligatory. As heretofore explained, the last California Legislature repealed the law passed by its predecessor in '97 concerning mining locations, and everything is now just as it was before the law was passed. Nothing rules in California regarding those things but the U. S. Statutes and whatever local laws and customs are not in conflict therewith. Already in Shasta and other counties is reported revival of the old mining districts, and in some cases demands have been made on county boards of supervisors for the old district records placed with them when the law of '97 (now repealed) went into effect.

The Magalia, Cal., Drift Mine.

NUMBER II.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by A. D. GASSAWAY, E. M.

Column Pipe.—The column pipe extending from the large pump to the 245 foot level is made of 9-inch lap-welded tubing, exterior diameter 9.68 inches, in sections exactly 15 feet in length, so as to be interchangeable. The heavy flanges are truly bored, so as to make a shrinkage-fit for each length of pipe. After being shrunk onto the pipe in proper position, they are beaded over and faced off to make proper joints. The flanges are male and female and are turned true for rubber gaskets. From the 245 foot station to the surface the column is made of 10-inch casing, inside diameter about 9.63-inch, with plain flanges bored, shrunk and beaded on, as in the heavy pipe below.

For awhile all the water was pumped to the surface; but, as the mouth of the old incline is 217 feet lower than the collar of the shaft, about 700 feet of 7-inch and nearly 1800 feet of 8-inch casing was laid from the bottom of the shaft through the old works to that point, and the pumps now discharge into Little Butte creek. This line of tubing connects with the large column pipe at the bottom of the shaft by a Y. The pumps discharge into the column pipe, where the water rises to a height sufficient to force it through the 7-inch and 8-inch tubing. A gate is placed between the Y and the 7-inch pipe, which may be closed and the water pumped to the top of the shaft, as at first, when necessary.

Some of the turns in the old works were very sharp, which made it difficult to lay the tubing. Wherever the ground would permit the pipe was screwed together, but on the curves the pipe was heated and bent, or cast-iron angle pieces and flanges were used. Beveled flange unions, all of the same angle, were used on the 8-inch pipe, and almost any angle up to 20° could be turned, the amount depending on the position of the flanges, as shown in the sketch.

FIG. 4.—ARRANGEMENT OF FLANGES IN PIPE LINE ON CURVES.

Boilers.—There are three boilers stationed near the hoist at the top of the shaft, size 54 inches by 16 feet, 60 inches by 14 feet and 48 inches by 16 feet, respectively, besides a small upright boiler that is seldom used. In the event of a failure in the water supply, through breakage of the ditch or in case of repairs on the compressor, these boilers furnish power for pumping. They are also used for reheating and underground hoisting.

Steam is conducted from the boilers to the large pump station at the bottom of the shaft by 600 feet of 3½-inch pipe, inside diameter, and thence to No. 3 pump station, 1950 feet distant, in 150 feet of 2½-inch gas pipe and about 1800 feet of 3-inch casing. All of this pipe is first wrapped with asbestos, then with hair felt. From the boilers down the shaft to the large pump station the whole is thoroughly wrapped with canvas; thence to No. 3 station it is enclosed in a wooden box to protect the felt and asbestos from the action of the water. This covering, being an excellent non-conductor, keeps the pipe hot and prevents the rapid condensation so common in long lines of bare steam pipe.

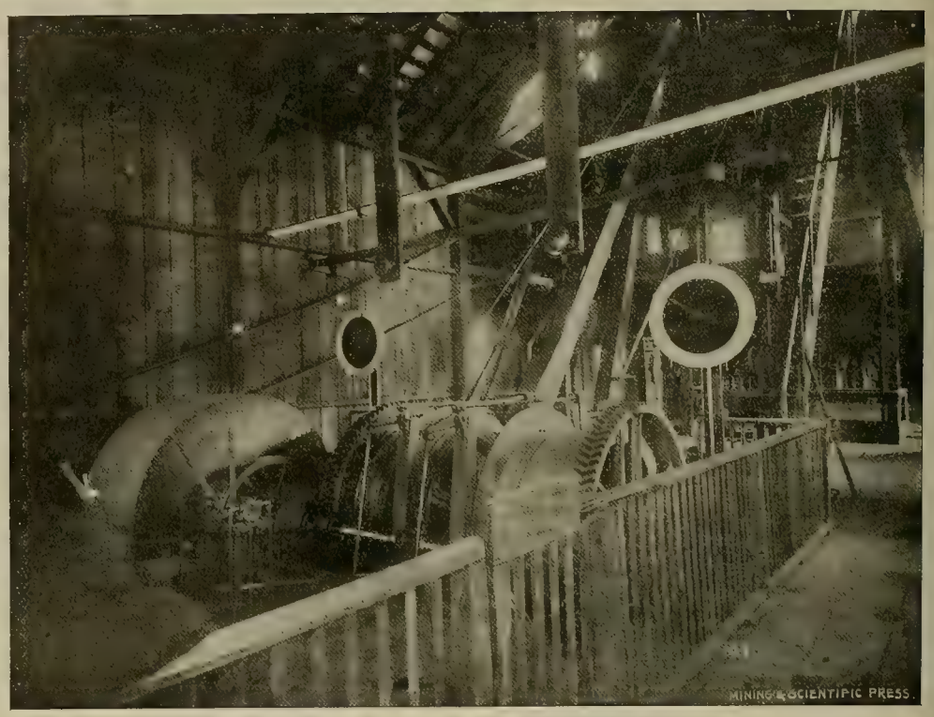
Expansion joints are placed at suitable distances to counteract the injurious effects of expansion and contraction, which otherwise would soon tear the pipe from its fastenings and cause it to leak. The loss of pressure by friction and condensation from the boilers to No. 3 station, 2600 feet distant, is about fifteen pounds.

Power.—The motive power is obtained from the Cherokee ditch and is delivered from the pressure box to the wheel through 1854 feet of 30-inch and 1850 feet of 26-inch pipe. The average length of the 30-inch sections is 19.73 feet and the iron .073. The average length of the 26-inch sections is 19.27 feet and the gauge .07 inch. It is double riveted longitudinally and single riveted transversely. Air valves are set at proper distances and the pipe is placed in the ground and carefully covered to prevent unequal expansion and contraction. The total weight of the pipe is 95,000 pounds.

A receiver 36 inches in diameter and 11 feet 6 inches in length is placed near the compressor, and another about half as large is located at the No. 2 pump station, about 2400 feet from it. The air is carried from the large receiver down the shaft to the large pump station through 650 feet of 6-inch casing pipe; thence 1675 feet in 4-inch casing and from thence on to No. 3 pump station, and to the face in 3½-inch casing. Wherever the pipe can be put in straight it is screwed together, but on the curves, where it is necessary to bend it and the joints cannot be screwed together, flange unions are used with rubber gaskets. The loss of pressure between the compressor and No. 3 pump station is about 2½ pounds, while at the station at the bottom of the shaft there is a gain of 1½ pounds.

Reheaters.—At the pump stations the air is passed through steam reheaters before it is admitted to the pumps. These reheaters consist of one or two coils or "worms" of ¾-inch pipe within a wrought-iron drum with cast iron heads. The heads are screwed on to the tubing that forms the drum, and the whole is about 12 inches in diameter and 2 feet 4 inches in length. The steam enters the coils at the top and passes out at the bottom into a steam trap. The air occupies the entire space within the drums and around the coils. If the reheater has double coils, one is placed within the other. As the steam circulates withinthe coils its heat is imparted to the air by conduction, thus raising it to a higher temperature, the expansion rendering it more efficient.

At the large pump station two of these reheaters are used. The air enters the top of one, passes from the bottom of the same into the bottom of the other, and thence out through the top into the pump. In running compound pumps by compressed air it is necessary to reheat it, otherwise they will freeze up, unless they are quite close to the compressor, or the air has retained its heat. Simple pumps may be run under ordinary conditions without reheating, but even then it pays to reheat.

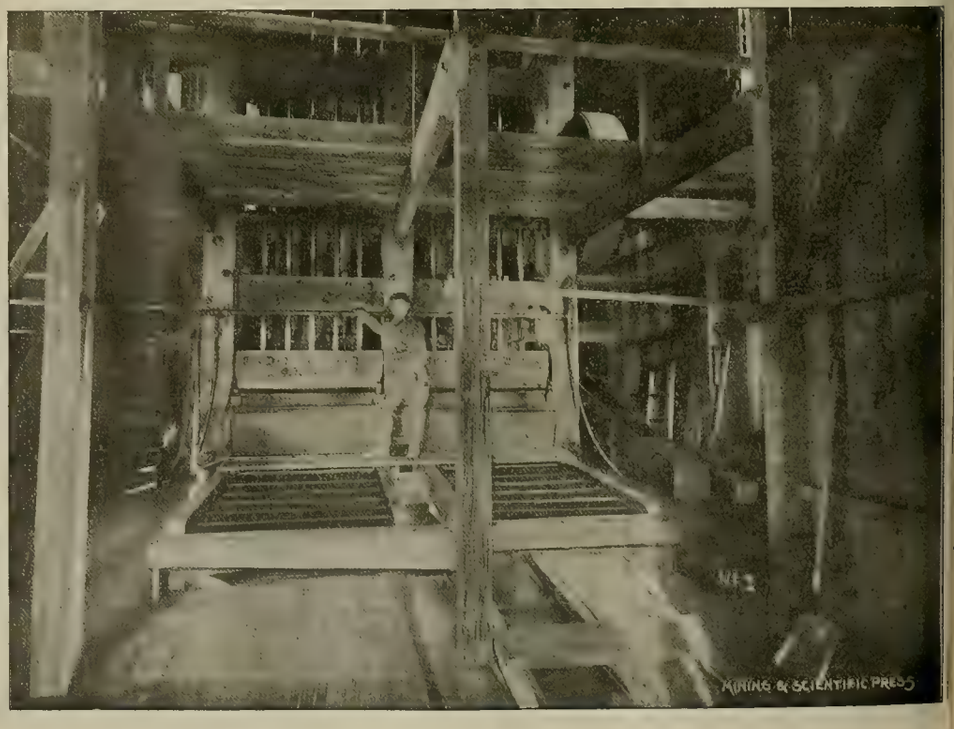


HOIST AT MAGALIA MINE, BUTTE COUNTY, CAL.

Hoist.—The double drum hoist was built by the Union Iron Works of San Francisco. The 6-foot Pelton wheels operate under an effective head of 140 feet. The hoist is geared so that 150 revolutions per minute of the water wheels run the drums at 30, which gives the cage a speed of 400 feet per minute. By using two water wheels the drums are allowed to run either way. The pinions are loose on the wheel shaft and are operated by clutches. The drums may be operated singly or together. Heavy post brakes are used. The gates that turn the water off and onto the wheels are operated by a hydraulic stand made by the Pelton Water Wheel Co. The power is derived from a 12-inch pipe connecting with the 26-inch main that supplies the compressor.

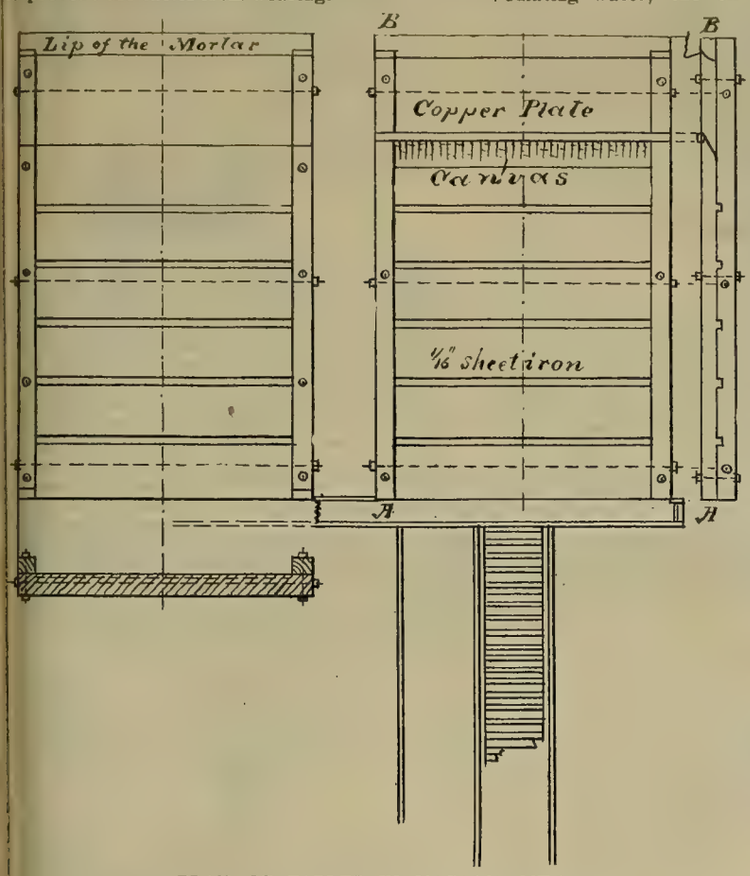
Ventilation.—As the collar of the shaft is 227 feet higher than the mouth of the old works in Little Butte creek, the shaft acts as the "upcast." The old works are bulkheaded at the bottom of the shaft and from there 700 feet of 15-inch, and about 3100 feet of 10-inch air pipe carries a constant current of cool fresh air to the face. This current returns through the gangway to the shaft and thence to the surface laden with the powder smoke and foul gases of the mine. This current is strengthened by a No. 2 blower driven by a No. 1 Pelton motor on the same shaft and base. This blower is placed at the upper end of the air pipe just within the old works and is operated by a small stream from the pump column under a 300-foot head.

Milling.—The gravel was formerly free and easily



CEMENT GRAVEL STAMP MILL, MAGALIA MINE, BUTTE COUNTY, CAL.

washed, but finally it was found so heavily cemented that it became necessary to erect a mill to liberate the gold from the matrix. A 10-stamp mill, driven by water power was completed in October, '97. The stamps weigh 850 pounds and drop 7 inches 102 times per minute. Chrome steel shoes and dies are used. Woven steel wire screens with a $\frac{3}{16}$-inch mesh are used. The duty of a stamp is about eight tons in twenty-four hours, the amount varying with the hardness of the material. The gravel is dumped onto inclined grizzlies, when the coarse lumps and cobbles slide onto heavy horizontal grizzlies. Here the lumps are reduced to the proper size and the cobbles thrown to one side where they are finally washed and removed to the waste dump. The mortars discharge onto tables 53 inches wide in the clear and 8 feet long, made of sugar pine plank 4 inches thick, and have a grade of $\frac{3}{4}$-inch to the foot. The upper portion of the tables is covered with copper plates 30 inches wide. The remaining space contains grooves 2 inches wide and $\frac{1}{2}$-inch deep running crosswise, 10 inches apart, and filled with quicksilver. The space between the grooves is lined with sheet iron $\frac{1}{16}$-inch thick to prevent the tables from wearing.



PLAN OF TABLES IN MAGALIA MILL.
Grade ¾ inch to 1 foot. Grooves ½ inch deep, 2 inches wide.

As the gold is coarse most of it remains in the mortars, while nearly all that passes the screens is caught on the tables.

After the pulp leaves the tables it passes through a double sluice, each part 15 inches wide in the clear and lined with Hungarian riffles. Very little amalgam reaches this sluice, which discharges into a 16-inch sluice 1500 feet in length, lined with riffles made of 2-inch stuff lined with strap iron and 2x4-inch and 3x4-inch scantling. This sluice was used for washing before the construction of the mill. A small sluice with 10-inch sides and 13-inch riffles carries the material about 4300 feet farther, beyond the point where the Cherokee ditch again takes the water from the ravine. It was necessary to construct the sluice to this point to prevent the mud and slimes from entering the ditch.

Plates do not work successfully as, on account of the large amount of coarse material that passes over, it is very difficult to keep them from scouring.

A strip of canvas or burlap about 10 inches wide and 53 inches long, the width of the tables, tacked to a 1x2-inch strip, rests on the sides or ribs of the tables just above the upper groove, to prevent the "splash" from whipping the quicksilver from the grooves.

The loss of quicksilver in milling 27,000 tons of gravel was .07 ounce to the ton. The cost for shoes and dies in milling 20,000 tons was about 1 cent per ton.

It pays to mill gravel, especially if it is clayey or even slightly cemented. The large amount of gold taken from tailing claims, after passing from hydraulic and drift mines through long lines of sluices and undercurrents, is ample evidence that it does. Milling does not save it all, but it will save such a large percentage that reworking the tailings will hardly prove profitable in most instances. The cost of milling should not exceed 15 cents per ton, and under ordinary conditions should be reduced to about 11 cents. This is exclusive of the first cost of the plant. Experience in the West Harmony mill, containing fifteen stamps, at Nevada City, and in the Mayflower mill of twenty stamps at Forest Hill, and in the Magalia mill, substantiates the above. It is difficult to wash the gravel from the average drift mine without losing several times that amount.

Magalia, Cal., March 25th, '99.

The Genesis of Petroleum and Asphaltum in California.

NUMBER XI.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

The argillaceous material cannot be removed like the calcareous and silicious cementing matter, consequently sands cemented with argillaceous material seldom contain bituminous accumulations to any great extent. When the calcareous and silicious cementing material is removed by circulating water, the oil if present occupies the sand. This leaching generally occurs along the line of faults and the summits of anticlines, as they more readily offer avenues for the egress of water, but may occur along anticlinal dips and in synclines; in fact in any place where the intricate subterranean course of percolating water reaches the sandstone. When the circulating water has been copious the calcareous and silicious cementing material has been carried away to the surface of the earth, sometimes forming deposits of sinter, tufa, limestone or dolomite. When the flow of these waters charged with carbonate of lime and silica has been feeble, the sandstone has again been cemented and made impervious to water, then the flow of water ceases or finds some other path of escape.

Deposits of petroleum oil, resembling pools, occur in the sandstone stratum in which the circumjacent sandstone is cemented with calcareous and silicious material. The portion of the stratum now occupied by the bitumen was formerly occupied by the carbonate of lime or silica, the lime or silica having been removed by the solvent action of percolating and circulating waters. If the gas and oil are ever removed from these porous strata, they will in all probability be again cemented by lime or silica, if water again takes possession and its flow is feeble.

Shale is laminated clay, more or less indurated, splitting into thin sheets along the original laminæ of deposition. In California the majority of shales are quite soft, being easily cut with a knife.

A large proportion of the oil obtained in California is taken from the cracks and recesses in shale. The strata are arranged around the axis of the anticline in concentric circles. During distortion occasioned by the uplifting of the strata there would be an elongation of these concentric strata. If they consisted of non-elastic shale they would be cracked and seamed transversely to the seams of their bedding. This would occur to a greater extent in the strata farthest from the axis of the anticline. If there was a great weight of superincumbent earth the cracks and seams would not be so large along the planes of bedding of the shale. Being more acutely bent, the strata on the steep side of an unsymmetrical flexure would be more broken than the other side.

During its uplifting the strata on the slopes the farthest away from the axis of the anticline would move slower than those nearer the axis, consequently one strata would move upon the other, grinding the shale into plastic mud and luting seams and cracks, which would assist in forming an incasement for water and oil. This grinding movement also keeps cracks and seams from occurring parallel with and along the planes of the bedding of the shale. When the shales are bituminized in their cracks and seams one-tenth of the bitumen is in the seams that occur parallel with the planes of bedding, and nine-tenths in the cracks and seams that occur transverse to these planes. Where the shales, the cracks and seams of which are filled with bitumen, which resists the action of denudation better than the shales that do not contain it, are side by side, the latter are worn away more largely than the former and a valley results, owing to denudation acting unequally. Many bluffs and prominent peaks and ridges owe their existence and stability to the bitumen in the cracks and seams of their shales.

When water takes possession of shale the capillary attraction offers so great a resistance that oil even under enormous pressure is incapable of forcing an entrance and ejecting the water. When oil is in possession of the shale the same resistance is offered to the entrance of water. Shale saturated with water is a far better covering for petroleum than dry shale. Where the distortion of the strata has been acute the multiplicity of these cracks and seams makes the storing capacity of these fractured shales very large—in fact, many will be equal in this respect to porous sands. For reasons stated heretofore, the cracks and seams will be wider on the summits of anticlines than on their slopes or in synclines. Owing to the broken condition of the shale the petroleum has ascended from strata to strata, and not for any great distance through any particular stratum or strata, until the concretion of the bitumen by exposure to atmospheric actions, assisted by silicious waters, sealed strata from each other.

Silica and Lime.—The hot waters created by chemical heat held in solution large quantities of silica. When the hot, silicious water approached the surface of the earth it was cooled; the cooler the water became the less capable it was to hold in solution this large amount of silica. Cooling of the water eliminated the silica, which was deposited in the interstices of the shales, increasing their solidity and imperviousness. There may also be an interchange between the silica dissolved in the water and certain constituents in the sandstone and shale—for instance, carbonate of lime—the silica, having a greater degree of hardness than the substance removed, would be deposited. This silicification is a very frequent phenomenon in these rocks.

If the silicious water circulated through particular strata, the silica eliminated by the cooling of the silicious water, by its superior gravity, sank to the bottom of the strata and cemented the same. Strata adjoining the hot, silicious water may be cooler than that in which the silicious water circulates; in that case the cooler strata acts as a condenser. This action created the strata known as "shells;" the shells often occur on the top and bottom of the sands and throughout the shales. This silicification, together with the concreting of the bitumen, creates impervious strata, which is capable of holding petroleum, oil and natural gas. These silicifications, when formed in strata in which bitumen occurs, are colored black. Their color is destroyed by burning, proving that it is owing to organic material.

Silica, in a very fine condition, is frequently attracted to some organic or inorganic nucleus which has grown in successive layers or bands, often of different colors. In a similar manner the small silicious particles, separated from hot, silicious solutions, are attracted by the incasements of porous or partly porous and seamed strata.

Lime is controlled usually by the same conditions and laws as the silica. Large masses of shale and sand stones have been calcified and salicified near the bituminous deposits in California.

Deposits of bitumen and petroleum oil are controlled by the line of permanent water. Below the level of the ocean all cracks, seams, fissures and interspaces are permanently filled with water. Above the level of the ocean and below the beds of the streams the supply of water in these spaces is fairly permanent. Above the beds of the streams the supply of water is dependent upon the rainfall and the degree of freedom with which it leaves the formation.

Pervious and impervious strata modify the above conditions. Permanent water may be replaced or occupied by a deposit or column of bitumen, petroleum, oil or natural gas. When the underlying water which supports the oil is released by the uplifting of a formation above the permanent water by orogenic movements, the water leaves the formation and the oil drains into the voids formerly occupied by the water and maybe reaches the surface by the same avenues taken by the water and is lost or resinified to asphaltum. Frequently the porous strata accumulations of bitumen have resulted through the drainage of oil from a higher and large area of porous rock into a lower porous strata.

The bituminized sands on the Mesa deposit on the Sisquoc ranch show the drainage action. They are drained into a centrocline, the sides of the centrocline afterwards having been carried away by denudation; the water which buoyed up the oil escaped and the oil slowly sought the bottom of the centrocline. The sands forming the uppermost edge of the centrocline have to a great extent lost their bitumen; as soon as the bitumen leaves the sand it falls into an incoherent mass and is rapidly washed away by rains. The existing bitumen, in consequence of the long distance traveled, has become viscous principally through oxidation and evaporation.

This drainage is still slowly progressing, as in hot weather balls of nearly pure bitumen form on the

surface of the sands in the lower part of the deposit.

South of Asphalto in Kern county the bitumen has reached the bottom of the syncline by drainage and is now gradually descending through the syncline as through a ditch. Although this occurred ages ago this drainage is still in process.

(To be Continued.)

Largest Brick Chimney.

The statement was recently made in a local publication that the chimney of the Sanitary Reduction Co., in San Francisco, was the tallest in the world.

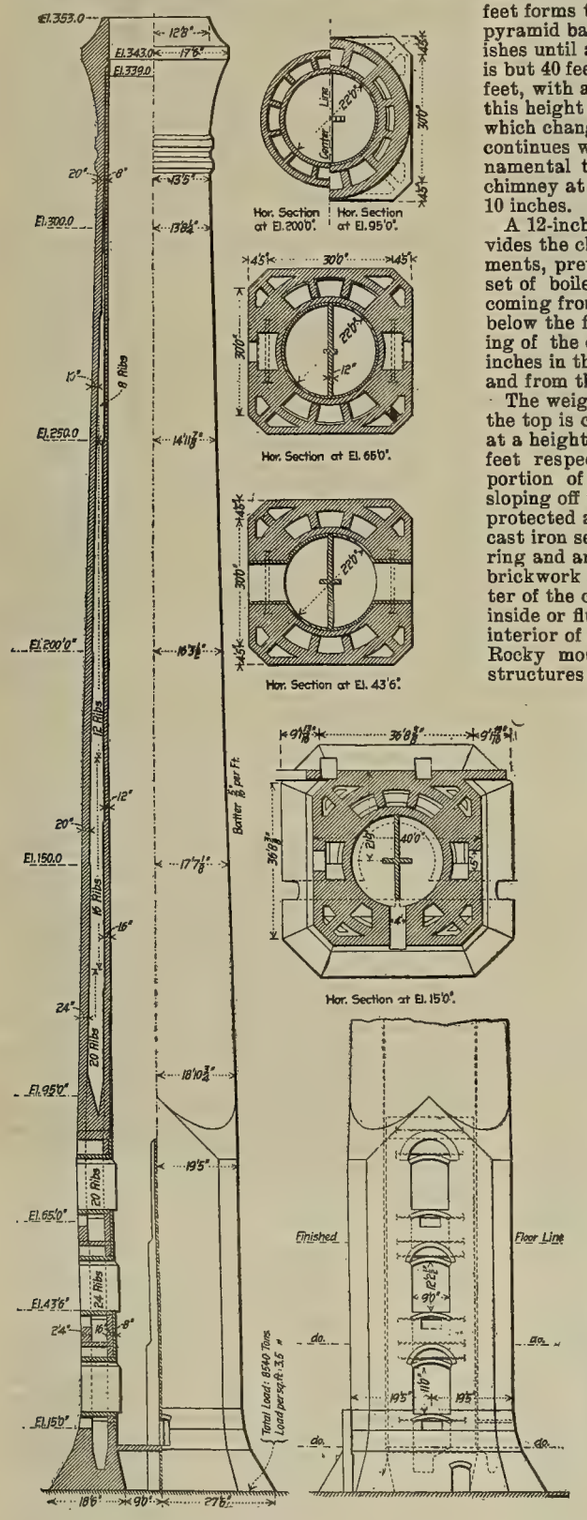


FIG. 1.

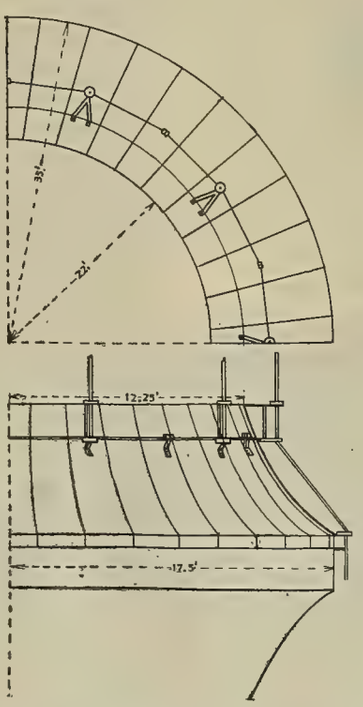


FIG. 2.

This is a mistake. The height of that chimney is 265 feet; it contains 1,250,000 bricks, is 44 feet outside diameter at the base, and cost about $15,000.

The tallest chimney in the world is believed to be in Glasgow, Scotland, 474 feet high, though the one at Hutte, Saxony, has some claims that way.

The subject is deemed of sufficient interest to justify illustrated mention of the largest brick chimney in the world, in New York City.

There is now building there an unusually large electric power station for the Metropolitan St. Railway Co. The intent is to make this and the one for the Third Ave. Railway Co. the largest in the world, to concentrate all the current-generating machinery, and to introduce a system of economical generation and transmission of electric power. Incidentally it may be mentioned that the power house, when fully equipped, can carry 75,000 H. P. It will contain eighty-seven water-tube boilers, each of a maximum capacity of 800 H. P. The engine room will contain eleven engines, each direct-connected to a three-phase, 6000-volt generator. A. M. Hunt of San Francisco is now inspecting that plant with a view to its duplication for Claus Spreckels' new electric light and power establishment in San Francisco.

But it is of the chimney construction that detail is intended.

A side elevation and a plan of the sections is shown in Fig. 1. A solid block of concrete 88x85½x20 feet forms the foundation. Starting with a square pyramid base 55 feet on a side, it gradually diminishes until at a height of 15 feet from the ground it is but 40 feet, from which point it continues up to 80 feet, with a side dimension of 38 feet 10 inches. At this height it begins to change to a circular section, which change is completed at 95 feet, from whence it continues with a taper of $\frac{5}{16}$-inch to the top. The ornamental top begins at a height of 317 feet, the chimney at that point having a diameter of 26 feet 10 inches.

A 12-inch firebrick wall extending up 85 feet divides the chimney into two semi-circular compartments, preventing the current of hot gases from one set of boilers having any influence upon the gases coming from the flues on the other side. About 4 feet below the floor of the lowest flue, the firebrick lining of the chimney commences and extends about 8 inches in thickness to 5 feet above the upper flue, and from there 4 inches in thickness up to 115 feet.

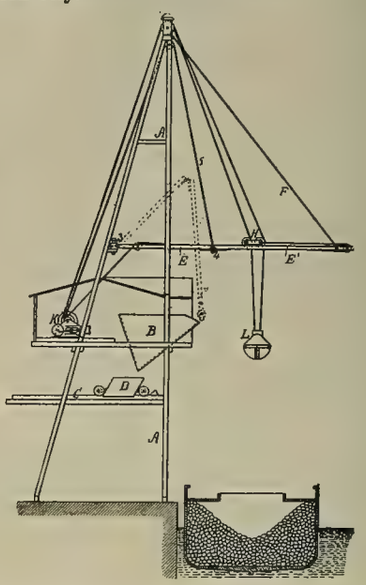
The weight of the overhanging enlarged portion at the top is counteracted by three steel rings, the first at a height of 335½ feet and the other two at 3 and 6 feet respectively above the first. In the thickest portion of the cap the brickwork is 6½ feet thick, sloping off to 20 inches at the top. The chimney is protected at the top by an iron cap made of forty cast iron sectors, bolted together into a complete ring and anchored to a steel ring embedded in the brickwork about 14 feet below the cap. The diameter of the cap at its widest portion is 35 feet and the inside or flue diameter is 22 feet, or the same as the interior of the chimney all the way up. East of the Rocky mountains it is necessary to protect all structures from being struck by lightning. The big brick chimney is well protected that way, as shown in Fig. 2, by ten copper rods 1¼ inches in diameter, projecting 6 feet above the top of the point, terminating in four pronged points, each tipped with platinum for about 2 inches. A heavy copper band encircles the cap at the base of the rods and at two points opposite, two copper strips, 1x$\frac{5}{16}$-inch, lead down the sides of the chimney to suitable ground-plates. A total length of 1030 feet of lightning conductor was used. Encircling the inner edge of the cap, a second copper strip has been placed with a ground connection, thus affording a double protection. Such protective expense is rarely deemed necessary on the Pacific coast. It is understood that the cost of the chimney is about $100,000, and the cost of the induced-draft plant will be about one-third of this. Recently was given some account of the induced-draft system, which is intended to do away with the need for such high chimneys as the one herewith described.

Latest Mining and Metallurgical Patents.

Patents Issued April 4, 1899.

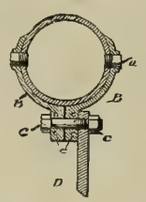
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

HOISTING APPARATUS.—No. 622,227; C. W. Hunt, New York City.



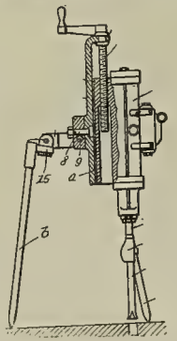
A combination with stationary track, car and pulleys and ropes or chains thereon adapted to raise and suspend a weight, of a boom having a track that is a continuation of the stationary track, a support for the outer end of the boom, a hinge for connecting the inner end of the boom at the stationary track and a joint between the two parts forming the boom and means for drawing up the latter joint to fold the boom. There is a combination with stationary support, of boom joint for connecting the boom to the stationary support, and upon which the boom can be swung horizontally or folded upwardly, means for sustaining the outer end of the boom, a hinge for uniting the two parts of which the boom is composed, means for moving the hinge upwardly in folding the boom, and a track upon the boom with a truck running thereon.

RABBLE ARM FOR ORE ROASTING FURNACES.—No. 622,233; J. Jacobs, Florence, Colo.



A combination with a hollow cylindrical rabble arm, of studs projecting from the periphery thereof; a two-part yoke embracing the arm and having openings which encircle the studs to form engagement therewith against displacement in any direction; a blade independently mounted upon the lower portion of the yoke; means for securing the two portions of the yoke together and for holding the blade in position thereon.

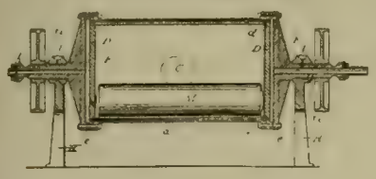
SUPPORTING TRIPOD FOR ROCK DRILLS.—No. 622,264; J. H. Rhodes, Harvey, Ill.



A supporting tripod for rock drills comprising a frame consisting of a couple of side braces connected by a crossbar; three adjustable leg holders, one pivotally connected to and between the rear ends of braces; the others pivotally connected respectively to the forward ends of the two side bars, and three adjustable supporting legs held by leg holders; each leg holder consisting of a circumferentially broken or split socket adapted to receive a lateral projection on the upper end of a supporting leg, and being

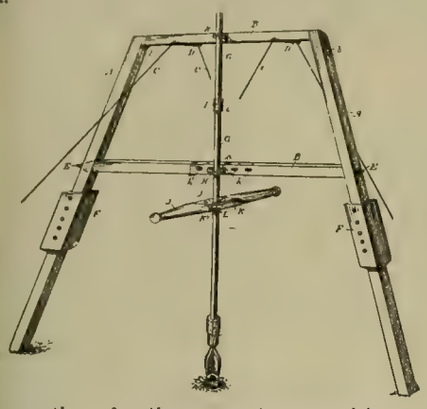
connected to the frame by a pivot bolt which passes through the separated end portions of the socket comprising holder, whereby a loosening of the nut of bolt permits the leg to be swung from side to side and also from front to rear, and a tightening of the same locks the leg in both adjustments.

METHOD OF AMALGAMATING ORES OF GOLD AND SILVER.—No. 622,295; J. E. Sutphen, Albany, N. Y.



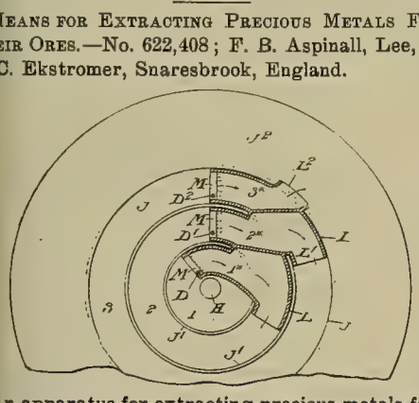
A method of amalgamating ores of gold and silver, which consists in applying a suitable quantity of ore pulp confined in a cylinder, and subjecting such pulp and mercury to the action of heat, and at the same time applying a steady pressure upon the pulp and mercury, keeping the mercury in a homogeneous body and in close contact with the ores.

DEVICE FOR PENETRATING FROZEN EARTH OR GRAVEL.—No. 622,365; T. J. Hubbell, Santa Cruz, Cal.



An earth-perforating apparatus comprising a perforating tool, a shank and means connecting it therewith, a framework having upper and lower cross timbers, and upper and lower guides carried by cross timbers and through which guides the shank loosely passes, one guide fixed and the other adjustable to bring it in the vertical line of the fixed guide when the frame of the apparatus is set upon an incline; a supporting frame including foldable side members and connecting cross timbers, a boring tool and a shank to which it is detachably connected to bring a transverse handle having a vertical slot or channel in one side to fit said shank, and a pivoted latch or keeper for closing the slot or channel and locking the shank in place.

MEANS FOR EXTRACTING PRECIOUS METALS FROM THEIR ORES.—No. 622,408; F. B. Aspinall, Lee, and E. C. Ekstromer, Snaresbrook, England.

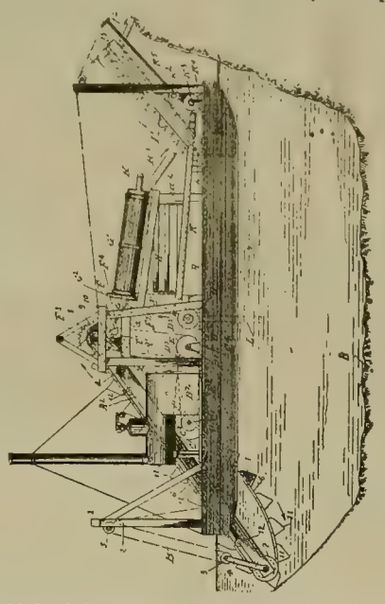


An apparatus for extracting precious metals from their ores comprising a tray divided by partitions into annular troughs, a closed vessel within which tray rotates, a plow containing a series of inclined passages leading from one to another of troughs over their dividing partitions, a nozzle in the mouth of each passage, means for supplying pulverized ore to tray and means for supplying mercury fumes through nozzles into passages, all in combination.

MINER'S DRILL.—No. 622,409; H. Aylmer, Richmond, Canada.

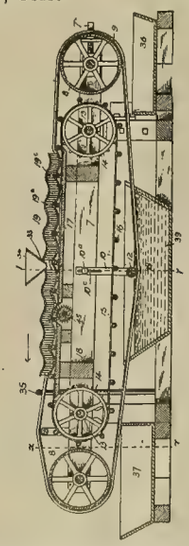
In a drill, the combination with the body proper provided with a dovetailed groove extending across the end and transverse side notches extending into the groove in the center of the sides, of the drill point having a dovetailed portion adapted to fit the groove and a central hole adapted to aline with the notches, and a pin extending through the notches and central hole in the point.

GOLD DREDGING APPARATUS.—No. 622,532; Robert H. Postlethwaite, San Francisco, Cal., assignor to the Risdon Iron and Locomotive Works, same place.



A gold dredging apparatus, combination of dredge boat, swinging ladder mounted at one end thereof, endless carriers supported by ladder, cutting or excavating buckets secured to or carried by endless carrier, devices for raising and lowering the elevator, mechanism for driving the endless carriers, the inclined rotary grizzly, a trough or runway for conveying the excavated material from the excavating buckets to the grizzly, a force pump for supplying water into the grizzly to wash and separate the material fed therein, a series of separating plates or platforms arranged at an incline below the rotary grizzly, a sump or well formed in the dredge boat, the sluiceway leading from the platforms or tables to the sump or well, the discharge pipe for conveying the material from the sump, a bucket elevator mounted upon a movable ladder for removing the heavier material, a runway for conveying the heavier material from the rotary grizzly to the bucket elevator, and of devices for raising and lowering the elevator ladder and the discharge pipe. The pump and connections empty the well, the discharge pipe is connected to the pump by a universal joint, the bucket elevator works over a movable ladder. There is a perforated spray pipe leading into the separator or grizzly from the lower end thereof, a pump for forcing water into the pipe and through its perforations and under disintegrating pressure onto the material fed into the grizzly or separator, collecting tables arranged below the separator or grizzly and by means of which the separated metal from the dredged material is recovered.

ORE CONCENTRATOR.—No. 622,641; August Ten Winkel, Denver, Colo.

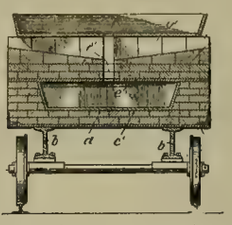


An ore concentrator combination of table, endless apron traveling above the table, agitators traveling between the table and the apron and engaging the latter underneath, apron sufficiently slack to form valleys or depressions between the agitators, an auxiliary apron attached to the table and engaging the endless apron from above for the purpose of maintaining the transverse valleys in the endless apron, and facilitating the separation of the mineral from the gangue, the auxiliary apron being divided to permit the material to be fed to the endless apron at a suitable point between the extremities of the auxiliary apron.

ORE WASHER AND SEPARATOR.—No. 622,507; J. F. Mason, Waycross, Ga.

A combination of a horizontally arranged shaft, a cylindrical screen rigidly secured thereto, a trough journaled upon shaft beneath screen, means for rotating shaft and screen, and for simultaneously rocking trough in a path parallel to screen during the rotation of the shaft, a spout entering one end of the screen for delivering the ore and water thereto, and means for rotating the shaft.

METALLURGICAL FURNACE APPLIANCE.—No. 622,438; W. Beam, Gill Hall, Pa.



A crucible supporting structure for furnaces, comprising a refractory base portion having a chamber, a removable cover resting on base portion and apertured over the chamber, a refractory crucible bed built upon cover and apertured to correspond therewith, the bed having risers with passages therebetween for products of combustion, the bottoms of the passages sloping toward the apertures in the bed.

Copper Ores, Etc.

Written for the MINING AND SCIENTIFIC PRESS.

Copper is in demand, and as a result every sort of mineral having a bluish or greenish color is considered copper by inexperienced prospectors. A few days since a mass of serpentine was exhibited in San Francisco, on the faces of which was a thin coating of green carbonate of copper. This was represented to be very high-grade ore. It would perhaps assay a fraction of one per cent copper. In times like these wad becomes black oxide of copper and red iron oxide is cuprite. Mariposite or any other green mineral is at once malachite, etc. The range of copper ores is a very wide one, but the principal ores become familiar after a brief acquaintance. The most common are the green and blue carbonates and the yellow sulphide (chalcopyrite). A good test for copper is to boil the pulverized mineral in nitric acid. A green solution will result if copper be present. To further prove it, add ammonia in excess, when the solution becomes a beautiful blue. This color will disappear upon the addition of a solution of cyanide of potassium.

THE Mansfield Copper Mining Co., Germany, have introduced at their Otto mine two machines for lifting the mine cars. These lifting cylinders are worked by compressed air, effecting a quicker and easier transfer of the cars from one track to another than was possible with the hoisting screw previously in use. A compressed air cylinder is arranged upon a movable frame suspended at a height of 6 feet 8 inches. The frame can be moved on the rails with ease, the air being supplied by an indiarubber hose. The piston rod of the air cylinder is connected to an arrangement of levers for seizing and lifting the wagon as soon as the air valve is opened. The releasing and lowering of the wagon is effected by opening the exhaust valve.

JAMES P. WILLIAMS of Milldale, Ohio, has secured a patent for a device which he claims will prevent collisions on railroads. It consists of an electric dynamo which is placed under the trucks of all engines and operated on the principle of the generation of electricity by induction. Williams claims that the two trains will become cognizant of the presence of each other on the same track at three miles distance by an arc light in the cab of each engine.

INDIAN maize contains a kernel in which there is a yellow germ. Under chemical treatment this germ yields an oil which, when refined, is a competitor with cotton seed oil in the substitution for olive oil, and which may be vulcanized and made to do duty as rubber. What are called rubber boots and shoes are being made from this imitation rubber at a cost far below that of the genuine article.

Development of Submarine Telegraphy.

The development of the submarine telegraph from a mere gutta percha coated wire laid in New York harbor by Prof. Morse in 1842, to the great cables which now engirdle the entire earth, except the bed of the Pacific, is described in a statement just issed by the Treasury Bureau of Statistics entitled, "Chronology of Submarine Telegraph Construction Throughout the World and the Development of Submarine Telegraphy." This publication, which has been prepared by the Bureau of Statistics in view of the special interest just now developed in a submarine telegraph line to connect the United States with Hawaii, Guam, the Philippines and the Asiatic coast, shows not only the location, number and length of the submarine telegraphs of the world, but also the history of this great system and the part which American genius and enterprise have had in its development.

The statement credits Salva, a Spaniard, with the first recorded suggestion of submarine telegraphy, made before the Barcelona Academy of Sciences in 1795. Aldini, a nephew of Galvini, performed experiments in the transmission of electric signals under the sea near Calais, France, in 1803; Schilling ignited gunpowder by electricity transmitted through subaqueous conducting wire under the Neva river near St. Petersburg, in 1812; telegraphic signals were transmitted through insulated wires under the river Hugli, in India, by the director of the East India Co.'s telegraph system in 1839, and in 1842 Prof. Morse transmitted electric currents and signals through an insulated copper wire laid for that purpose between Castle Garden and Governor's Island, in New York harbor, and in the following year suggested submarine electric communication between the United States and Europe. In 1845, Ezra Cornell, in conjunction with Prof. Morse, laid and successfully operated submarine copper wires in the Hudson river between New York and Fort Lee, and in 1847 a section of the telegraph line connecting New York and Washington was laid through the waters of a narrow creek by J. J. Craven of New Jersey, thus demonstrating the practicability of actual submarine telegraphic service. In 1850 a submarine telegraph line was laid across the English channel and signals exchanged, but without further success, though in the following year a cable containing four copper wires insulated with gutta percha and protected by galvanized iron wires wound spirally about it was laid across the English channel and put into successful operation as a submarine telegraph line.

These experiments having proved the practicability of submarine telegraphy, the great enterprise of a telegraph line under the Atlantic ocean was undertaken, and the subsequent developments are described in the statement as follows:

1857.—First attempt to lay a submarine telegraphic cable across the Atlantic ocean, the enterprise being headed by Cyrus W. Field of New York, and Charles Bright, J. W. Brett and others of England. The cable was to extend from Valencia, Ireland, to Newfoundland, the length of cable necessary being estimated at 2500 miles. The construction of this cable was similar to that across the English channel. After 225 miles had been laid from Valencia westward, the cable broke and the work was abandoned.

1858.—Renewal by Mr. Field and his associates of the attempt to lay a submarine telegraphic cable across the Atlantic. The United States naval vessel Niagara and the British vessel Agamemnon, carrying each one-half of the cable, proceeded to mid-ocean, and after joining the ends of their respective sections, on July 29 proceeded westward and eastward, paying out the cable and reaching their respective destination, Newfoundland and Valencia, on the same day, August 5th, 1858, when electrical connection between the continents was at once established over 2050 nautical miles of cable which they had thus laid. Congratulatory messages were exchanged between the President of the United States and the Queen of England, and there were public rejoicings in both countries over what was pronounced the great event of the century. After less than one month of operation, however, the cable ceased working and it was never operated further, nor was any part of it ever recovered. During the time of its operation 730 messages of about 10,000 words were passed over it. Its total cost was $1,256,250.

1859.—A submarine telegraphic cable to connect England with British India was laid through the Red sea and Arabian sea to Kurrachee, India, having a total length of 3043 nautical miles, but with several intermediate landings. Some portions of the line worked satisfactorily for thirty days, but few if any messages were sent over the entire length, and it soon proved a complete failure.

1860.—Elaborate study of the entire subject of submarine telegraphs and the construction of cables was made by a committee appointed by the British Board of Trade, resulting in an expression of the belief that submarine telegraphy might, despite past failures, become successful and profitable if sufficient care were exercised in constructing, laying and managing the cable.

1861.—A submarine telegraphic cable, which had been manufactured with great care, was laid across the Mediterranean from Malta to Alexandria, Egypt, with intermediate landing places at Tripoli and Benghazi. The cable consisted of seven copper wires stranded together, covered with several coatings of gutta percha alternated with other nonconducting and waterproof material, and in turn covered and protected by eighteen wires wound spirally about this core. This cable proved a permanent success and went into general operation shortly after its construction. The speed of transmission, which on the Atlantic cable and shorter submarine lines had been three words per minute, was brought up to ten words per minute on each separate section, but was only three words per minute when all the sections were united and operated as a single line of 1331 miles.

1862.—A submarine cable which had been laid across the Mediterranean sea between France and Algeria in 1861 proved a complete failure after a few months of experiment.

1864.—Construction of a cable line to connect India with England untertaken by the Indian Goverment, the line to be laid through the Arabian sea and Persian gulf to connect with land lines, thence to Calais and by the short submarine line under the British channel to England. The submerged line in the Arabian sea and the Persian gulf had a total length of 1450 miles, but with three intermediate landing places. This line consisted of a copper core surrounded by layers of gutta percha, alternated with other nonconducting and waterproof material, being protected by an outer sheathing of twelve galvanized iron wires wound spirally about it, which in turn were protected by double wrappings of tarred hemp yarn. All of these materials and the various sections of the cable were constantly and thoroughly tested electrically and otherwise during its construction. The line when laid proved a complete success, becoming the first successful telegraphic connection between England and India.

1865.—Another attempt was made by Cyrus W. Field of the United States, and his associates in the United States and England, to lay a submarine telegraph cable from Valencia, Ireland, to Newfoundland and the United States. The cable, for which the contract price was $3,000,000, partly in cash and partly in shares of the company, consisted of seven copper wires surrounded by numerous coatings of gutta percha and other waterproof nonconductors. This was in turn surrounded by ten Bessemer steel wires, this being the first use of steel wires for cable protection, each wire being separately wound with pitch-soaked hemp yarn, the shore ends being also further protected by thirty-six heavy iron wires wound spirally about the completed cable. The steamer Great Eastern, then the largest steamship afloat, was specially fitted up for laying this cable. Great care was exercised in every particular, but after 1186 miles had been laid westward from Valencia the cable broke in water over 11,000 feet deep and the attemts to recover it were unsuccessful.

1866.—Mr. Field and his associates renewed their efforts to lay a cable across the Atlantic. A new company with $3,000,000 capital was formed with the double purpose of attemping to find the end of the cable partially laid in 1865 and complete the line, and also to lay another cable parallel with and near to it. The cable manufactured for the proposed new line was similar to that of 1865. The Great Eastern was remodeled to further meet the requirements of the work, and left Valencia, Ireland, July 13, 1866, paying out the cable in a line about twenty-five miles north of that followed on the preceding year. She safely arrived at Newfoundland in fourteen days from the date of leaving Valencia, and electrical communication was immediately established between the United States and England, which has never since been more than temporarily interrupted. The Great Eastern then returned to the spot where the cable was lost in 1865, and after eighteen days work succeeded in bringing the end on board from a depth of over 11,000 feet, the tests immediately made showing it to be in perfect working connection with the Valencia end. A splice was made and the laying of the line toward Newfoundland resumed and on September 8th the cable was landed at that point and the second successful line of communication between the United States and Europe thus completed, Newfoundland being already in submarine telegraphic communication with the mainland and telegraph systems of the United States. The length between Trinity bay, Newfoundland and Valencia, Ireland, is given by the American cyclopedia at 2143 miles. The rate of speed in transmission over these cables was at the beginning eight words per minute, but increased to fifteen words per minute.

The success of the 1866 cables so completely demonstrated the practicability of submarine telegraphy that its progress thenceforward was very rapid. A second Anglo-Mediterranean line was laid from Malta to Alexandria in 1868, proving a complete success; a cable between France and Nova Scotia was laid in 1869, and another from Suez to Bombay, India. In 1871 a cable line was laid along the eastern coast of Asia to connect with land lines already constructed across Siberia and Russia. These land lines had been built shortly after the failure of the first Atlantic cable experiment in the hope of connecting Europe and America by the way of Siberia, Bering straits, Alaska, British America and the United States, but that plan becoming unnecessary after the success of the 1866 cable experiments, the land line across Russia and Siberia was utilized to connect a cable system of the eastern shore of Asia with the land and cable systems of Europe and America. In 1873 South America was connected by cable with the United States and thence with Europe; in 1875 cables were laid along the coast of Africa, connecting its important points with Europe and America; in 1880 cables were laid across the Gulf of Mexico and along the western coast of South America and connected by an overland line across the Isthmus of Panama. The invasion of the Pacific has been already begun by the construction of lines extending from Australia 1200 miles southeastwardly to New Zealand and 800 miles northeastwardly to New Caledonia, but leaving the Pacific the one great body of water which has not yet been completely spanned by submarine telegraph wires. This it is believed is now practicable, since the distance between the four landing places now under the control of the United States, Hawaii, Wake Island, Guam and the Philippines, is in each case less than that through which submarine cables are now being daily operated between France and the United States.

The Cost of a Train Mile.

It is difficult to state just what constitutes a train mile. On some roads a great deal of extra or helping mileage is necessary, which makes double engine mileage; others figure differently. Many roads reckon train mileage according to the mileage of train crews; the "run" of a conductor one way is called a "train." This is probably the simplest way of stating train mileage.

The question of train mile cost is interesting and worth noting. The table which follows gives the cost per train mile of the various items of expense, governed by train mileage more or less directly. In dividing certain expenses between passenger and freight, arbitrary methods have necessarily been adopted, but there is not much difficulty in getting a basis of fair division. We give the cost per freight-train mile:

	Cost per train mile.
1. For enginemen, firemen, fuel and supplies	22.138c
2. For repairs of locomotives	8.064c
3. For repairs of cars	19.880c
4. For certain items of maintenance of way	4.135c
5. For train service and supplies	11.564c
6. For superintendence, loss, damage, miscellaneous, etc.	6.006c
Total	71.787c

The passenger-train mile shows the following cost for the same items:

	Cost per train mile.
1. For enginemen, firemen, fuel and supplies	11.250c
2. For repairs of locomotives	6.082c
3. For repairs of cars	7.990c
4. For certain items of maintenance of way	4.043c
5. For train service and supplies	5.672c
6. For superintendence, loss, damage, miscellaneous, etc.	5.888c
Total	40.925c

Correct Mining Blanks a Necessity.

To the Editor:—In a recent application for a quartz patent from this county the department has hung up the case and sent back all the papers because the original location certificate did not set forth on its face that the locator "was a citizen of the United States or had declared his intention to become such." The blank form should contain this statement, basing the argument on the necessity that a man who takes advantage of a privilege accorded him should make out a prima facie case of being qualified to receive such benefits. Many of the customary blanks sold are no good. They omit this statement, the locator never by any chance puts in any more information than the printed form calls for, and if this case is a precedent every patent application based on these forms will sooner or later be thrown out and sent back to have the missing facts supplied (if they can be), and at best delay will be caused. If the location was by a transient, who has been lost sight of and who never came upon the voting register, it will be impossible to correct the record, the location fails and all proceedings based upon it become void. Prospector.

Coulterville, Cal., April 3rd, '99.

Rossland, B. C., is the only place thus far heard from where the new eight-hour law will not be likely to cause strife. The mine managers have decided to accept the law in its spirit and intent and will reduce the hours of work to eight, but will attempt no reduction in pay. One reason for this probably lies in the fact that the scale of wages at Rossland has been somewhat below that of other districts in British Columbia.

Mining Summary.

ALASKA.

Minook creek is said to be disappointing, many claims proving almost valueless. The miners are leaving for other diggings.

B. C. Mining Journal: Gold Run, a creek in the Atlin lake region, is reported rich. Pan prospects have been obtained as high as $2.50. The gulch is fed by two glaciers and is about seven miles long. The usual rush which follows each new find is on.

ARIZONA.

A railroad is to be built from near Kingman to Chloride.

Supt. Grant has commenced work on the Mollie Gibson mine at Chloride. The main shaft will be sunk deeper. It is 90 feet and the ore extends nearly across the shaft.

Russell & Ziemer's gold mine in Todd Basin is producing ore in large quantities.

T. L. Ayers has let a contract to Burns & Joyce to sink the main shaft on the Eureka 100 feet deeper. The shaft is now down 236 feet.

The Elkhart shaft at Chloride will be sunk to 1000 feet.

Three shifts of men are working on D. Bean's mine at Sheep Trail, near the Colorado river.

At Tucson the Twin Buttes copper mines were reported sold on the 8th to a Boston and New York syndicate for $100,000, 10% of the purchase price being paid. The Butte mines are eight miles south of the Azurite copper bullion producing mines. It is intended to at once equip the mines for matte production.

A rich vein of copper ore is reported fourteen miles east of Ehrenberg. It had been dug over and run through dry washers for gold in the decomposed quartz and copper ore. Frequently placer workers would find chunks of copper ore, but made no exploration. L. F. Bradshaw started a shaft and found the copper continued down. It contains one ounce to the ton in gold, besides the copper.

There is a report of a strike in Hassayampa district of a ledge 1 foot wide which assays from $300 to $750 a ton and twenty-six ounces in silver. The mine is the Tip Top, owned by J. Shull and J. Phillips of Prescott.

Tombstone *Prospector*: J. Miller's new strike two miles east of Russellville resulted in the sale of a group of ten wolframite mines and shipping to a concentrator will commence at once. The ore will run 70% iron tungstate. Work heretofore has been confined to a few owners.

Kingman *Miner*: D. C. Lane, formerly of Banner, Cal., has bonded and is reopening the Dean mine in the Hualapai mountains, fifteen miles east of Kingman. The mine was formerly worked extensively.——There are several shafts in the White Hills district from 500 to 700 feet deep. The Daisy has a tunnel driven entirely through Sunset peak, and the vein worked to the surface.

Tombstone *Epitaph*: The Copper Queen Co. are sinking a new shaft about a half mile east of the middle shaft, called the Holbrook. It is understood that the company intend to go 700 feet in this new shaft.

CALIFORNIA.

Amador.

It is reported that the control of the Central Eureka mine, near Sutter Creek, has passed to E. & J. C. Coleman, formerly of the Idaho mine, Grass Valley.

Amador *Record*: The Ranlett copper mine, at Newton, is to resume operations.——The Tellurium quartz mine, at Pine Grove, has been sold to French capitalists, who will operate it.

Calaveras.

(Special Correspondence).—In and about Murphy prospecting and mining are active, owing to the recent rains. East of Murphy at Collierville the two 2-stamp mills are running on high-grade ore, taken from the old Collier mine, now called the Blood mine. The property is owned and worked by representatives of the Santa Cruz Powder Co. They own several other mines in the vicinity, including the Deer Lodge. Men are now at work on this mine taking out a milling test. If satisfactory, a large mill will be put on the mine.

There is some excitement over a recent rich strike on San Antonio ridge, three miles below Sheep Ranch, near the Campbell mine. Part of the rock is sacked as taken out.

Work has been resumed on the Big Horn mine on San Domingo.

Murphy, Cal., April 6th, '99.

A. Granda was killed at the Utica mine on the 3rd inst. in a strange manner. He was climbing a ladder with six sticks of powder on his shoulder, which were ready for use. In some manner one of the fuses took fire from the lighted lamp in his hat and the explosion followed, blowing him to pieces.

Calaveras *Chronicle*: A 4-stamp mill has been built at the old Collierville mines, five miles east of Murphy's. The mill is equipped with electricity, concentrators, canvas plant, etc. The mine is worked through tunnels, the ore being sent to mill by tramway.——S. H. Lucas is successfully operating the Gladiator mine, near the Blue Lakes electric plant, on Mokelumne river, above Big Bar bridge.

Calaveras *Citizen*: It is reported that the Poorman mine, near Glencoe, is to be reopened.——The McNear mill, near Murphy's, has started on a run of several hundred tons of rock from the Red Gold mine, being worked by Hurd, Bunny & Scantleberry.

Del Norte.

The *Record* hears that the Union copper mine near Low Divide will be reopened and worked by Eastern people, who have been investigating.

El Dorado.

Placerville *Nugget*: The American River mine, owned by Casey & Son, has made its first mill run, realizing $7 per ton. The mine is opened by a tunnel 140 feet long, at the face of which the vein is 10 feet wide.

Placerville *Democrat*: The report of the sale of the Gentle Annie, near Placerville, was premature. Negotiations are about completed, however. The prospective purchasers are an Eastern company. It is reported they will erect a 40-stamp mill.

El Dorado *Republican*: The new 5-stamp mill of the Cambrian M. Co., at Gold Hill, is running. The power is water.

Placer *Argus*: H. S. Chapman has completed a cyanide plant at the Taylor mine and will begin working sulphurets, of which there is a large quantity. No other work is at present being done at the mine.

Inyo.

Bishop *Register*: R. & E. Blake have a discovery near the summit, southeast of Big Pine, which makes a good showing.——G. Sanger is shipping ore from his mine below Waucoba. About 100 tons of silver-lead ore are now out.——A representative of the North American Development Co. has gone to inspect copper claims ninety miles from Big Pine, across the White mountains.——The outlook for the region in Mazourka canyon, opposite Independence, is good. It has already turned out considerable gold. —— Johnson Bros. & McGinnis have opened a prospect in the Inyos east of Independence. They have been working several weeks on a ledge of 10 feet, that shows assay of $20 and over.——Barnes & Anderson have a 4-foot ledge north of the Johnson location which shows free gold. A carload will be sent to Dayton as a test of the average of the ore.

Kern.

Californian: An antimony mine in Jawbone canyon, northeast of Mojave, has been sold in Bakersfield for $12,000 spot cash. A. Blanc of Oakland is the buyer, G. Aitkin and R. Irwin the sellers.

Randsburg *Miner*: The shaft in the gravel deposit near the St. Elmo mine, six miles south of Randsburg, reached bedrock at 32 feet. The bedrock rises north and south, indicating a depression or channel having an east and west direction. The roof of the workings is a cemented material which requires little timber to support it. The pay streak varies from 1 to 3 feet in thickness. The first car milled at Barstow induced further effort, and two cars were afterward crushed in the Red Dog mill at Johannesburg. Three cars will be sent to Barstow. Others are at work prospecting and it looks as though that section sloping east from the Stringer mines might be underlaid with pay gravel. The gold is coarse and bright. These mines are west of the side line of the St. Elmo mine.

Los Angeles *Mining Review*: Two prospectors, Pitzel and Jay, have located a rich vein east of the Stringer district and two miles from Randsburg. The vein has increased from 6 inches to 1 foot in sinking a 25-foot shaft. The ore is high grade.——The Spangler mine near Garden Station shipped a carload of ore to San Francisco. The ore from the mine runs from $80 to $100, but it neither amalgamates nor cyanides, therefore the smelting process had to be resorted to.

Lassen.

(Special Correspondence).—Hayden Hill is a mass of eruptive rock of felsitic character. Its altitude is about 6500 feet above sea level. It is the center of the only mining operations of consequence in the county. The greater part of the county is covered with lava flows which obscure the underlying rocks which may be mineral bearing. Timber and water are scarce and the winters usually severe and the snowfall heavy. The mines of the district are credited with a production exceeding $2,000,000. The mines are worked to a depth of about 300 feet, and the pay ore is usually rich. The hill appears to be a network of fissures in a number of which are mineral veins. The district requires capital for development.

Susanville, April 10th, '99.

Los Angeles.

Mica has been discovered near Acton by prospectors.

A new quartz mill has been set up in Tejunga canyon for prospecting veins of the vicinity.

Madera.

Merced *Star*: E. J. Olds is putting in pumping machinery at his copper mine near Buchanan.

Fresno *Republican*: The new hoisting works at the Gambetta at Grub Guch are completed and the owners will sink 1000 feet before taking out any ore except what is encountered in sinking.——The Lucky Bill mine on Potter Ridge has been bonded for $40,000 and fifteen men are at work sinking.

Marin.

The Golden Crown M. & M. Co. are shipping forty tons of sulphide copper ore from their mine in Union gulch, near Bolinas bay, to Selby Smelting Works. The ore contains gold, silver and copper. The ore occurs in the bluish gray sandstone common to the Coast Range and is near a mass of serpentine.

Nevada.

At Trenton, N. J., on the 10th, the North Star Mines Co. was organized with a capital stock of $5,000,000; "to control and operate the business and property of the Grass Valley Water Co. of California and to carry on a general mining business." The incorporators are J. D. Hague, A. G. Agnew, W. L. Bull and W. D. Pagan of New York and B. Strong of Montclair, N. J.

Grass Valley *Union*: It is rumored the London Exploration Co. has bonded a group of ten claims on the south side of Osborne hill near Grass Valley. The claims include the Ben Franklin and Lafayette. Contracts have been let for extending the tunnels on these claims. The same company is also negotiating for claims near the Allison Ranch mine on Wolf creek.

Nevada City *Herald*: A cave in the Reddick mine, near Nevada City, occurred on the 9th inst., imprisoning two miners at the bottom of the shaft. The water commenced to fill the shaft, the men climbing upwards to the cave. They were released in a few hours without injury.

Grass Valley *Union*: The Central mine, formerly the Greenhorn, at Grass Valley, is to be reopened and developed by a Los Angeles company, under the direction of Mr. Bailey. Arrangements are being made for building a new mill.——The Brunswick mine, near Grass Valley, in January cleaned up $12,093, in addition to a quantity of sulphurets. The mine was idle during February, owing to necessity of laying a new pipe line. The March cleanup has not been made public. Seventy men are on the payroll.

Placer.

Gen. Mgr. Buckminster, who has returned from the Santa Ysabel mine, tells the Boston News Bureau that No. 1 shaft will be made a three-compartment shaft and hoisting machinery erected, including a large air compressor. There will be twenty additional stamps, and the entire forty stamps should be at work July 15th. The enlargements and improvements contracted for may cost $35,000. There is about $40,000 in the treasury. The operating cost is figured to average $4 a ton. About eighty men are employed.

Herald: On the west side of Duncan canyon, south of Bald mountain, the Hutchinson mine has been in operation all winter. They now have water to wash the dirt and will ground-sluice the front. Three-fourths of a mile northeast the Pine Nut Co. will resume work in their bedrock tunnel and will complete it by fall. One mile northeast is the Blue Eyes mine, fitted up for hydraulicking. The bedrock having pinched off indicates a lower channel. No washing was done last year, owing to the dry winter. The company placed flumes and appliances in order last fall and made an addition to the canyon flume, and now will begin work. One and a half miles northeast from the Blue Eyes the Lucinda Con. Gravel M. Co. have fitted up to ground-sluice and prospect at several points this spring.

Colfax *Sentinel*: At Pioneer mine, near Damascus, the work of repairing the flume is in progress. Sinking in the No. 4 tunnel has reached the 1250-foot level. There are fifty-five men on the payroll.——The 5-stamp mill at the Mountain Maid mine, on the You Bet road, three miles from Colfax, is running steadily. It is now owned by Dr. C. Pusheck. ——J. N. Findley is hydraulicking at the Trafton mine at Georgia hill, near Yankee Jim's.

Leader: W. Nicholls, Jr., is running two monitors, using 2000 inches of water at his Polar Star mine at Dutch Flat.

Plumas.

Genessee valley has gold, copper and coal among its mineral resources. Coal was discovered a year ago. The Genessee quartz mine has been successful. Efforts are being made to construct a narrow-gauge railroad connecting the coal and the copper deposits.

The Plumas Development Co. has purchased mining ground on the ridge between La Porte and Gibsonville. The purchase comprises the Young America, St. Louis Con., Diamond Spring and Yankee Hill claims. Preparations for mining this season are well under way. Ten tons of pipe will soon be conveying water to Yankee Hill, where the first opening will be made.

National Bulletin: F. Scott is operating the Scott drift mine on North Fork, situated on the Big Flat channel.——Adjoining this property is the Cameron mine, which has developed into a paying proposition.——C. Bressler is driving a tunnel into the Malvern Hill mine.——Savercool Bros. continue operations at Dutch Hill.——At the Pliocene drift mine, recently purchased by Salt Lake capitalists, six men are employed.

Riverside.

Corona *Review*: A deposit of kaolin at the mouth of Paint Mine canyon has been discovered which is suitable for making the finer grades of pottery. It contains very little iron.

San Bernardino.

(Special Correspondence).—As iron ores seem to be much in demand, it may be well to call attention to the large deposits of iron ore in this county. They are in the West Lava Beds district, about twenty miles from Newberry station, in a southwesterly direction. The deposits are very large and are both hematite and magnetic. Some years since iron ore experts from Cleveland, Ohio, and Pittsburg, Pa., examined these ores and pronounced them high-grade and containing a very low percentage of sulphur and phosphorus. No determined or systematic effort has ever been made to make these deposits available. The distance to tidewater by present rail facilities is less than 200 miles.

Daggett, April 10th, '99.

Coal deposits are reported rediscovered about three miles from Granite Wells, twenty-five miles from Barstow. The ledge encircles a large-sized mountain and there is apparently a large amount of it. As yet it has only been uncovered about 20 feet into the side of the mountain. Such discoveries would aid the industries of the adjacent country; $14 per ton is the price of coal.

San Diego.

San Diego *Union*: R. Garvey is selling the Bay Horse mine, near Glamis, to a company of Pittsburg Standard Oil men. The sale is for $100,000, of which $10,000 was paid some months ago. It will be necessary to pipe water from the Colorado river, a distance of eighteen miles.

Escondido *Times*: A. Coventry has discovered a gold-bearing quartz vein near Fallbrook.

Santa Barbara.

Santa Barbara *Press*: Several beach oil locations have recently been made just without the city limits. A prospect well is to be driven.

Shasta.

Work has been ordered stopped on the Jackson group of copper claims in Backbone district, under bond to New York capitalists, headed by J. F. Coleman, locally represented by W. Forstner.

Redding *Free Press*: F. H. Dakin, Supt. of the Uncle Sam G. M. Co. at Kennet, reports that they have thirty men at work. Fifteen stamps have been running during March and 700 tons of ore crushed. Since March 15th they have been working new ground, the north and south ledges both being worked. The mine has its own chlorination plant. It was placed in working shape and is now being operated by W. B. Morrish.——Harrison gulch is a new camp in the southwestern part of the county. Operations are carried on by the Midas G. M. Co. in which J. H. Roberts is the principal stockholder. During the winter development work in the mines has gone on. Ten additional stamps have been placed in the mill doubling its capacity. Fifteen stamps will be kept running. Custom work will be done. The cyanide plant, destroyed by fire last year, has been rebuilt. Roasting of tailings before cyaniding will be practiced.

Mountain Miner: The report is current that the Mountain Copper Co. intends to build a refinery in connection with its smelter.

Sierra.

Dunlap & La Montanya, of San Francisco, propose to reopen the Alaska mine at Pike City. It is the intention to operate the machinery by electricity, obtaining the current from the Yuba Power Co.

Downieville *Messenger*: The hydraulic mines are in operation.——The Continental G. M. Co. has been organized with a capital stock of $30,000, to operate the Fessler mine near Alleghany.——The Kenton mine has closed down temporarily.——Four men are at work in the South Fork mine. Others will be added when timbers can be had.——The Plumbago mine is working as usual and doing repair work on the dam.

Siskiyou.

Yreka *Journal*: The mill at the Schroeder quartz mines on Deadwood mountain is running steadily.——A quartz ledge has been discovered on the Scott Valley road, between Yreka and the Forest House, which is 40 feet wide. It is on the Sells place. The ledge has been uncovered for 50 feet, and the locators will sink.——L. Knight is doing work on the Mary Ann mine on Salmon river, near Sawyer's Bar.——The Greenhorn blue gravel mine continues to pay $300 a day, besides doing dead work in crosscuts.——The Oregon G. M. & M. Co. has purchased the Ah Ock mines and ditches at Happy Camp.

Yreka *Journal*: The cleanup at the Greenhorn Blue Gravel mine Sunday amounted to $600, or double that of any previous cleanup. The average has been upwards of $300, but on Sundays all the riffles are taken up to get more gold. The mine is improving.——Jillson & Roberts are taking out ore from their mine near Hornbrook and the 12-stamp mill is running day and night. They have a 12-foot ledge.——Over 300,000 pounds of machinery will be hauled to Yreka for the Ah Ock mines near Happy Camp, Klamath river, and the old Grider, Torgenson and Fraser mines in the same section, purchased by the Oregon M. Co.——A number of copper ledges have been found near Happy Camp.——The ledge of the Golden Star mine at north fork of Humbug, tapped in the tunnel, is 5 feet wide 500 feet below the prospecting shaft on the surface. The company intends to give it a thorough test, when a mill will be erected, with concentrators.

Trinity.

The Strode Bros. are about to commence the season's operations on their mine near Trinity Center. M. Juhl will have charge of the mill.

Trinity *Journal*: The Katie Foley mine, at Carrville, is running high-grade ore in an arrastra. The owners will build a 5-stamp mill. ——A tunnel is being run on the Dewey mine which will reach the vein at a depth of 100 feet.——A cyanide plant is to be built at the Golden Jubilee mine near Carrville.

Tuolumne.

The new mill at the Bown mine near Robinson's Ferry is completed and will probably be started on the 17th inst.

Jamestown *Magnet*: The Confidence mill will start up ten stamps April 4.——A new hoist is to be built at the Arbona mine, Tuttletown.——At the Arrow mine, four miles east of Sonora, the showing is favorable. The owners will sink a shaft to cut the vein.——Machinery is being hauled to the Hazel Dell mine, seven miles north of Soulsbyville.——Miner & Burnham have struck good milling rock in their claim near Knight's creek.——Anderson, Curts & Day are taking out good rock from the old John Royal mine at Summit Pass, near Jamestown.——J. T. Newcomer is running the Dorsey mill on rock from a mine near American Camp.——The mill on the Hilton & McPherson mine, at Saw Mill Flat, is still running on custom ore from the Over and other mines.——The new pump on the Hennessy mine, at Saw Mill Flat, is rapidly unwatering the works. Sinking will be resumed.——McCormick, Bannister & Co. are shipping sulphureted ore from their Vine Springs mine to the Selby Smelting Works. Assays showed $1600 per ton of sulphurets. ——M. Page of Columbia, Supt. Gray Eagle mine at American camp, says a new shaft will shortly be commenced. The erection of a steam hoist is also contemplated.——The Old Tuolumne M. Co. has been several months reopening its 2000-foot tunnel, which was badly caved.——McKenzie & O'Hara have struck good rock in the Anaconda mine, a mile and a half north of Columbia.——D. Kelly & Bro. are prospecting in the vicinity of the old Von Tromp mine, which has been idle for some time.

Independent: The Longfellow mine at Big

Oak Flat was compelled to shut down on account of excess of water recently, but a Dow pump was put in which handles the water easily.——The Little Giant at Big Oak Flat is down 100 feet sunk with a windlass.——Rumors continue to circulate concerning the sale of the Rawhide mine on Rawhide ranch two miles northwest of Jamestown, and the App mine at Quartz mountain three miles south of the Rawhide to eastern capitalists for $1,500,000.——Wallace, Walter & Chenoweth have taken out a $600 pocket from their mine three miles northwest of Sonora.——A contract has been completed for the sinking of the Mack shaft at Big Oak Flat 100 feet and running a 150-foot drift. It is rumored that a 10-stamp mill will be put on this mine.——Supt. Page of the Grey Eagle mine near Sonora says that owing to lack of water the company have decided to substitute other power.——Mining men from Placer county visited the Siner mine, northeast of Columbia near the Ham and Birney, with a view of purchasing. A shoot of ore has been opened up. The vein is 4 inches to 3 feet in width and is said to mill $12 per ton.——Samuel Ralston uncovered in his pocket mine east of Sonora gold to the value of $5000.

Union-Democrat: At the Alameda, four miles west of Sonora, an east crosscut is being run at the 900 level, where it is reported a 13-foot body of ore has been found.——B. McDonnell has resigned the superintendency of the Big Betsy and will go to Mexico to take charge of a property H. McDonnell recently sold to a London syndicate.——The Boston & Tuolumne Co. has put in at its mine at Big Oak Flat a 6-inch jackhead pump, which drains the workings down to the 200 level. Sinking is in progress. W. R. Dorr is Supt.——The shaft of the Mack mine at Big Oak Flat is to be straightened and a contract let to sink 400 feet.——It is reported that O'Brien & Landers of Sonora have sold the Green and Mt. Moriah mines on the East Belt, near Sugar Pine, to Wells & Richardson, an Eastern company. The price was $31,500 cash. These mines were among the first bullion producers of Tuolumne county, but have long been idle.

COLORADO.

BOULDER COUNTY.

The Dolly Varden mine is reported sold to Eastern people for $125,000.

CHAFFEE COUNTY.

Denver *Post*: Covey & Kennedy report they have free gold on the Mollie Gibson in the Whitehorn district, sixteen miles west of Salida. At a depth of 13 feet the vein is 24 inches wide, estimated to run about $160 a ton. The district is little known and embraces 75,000 acres of land. Twenty properties are shipping pay ore.

CLEAR CREEK COUNTY.

Mining Gazette: The owners of the Big Six mine on Cnicago creek have 8 inches of ore that runs from twelve to sixteen ounces gold per ton, and 1 foot that runs well on the plates.——The B. B. tunnel has 12 feet of ore that nets $12 per ton. Several veins have been cut and drifting and stoping commenced.——The Century tunnel on Chicago creek has cut four veins, some of which show good values. A large vein has been found which lies with the tunnel.——Three sets of leasers on the Quito are taking out good ore.——Forester & Sons, on the extension of the Quito, on Chicago creek, have been shipping ore for three months to the Mattie mill.——Denver parties have taken J. Morris' property on Chicago creek and will work the Home Guard.

EL PASO COUNTY.

Victor *Record*: A pump with a capacity of 1000 gallons per minute has been put in below the 8th level of the Portland mine at Cripple Creek.——Recent development on the Hoosier shows that Lessee Anstie has two parallel veins, both carrying high values. The drift has been extended 30 feet on the west vein, 4 feet in width; assays on 33 inches went three ounces to the ton and the remaining 15 inches sixty-one ounces. The easterly vein is 7 feet wide and is good pay.——Misson and associates on the M. K. and T. of the Columbia-Victor Co., are getting out ore from a small streak in the 200 level. The ore runs ten ounces to the ton.

Denver *Mining Record*: The Damon at Cripple Creek has struck a new ore body. A chance shot into the west wall of the level at 75 feet has disclosed a new ore shoot, probably the apex of a new vein. It has been opened from 5 to 7 feet in width for 20 feet.——The Osborn lease on the Favorite shows free gold visible to the eye. An assay from the breast showed $300 to the ton.——Pinnacle lessees at Cripple Creek are getting ready to ship twenty-five tons of ore from the Lansing lease. Lessees are doing development.

Woodland Park *Times*: It is now reported that H. B. Kenyon will build a 100-stamp mill on the land of Dr. Bell, near the mouth of Missouri gulch, for the purpose of working ores of the Sandstone belt. Five claims have been bought for $10,000 cash by the people backing the enterprise.

HINSDALE COUNTY.

Denver *Record*: The new compressor and drill at the Contention mine are in operation, 7 feet will now be made daily until the Argus tunnel reaches the Contention vein. The Megunticook Co., operating the Contention, have a large body of ore and they will probably build a mill.

LAKE COUNTY.

The Small Hopes M. Co., lessees and operators of the combination of deep sulphide mines, worked through the three-compartment 1330-foot R. A. M. shaft, have reduced shipments, laying off a large force of men. They will commence sinking the shaft below the bodies of ore under the present deepest level. The second and third levels will be worked. A small hoist will also be used at the bottom level. These ore bodies are the deepest in Leadville.

Leadville *Miner*: The Bon Air shaft, which caved recently, has been caught up for about 100 feet and the work is progressing.——The Iron-Silver mine on Iron Hill is shipping 300 tons of iron sulphides daily. There are 115 men on the payroll.

Leadville *Reporter*: The Greenback shaft has reached a depth of 1060 feet and is in lime. The new hoist is in position. The gallows frame posts will be of Oregon fir, 12x14, 65 feet long. The shaft will be sunk to 1500 feet. At 1100 feet a station will be cut and a drift run to strike the ore bodies in the Mahala.

RIO GRANDE COUNTY.

San Juan *Prospector*: Good reports come from the Income mine at Embargo. A body of ore, which is understood to average from $75 to $100 per ton, has been found.

SAN JUAN COUNTY.

The Yukon Tunnel mill is spoken of as one of the possibilities. It will be placed on the Uncle Sam group, up Cement creek. This property is owned and operated by the Boston & Silverton M. & M. Co.

The Cliff Dweller tunnel is now in 300 feet, with 70 feet farther to drive to cut the ore shoot.

A 4-foot vein of fine gold quartz was tapped 275 feet in the crosscut on 1. X. L. property, owned by the American M. Co., above Gladstone.

SAN MIGUEL COUNTY.

San Miguel *Examiner*: Work is under way again on the Keystone placer. A number of placers along the San Miguel river will be worked this season.——The forces at the Silver Peak are being increased each week and it will be but a short time until the mill will start.——Work on the Enterprise dumps at Rico will soon begin, Mr. Hawley having an eastern company to assist in his enterprise. A concentrating plant will be built.——It is rumored that the Iron mine will be worked this season. During '98 the mine shipped 258 cars of iron ore to Durango. It is low grade, averaging about $5 per ton. The deposit is of unknown extent, but is easily handled and close to the shipping station. Work stopped when the snow came.

IDAHO.

The Florida Mountain M. Co. and the Trade Dollar M. & M. Co., on Florida mountain, Owyhee county, have been consolidated. This combination takes in all the important mines on Florida mountain except the Black Jack. The Florida Mountain Co. will receive $1,500,000. This company has expended $340,000 in mill and other improvements. The mines will be worked through a tunnel, the mouth of which is at Dewey. When the Blaine mine is reached—the objective point—the tunnel will be 13,700 feet.

Graham, Garrett & Co., of Spokane, Wash., have organized the Syndicate G. M. Co., which is developing a gold property in the Buffalo belt, forty miles northwest of Buffalo Hump. It is claimed they have uncovered a ledge of gold-bearing quartz from 8 to 10 feet wide, the values running high. Seventy-five men are said to be at work in that vicinity.

The construction of the 200-ton concentrator at the Hecla mine at Wallace is in progress. The mine has been developed so that a supply of ore is available. There are several claims in the group.

The Banner M. Co. has let a contract to continue its lower crosscut tunnel. It will be over 600 feet long when completed, being half way in now.

At Midas Bar, Snake river, a trial run of a dredge is being made under the direction of a company of Douglas, Wyo. The run is to be made on ground leased from E. S. McComas; the contract requires that the dredger is to work 2000 cubic yards of dirt per day for fifteen days, and save 85% of the values. In case of failure the builders of the dredge are to forfeit $3000.

Salt Lake *Tribune*: The 500-foot tunnel on the Blue Jacket mine in Seven Devils has cut the ledge at 310 feet from the surface and is 45 feet between defined walls. The ore is of good grade.

Cuprum *Standard*: The United Copper Mine Co. will soon begin the erection of a smelter at the Greenvale mine, having 100 tons capacity. It will be run also as a custom smelter. On one of the claims of the company half a mile from Cuprum a 6-foot vein of pyrites has been discovered. A diamond drill is to be used in prospecting in the vicinity.

Spokane *Chronicle*: The Wall Street group at Buffalo Hump has been bonded to D. B. Wilson and L. H. Eddy of Salt Lake City for $50,000. The first payment of 10% is to be made May 5th. The group consists of the Wall Street, Banker and Broker. A 6-foot ledge has been opened running the length of the claim. Assays from the surface have run $32.

Mullan *Mirror*: Work on the lower tunnel at the Bell mine at Mullan is progressing with two shifts of five men each, 1200 feet will be driven. A wagon road is to be built to the mine starting from the Gem mill.—— The drift at the "16 to 1" is in 3 feet of clean ore. An assay of ore shows 66% lead and forty-five ounces of silver.——Ground has been broken for the Hecla mill at Burke. The mill will be running June 1st.——At the Sonora, above Burke, 650 feet of tunnel has been driven to reach a ledge 200 feet farther in.——Five men are driving a tunnel at the Union, opposite the Granite mill on Canyon creek, on what is thought to be a continuation of the Gem.

Spokesman-Review: The Standard M. Co. of Wallace, Idaho, paid a $30,000 dividend April 1st, making a total of $1,745,000.——The Big Buffalo shaft at Buffalo is down 35 feet, but for the last few feet values have depreciated, and the size of the shaft will be reduced; the force of miners will be not more than twelve men. It is said the ore in the bottom of the shaft is more heavily mineralized than above, and carries enough gold to pay if the values now shown hold out. Definite information as to values could not be obtained.

Sheridan Paper: The Winslow claim, in the Buffalo Hump camp, is reported bonded to D. B. Huntley, representing the the De Lamar Mines, Ltd., of De Lamar. The consideration is $50,000, of which 10% has been paid.——W. H. Wright of Spokane has bonded the San Francisco group at Buffalo, comprising the San Francisco, Baby Louise and Monte Carlo claims, for $50,000, and $1000 has been paid.

MICHIGAN.

The American Steel & Wire Co. have purchased five lake steamers of the Zenith Transportation Co. of Cleveland for about $1,000,000 to be used in carrying ore from the Superior mines recently purchased by that company to Chicago and other ports where its mills are located. The company acquired a few vessels with some of the constituent companies in the reorganized concern, and will probably add a few more to its fleet. It will probably establish also a line of cars to handle ore between lake ports and some of its interior mills.

At the Franklin mine the cost of stamping was reduced from 54 cents per ton in '97 to 51.02 in '98, and the cost of handling rock per ton from $1.82 in '97 to $1.60 in '98.

MISSOURI.

The Missouri Zinc Fields Co., the Boston-Providence, and the Boston-Duenweg, made a Missouri output of 1,034,000 pounds of zinc and 20,000 pounds of lead for the week ending April 2nd. The total output of the district was 12,630,880 pounds of zinc and 908,370 pounds of lead, which sold for $258,286. The district is now producing at the rate of $15,000,000 per annum.

MONTANA.

The Anaconda C. M. Co. of Butte has let a contract for the construction of a five-mile tailings flume to carry tailings away from the Anaconda smelters.

The mines and smelters of the Boston & Montana Co. are all closed down and hundreds of men out of employment pending an adjustment of the legal difficulties of the concern. This state of affairs is the outcome of litigation between the Boston & Montana and the Montana Ore Purchasing Co. Suits for unlawful extraction of ore are pending, involving about $5,000,000. The properties of the two companies are worth, according to market quotations, nearly $70,000,000.

Denver *Mining Record*: The Sailor's Dream, in the porphyry belt fifteen miles north of Butte, ten years ago produced $60,000 from surface workings, but, with development, it has widened into a body of low-grade ore running from $10 to $14 per ton. The property has been purchased by a Butte syndicate, who have erected a mill which is saving $10 per ton on the plates. This is the only property in this unorganized district that has any development.

Whitehall *Zephyr*: The Anaconda Co.'s coal mines at Belt are closed and the miners have left camp. They struck for higher wages and the shut-down resulted. No employe is retained, except the watchman.

Helena *Independent*: Negotiations are pending for reopening the Whitlatch-Union mine, the property of the National M. & Exp. Co., at the head of Oro Fino gulch, four miles south of Helena. The deposit of free-milling ore in the original McIntyre and Union lodes was discovered in '64. In '66 J. Whitlatch became the owner of one of the claims, which extended 200 feet along the vein. Miners' wages were at first $6, then $5, and in '72 fell to $4 per day. Judge Turnley owned a 10-stamp mill on Grizzly gulch, in which Whitlatch treated the first 1000 tons of ore, paying $15, the cost of hauling being $5 per ton. To-day this ore could be treated in a 10-stamp mill on the ground for $1.50 a ton.

Helena *Independent*: An 84 H. P. gasoline engine has been taken to the East Pacific near Helena to operate an air compressor and machine drills.——A strike on the Fourth of July lode at the depth of 300 feet is reported. It lies north of the New Year mine in the Judith range. —— The Old Joe mine, near Pony, has been steadily worked the past winter by Drackert & Ervin, who have a lease and bond on it, and are driving the lower tunnel where they have a body of ore that will run from $10 to $30 per ton.——The shaft on the McClellan mine, Dry gulch, is down 160 feet; the ore is not so hard and another crosscut will be run at 200. At the 100-foot level is an ore body 90 feet wide which can be worked by concentration at profit. H. Bush, Mgr. of the mine is now in Helena with a view of the construction of a concentrator. —— The new 10-stamp mill on Big Indian gulch east of Dry gulch is operating successfully as is also the Winscott mill.——Progress is being made on French bar twelve miles northeast of Helena, on the dredging plant and in the erection of the 10-stamp mill.—— Another dredging plant is east of East Helena. The machinery has been moved to the ground and the manager expects to start by May 1st. ——The cutting of a station on the 400-level in the main shaft of the Eva May mine has been completed and the sinking of the shaft to the 500 level will be commenced. The mine is at the head of Cataract creek, south of Rimini, and is equipped with a hoisting plant and a 200-ton concentrator.

NEVADA.

On the Comstock, Mgr. Ross of the Comstock Pumping Association keeps the elevator at work in the C. & C. shaft. Last week he reported as follows: "The Pumping Association has been engaged in cleaning out and repairing the C. & C. shaft below the 1750-foot level. The shaft is in fair condition. The pump compartment is nearly full of air pipes, columns, straps, pump rods and bobs, that are difficult to take out. This compartment must be cleaned out, as the space is required for the second elevator that will be placed in this compartment before the water can be lowered by the first arranged elevator. The plan is to place the second elevator in the pump compartment at as great a depth as possible: then to start it and hold the water at a point that will allow us to break the joints in the elevator that is now at work and raise it to the surface of the water, when such changes as are required can be made in the throat and nozzle, then to lower it into the water again and submerge it as deep as possible.

"When the water has been lowered the pump compartment will be cleaned out to as great a depth as possible and the elevator in this compartment will be again lowered to the point where the required changes can be made in the first elevator. In this way of working the 500 feet of flooded levels will be drained. Judging from our experience in draining the shaft for 150 feet below the Sutro drain boxes, it has been found that if an elevator was designed for the full lift of 500 feet, and it could be submerged below that point, it would drain the C. and C. shaft for that distance in from three to four weeks; but it would not be safe to attempt such work. The water is being drained from the lower levels slowly, while being rapidly lowered in the C. and C. shaft, as our measurements taken at the Con. Cal. & Va. winze, the Hale & Norcross incline and the Chollar combination shaft indicate.

"It is quite possible that nearly all of the drainage from the various mines finds its way through the vein and not through the drifts, as our experience with Comstock drifts and levels indicates very clearly that there are but few places where these openings will not cave tight enough to form fairly strong dams.

"Since April 1 the water has gone down in the Chollar combination shaft 5 feet 1 inch, in the Hale & Norcross incline 12 feet 6 inches, and in the 1750 winze 16 feet 9 inches, while being lowered 120 feet in the C. & C. shaft. No measurements were possible in the Obiston shaft until April 6, when we found the water to be 52 feet 11 inches below the station of the drift connecting with the Sutro tunnel. The water in the C. & C. shaft is being kept down to about its lowest mark, 132 feet below the 1750 level, by running the elevator sixteen hours during each twenty-four. We expect to continue working in this way until the second elevator is in place. The Pumping Association has been engaged as usual in doing work for the several mining companies, as appears in their weekly reports."

On the 12th he wired: "Elevator working steadily. Water in 1750-foot level winze 19 feet 7 inches below the station."

On the 13th Mgr. Ross sent the following: "Elevator working steadily. Water in the 1750 winze is 20 feet below the station."

There is no truth in the rumor that the big mill at DeLamar is to be closed down.

High-grade copper ore containing silver has been developed in Glencoe district, White Pine county, near the Utah line.

J. Purstcher is reported to have sold his interest in the Magnolia mine at DeLamar, Lincoln county, for $11,000.

Haggin & Tevis are said to be negotiating for Pioche mining property. The Raymond & Ely is one of them, for which the same firm offered $2,000,000 about twenty-five years ago.

The Searchlight district is just across the California line, near Manvel, and has a population of 100. The erection of a 20-stamp mill is talked of for F. W. Dunn, on the Colorado river, ten miles away. Turquoise is shipped from the Simmons mine to New York.

G. J. Smith has sold for $10,000 the Eria mine at Tuscarora to Woodruff & Redman at Salt Lake City, who also took an option on the ore on the dump at the mine for two years at $5000. Mr. Smith took out $180,000 and left a body of ore in sight below the water line. The new owners will put in a pumping plant and a 10-stamp mill.

Virginia *Chronicle*: Supt. W. E. Sharon, being asked as to the probability of work being resumed in the Gold Hill mines under his management, replied that the successful drainage of the Con. California & Virginia levels will be followed by the installation of a similar plant to drain the Gold Hill group.

Carson *Appeal*: J. Watson has struck a ledge of rich gold ore at Morrison Hill, back of South Camp. A number of parties have left Gardnerville for the scene and it is expected that a rush will follow.

Silver State: Repairs to the Obiston shaft have begun. Men are framing timber sets to replace those caved from the surface and the construction of hoisting works will begin at once.——A few men are at work on surface repairs at the Yellow Jacket old shaft in Gold Hill. Preparations for draining Gold Hill mines will soon begin.——The March pay-rolls of the Kinkead M. & M. Co. reached $3000 and those for April will exceed that amount. Twenty men are employed in taking ore from the Gould & Curry fillings.

Virginia *Enterprise*: It is reported that a rich strike has been made in the Enterprise (old Keyes) location in Seven-mile canyon.

Salt Lake *Tribune*: The New Pass M. Co., whose office is in Salt Lake, Utah, contemplates building a mill with fifteen stamps. For some time the management has been putting the ores through a small mill. A sampling of the mine shows an average of $25 per ton in gold.

NEW MEXICO.

Silver City *Enterprise*: The Texas mine at Central is showing up a body of ore on the 500 level. The mill is running. The new wells sunk to supply the mill developed abundance of water.——The Grand Central mine, owned by the same company, is being developed by a drift at the 300 level with satisfactory results.——Stevenson & Cochrane have taken leases and bonds upon several mines and are building a 5-stamp mill, with concentrators. They will soon add a crusher and a set of high-speed rolls.

OREGON.

C. H. Thompson of Spokane, and A. MacQueen of Butte, Montana, have bonded the Bunker Hill group, near Baker City, for $20,000.

Sumpter *News*: Godfrey & Taber of the Red Boy came down from the mine recently with their regular monthly clean-up of about

$20,000.——F. S. Lack of Baker City is Supt. Magnolia mine, near Granite. The force of ten men will be increased.

Baker City *Epigram*: McComas & Dumphy of La Grande have purchased the Keystone and Belle mining claims, adjoining the Bonanza, from H. P. Watson. The 200-foot tunnel is to be extended and other developments made.

SOUTH DAKOTA.

Black Hills *Mining Review*: In the Detroit & Deadwood tunnel, on City creek, steel rails are being laid as fast as the excavation is made.——The Dacy shaft at Ragged Top is down 500 feet in limestone.——The shaft at the head of Spruce gulch, near Deadwood, being put down by the employes of the Golden Reward Co., is 300 feet deep.——Quartzite has been struck in the Faust & May shaft at Garden City. The mine had been in a formation which was called the lower quartzite. J. B. Le Beau of Central City sunk a shaft through this hard rock and found a true quartzite lower down.——The new concentrating plant at the Bismarck mine, Keystone belt, will start up the 10th inst. All machinery has arrived. The process is new to the Black Hills, and it is being watched with interest.——Shipments have been resumed from the Esmeralda, in Blacktail gulch, owned by E. Faust. Several weeks ago a shoot of ore was found, but a cave occurred just as shipments commenced. The ore body is uncovered for 40 feet and has a height of 9 feet, carrying an average of $45 gold per ton.

Deadwood *Independent*: Corkhill & Fish have started a shaft at Gayville, in Deadwood gulch, to work a remnant of placer ground left by the early miners of '76-'77.

UTAH.

The stockholders of the Phœnix M. Co. have ratified the deal by which Kooser, McIntosh, Klenke and Shepardson become the purchasers of that Bingham property for $125,000.

At Salt Lake, on April 4th, the United States M. Co., with a capital stock of $10,000,000, was incorporated. The directors are E. K. Milliken, H. P. Sweetser, A. F. Belcher and L. L. Hight of Portland, Me. The company has acquired the property of the Jordan & Galena, Old Telegraph and Niagara of Bingham.

The Daly-West mill at Park City is again in operation and the mine force has been increased.

Almost every mountain range and hill in Utah contains a mine. There is not a county that does not have mines of good promise and some are already great.

A discovery of rich copper ore in a new district in southern Utah is announced, but the discoverers refuse as yet to make public the locality.

Tintic *Miner*: From the Ajax at Tintic a 200-ton shipment is being made, one-half of which is copper ore which samples 40%, 15% lead, fifteen ounces silver and from $8 to $4 in gold to the ton. The other half is "dry ore," estimated at $50 per ton in gold and silver.

Salt Lake *Tribune*: Fifteen men are now employed prospecting for new ore bodies in the Eureka Hill mine at Eureka.——Reports are in circulation that the Bullion-Beck concentrator is to be started again. Repairing is now being done at the plant.——The new management of the Old Telegraph, Niagara, etc., will begin operations at once by installing two large air-compressing plants and will develop the mines. It may take a year to do the development work contemplated and it is probable no ore will be shipped during that period. No leases will be given. Should development warrant it a smelting plant will be put in either at the mines or on the Jordan river or at both places to handle copper ores, lead ores or both.——At the Bingham C. & G. M. Co.'s property, Mgr. Heffron has put in a pump with which the unwatering of the main incline has been accomplished and the blocking out of ore is far advanced.——O. P. Landon has been developing a group of claims in Buckskin mountains with good results. Among the assay certificates is one that shows $2800 per ton in gold. He reports the discovery of a vein of elaterite in Garfield county in which a good showing has already been developed and will begin shipment as soon as a market is to be had for it in the East.

Mercur *Mercury*: All the vacant ground between the South Snowstorm and the Sindar group at Mercur has been located during the past week.

Salt Lake *Tribune*: The Camp Floyd mills are grinding over 1600 tons of ore daily, and when enlargements promised are completed the output will increase to over 2000 tons daily.——It is rumored the Ontario and Marsac mills at Park City will be running full capacity by May 15.——The Silver King mill is expected to start up within a week.——Mgr. Daly of the Daly-West is at Park City perfecting arrangements to increase the output.——The mines at Copper mountain, Box Elder county, are reported sold to Lewisohn Bros. It is the intention of the purchasers to perfect the plant and to operate on an extensive scale. The mines and smelter will give employment to 200 men.

Tintic *Miner*: At the Mammoth mine at Mammoth Hollow, the main shaft is down 1800 feet. The 60-stamp mill is kept running night and day by Supt. O'Rourke, who has been making tests of a new vanner, with which the mill may be equipped. In the mine are several bodies of ore difficult to treat and the board is discussing a cyanide plant. This ore under the cyanide tests yields about 15 ounces silver and .34 ounces gold to the ton.

Salt Lake *Tribune*: The Mercur Co. at Mercur will refine the auro-cyanides at the works hereafter and the Golden Gate Co. is preparing to do likewise.——In the recent strike in the May Day on Godiva hill the crosscut reveals a deposit of the same general character as the Uncle Sam and Godiva adjoining, a large part of which is lead ore carrying silver. There is also black quartz, which, besides silver, assays $14 in gold. The May Day strike has awakened interest in the Yankee Consolidated tunnel, which adjoins it on the south and east, and it is reported that the face of the tunnel has the same appearance as the May Day when the latter was nearing the ore.——Two loads of elaterite have arrived at Price from the Raven Co.'s mine in Indian canyon, and there are thirty tons more on the road.

Eureka *Republican*: The old Cave mine, comprising thirteen claims, is again operating, with S. T. Godbe as Mgr. They have a 1900-foot tunnel and are working virgin ground.——At the Horn Silver, Frisco, copper ore is being mined on the 1600 level. Originally the Horn Silver was a lead-silver mine.

Salt Lake *Tribune*: The Bullion-Beck at Eureka at a depth of 1300 feet has tapped a stream of water that will meet the requirements of its hoisting plant, if not to supply the concentrator. The strike is looked upon as of as much importance as a stream of silver and lead. The flow is about 800 gallons a day. A force of men are repairing the mill which will be started up on Saturday.

WASHINGTON.

The Golden Chariot and Golden Chest, at Republic, are being developed extensively. The veins are large.

A tunnel has been driven 200 feet on the Saly Ann, on Toroda creek.

It is reported that a strike has been made in the Charleton, near Horse Springs.

J. C. Clarke has taken a force of men to Pierre lake to resume work on the Helen E. and Mother Lode claims.

The Alice-Eureka has a body of ore in the face of the drift in which free gold is visible.

A. & E. Uhler, who located the Copper Queen and King, in Nespilum camp, sent 100 pounds of the ore to the Everett smelter, which returned $41 gold and 5% copper. This camp is thirty miles north from Wild Goose Bill's ferry.

Large low-grade veins are being developed on Iron mountain, six miles southeast of Republic. On the Big Three claim the vein has been stripped in a series of pits for 800 feet; it is 20 feet wide.

Republic *Pioneer*: A blind lead has been cut in the Alice-Eureka at Republic in the tunnel that did not show on the surface. It is 5 feet wide and assays $12. The tunnel is running for the main vein and has 35 feet to go.——G. Miller has been appointed Supt. of the Ben Hur at Republic. Preparation for sinking the double-compartment shaft is in progress.——Gold is reported discovered east of San Poil lake—a new locality. The discoverers thus far refuse to name the exact locality.

WYOMING.

Grand Encampment *Herald*: It is reported that sylvanite has been discovered eight miles east of Grand Encampment, associated with phonolite.

FOREIGN.

AUSTRALIA.

Mining Standard: The newly erected battery on the Sebastopol Plateau No. 1 Co.'s claim, Victoria, consists of thirty stamps of 1000 pounds each, falling ninety times per minute, with 6-inch drop, capable of treating 400 tons of quartz per week. The stamps are fitted with disengaging clutch gear, and the ore treated comprises crushing, amalgamation, concentration and chlorination. There is provision for water supply in a dam with a capacity of 600,000 gallons and the water is raised by a plunger pump driven by the main engine. The motive power for the battery is supplied by a 22-inch by 48-inch horizontal engine.——No material change in mines at Kalgoorlie is reported up to Jan. 1st.

Mining Standard: The Broken Hill mines in New South Wales produce over 1,000,000 tons ore annually which contains a large percentage of zinc. In these the value of the zinc is from $30 to $35 per ton, and the value of the lead only $15, yet it pays better to extract the lead than the zinc. The zinc contents of these ores at present are worth more than all the other metals they contain yet it cannot be separated at a profit. There are millions of tons of ore in the dumps and tailings piles of the Broken Hill mines.——Copper finds are reported from northern Queensland.——According to official returns New Caledonia last year exported 75,000 tons of nickel ore, 2373 tons of cobalt ore, and 7711 tons of chrome ore.——Owing to increased value of lead and tin, abandoned mines in New South Wales are receiving attention. A discovery of tin has been made at Mundi Mundi station, and valuable specimens have been brought in.——It is reported that the third prospecting shaft sunk by the N. S. W. Government in the Araluen valley is down 48 feet with 8 feet of washdirt. There is a large area of unworked ground, but it is very wet.——The English-owned Beacon mine, in the Coramba district (N. S. W.), is employing fifty hands in development.

BRITISH COLUMBIA.

(Special Correspondence).—When I came to Rossland I found three big shipping mines and several smaller ditto and the usual "shriekers" on the outside, a good, substantial camp, good houses and good people, bent upon building up the country and putting in their money to back it. I liked this and stopped there for several months. Some months later I came over here to look after some mines, and here I am still. There is much interest being manifested in this whole section, and the eastern Canadian cities have money to buy with and are buying, particularly in this locality. There are others just as good, but this has the present call. This camp is characterized by enormous "zones," I call them, of copper and gold bearing material, hundreds of feet in width. In these widths you cannot pick up a piece of rock not more or less impregnated with metallic sulphides. These sulphides consist of chalcopyrite, pyrrhotite and marcasite; the gold values seemingly follow this last. The enclosing rock is an altered basic eruptive. There are occasional masses of solid chalcopyrite occurring in these great zones of mineral, also masses of the iron sulphides carrying good gold values. Developments have not been extensive, but work is going on now on a number of these as rapidly as money can push it. I need not say that it takes big concerns to operate such properties, which will require concentrators, smelters and railways. Of course, the small chippy operator is here also in force bonding Gatos Bronco and examining snow croppings. The prospectors think him a fool, but the poor devils who buy upon his representation will have other and compound names for him. What a pity for legitimate mining that these fellows cannot be thrown into a pit to feed upon each other! Here are these honest Canadians who have by industry accumulated wealth; they earnestly desire to build up their western empire. They are willing to pay, and are they not entitled to fair treatment for their pluck and intent! There never yet was an honest desire to build up the cleanest of all industries in any section that rogues did not get in and cover it with infamy. To hark back to ancient history: Tubal Cain was probably an honest assayer, Solomon possibly may have had good mining judgment, but I will bet that Judas Iscariot was a mining promoter—I mean a promoter of wildcats, of course.

Besides these big base zones of which I have spoken, there is a granite range a little to the north where there are some free gold ledges. In fact, there are all things in this section—in the Slocan fine small veins of very high-grade, silver-bearing galena; in the Fort Steele country the same. There are dozens of little camps all over the country. Wherever there is one you can rely upon it that there is something—maybe not much, but something. These little camps all mean business for Canada and for the Canadian Pacific, and the Canadian Pacific does all it can to help them, mark you that! Did you ever hear of a big railway building a smelter to help a lot of poor miners to a market for their ore? Well, the C. P. R. R. did at Trail, and has not robbed them on treatment either.

Greenwood, B. C., March 31st, '99.

The sale of the Enterprise, a Slocan silver-lead property, is reported to the London & British Columbia Gold Fields, Ltd., of London for $750,000. It was owned by Finch & Campbell of Portland, Or., and D. M. Hyman of Colorado.

The Payne mine, consisting of five claims, has an area of forty acres and a length on the line of the vein of about 2500 feet. It was the first claim located in the Slocan. The average altitude of the property is about 6500 feet. It is connected with two railways—the Kaslo & Slocan and Nakusp & Slocan (C. P. R.)—by means of a self-acting tramway, which is said to be the longest in the world of its kind—6000 feet—with an elevation of 2500 feet. The ore chute on the Payne is 1240 feet in length, and is, so far, the longest discovered in British Columbia. The property has been mined to a depth of about 300 feet, and is now being developed by two other tunnels. The shipments in '98 averaged 105 ounces silver and 53% lead; gross value, $97.79 per ton, or, after deducting freight, treatment and duty, $62.39. The rate paid last year for freight and shipment was $21 per ton; this has recently been reduced to $19. The cost of exploratory development work during the first two months of '99 amounted to $3.18 per ton of ore milled. The capital of the new company, the Payne Con. M. Co., Ltd., will be $3,000,000, in $1 shares.

The Hall Mines smelter at Nelson is expected to begin this week the treatment of silver-lead ores. It is not the intention of the company to attempt the treatment of silver-lead ores by themselves. Silver King ores carrying a small percentage of copper will be treated with the galena ores.

The Gem and the Story claims, north of the Sullivan group, have been sold to a Spokane syndicate, composed of W. W. D. Turner, W. M. Ridpath, W. J. Harris, C. Thies, W. J. C. Wakefield and G. Foster. Work is to commence as soon as snow disappears. This is the fourteenth property sold or bonded in Fort Steele district within thirty days.

A deputation from Nelson has waited on Minister of Mines Hume, asking a revocation of the eight-hour amendment to the mining act passed last session. They represented that it caused a closing of many of the principal mines and upset a $300,000 deal. The deputation believe the Government will grant their request.

The total shipments of ore from Rossland to the several smelters from Jan. 1st to April 8th was 22,036 tons.

Trout Lake *Topic*: The Nettie L. mine on Trout Lake has commenced shipping ore. The Beatrice is also sacking ore for shipment.

Ymir *Miner*: The Dundee Co. has sent forty-two tons of concentrates to the Northport smelter.——Work on the Spotted Horse, on Round mountain, is to be started up at once.——A four-drill compressor has been ordered for the Yellowstone and preparations made for an increase in the force.

LOWER CALIFORNIA.

San Diego *Union*: A stamp mill and dynamo have been shipped to H. M. Russell at Alamo for his mine in that district.

MEXICO.

(Special Correspondence).—D. H. Snyder is working the Santiago mine and has 600 feet of work done in the way of shafts, tunnels and levels. His ore assays from $5 to $300 per ton.

R. L. Penn is working the Colorado mine which assays from $30 to $480 per ton. These two mines are ninety miles from Agiabampo and fifty miles north from Feurte.

Mitchell & Swenigston are working a mine between the two above mentioned.

W. Head of Cripple Creek, Colo., is working a promising copper mine 15 leagues southwest.

Bradley & Shauklin of Kansas City, Mo., are working a placer claim with good results. They have two 30 H. P. boilers and an 8-inch centrifugal pump. M. Erbe is putting in a stamp mill near here, the first in the country. There are several other parties getting started.

Santiago Mine, Sinaloa, March 29th, '99.

A Durango dispatch says that the Sierra de Mercedo mountain of iron adjoining that city has been purchased by C. P. Huntington for $800,000 in gold. The Sierra de Marcedo is a mass of magnetic iron ore 2500x5500 feet and 2000 feet high. Mr. Huntington is locally credited with intention to establish steel works there. The Mexican International Railway, owned by Huntington and associates, is built to the foot of the mountain.

The Avino mine, in Avino Camp, Durango, has been worked for 300 years by the Mexicans. It was bought for $300,000 and has lately been financed for $4,000,000 by Boston, New York and London men. The syndicate which purchased it is known as the Avino Syndicate, Ltd. In making a crosscut to connect two different workings, a vein of sulphide copper was cut through, averaging 10 feet in width. In this ore, which is now being taken out, there runs about twenty-five ounces silver and from $2 to $3 in gold per ton. The products of the mine include lead, copper, gold, silver and iron, for all of which the owners are getting pay at the smelter, the iron bringing 25 cents per unit; a 300-ton smelter is now being put in.

The miners exploring the coal beds at La Barranca in Sonora, under the direction of Prof. Dumble, it is reported, have found at one place a bed of natural coke 7 feet thick.

Modern Mexico: Smelter No. 3 at Monterey has the tallest smokestack in the Republic, 183 feet from the ground.——G. Watson, of Chihuahua, is erecting a smelter at Inde, Durango, for the reduction of lead and silver ores.——Over 500 tons of ore are exported daily through the custom house at Juarez, and a large amount treated there.——During February the Sierra Mojada mines produced $416,770.70 in silver, copper and lead, from 15,605 tons of ore.——An experimental plant is being erected at La Colorada, Sonora, for treating tailings and ores by the cyanide process of Charles Butters & Co.——The Penoles Co. of Durango paid dividends amounting to $1,050,000 last year; the Santa Maria de la Paz, Matehuala, $960,000; and the Esperanza y Anexas, $420,000.——Fifty men are now employed on the Dos Cabezas, sixty miles from Casas Grandes, and this number will be increased to 150. The company has $200,000 worth of low-grade ore mined, ready for shipment. E. S. Stephens represents the owners.——Lewis Bros., of New York, are opening antimony mines twenty miles northwest of Santa Ana, Sonora. They have already extracted about 100 tons of ore, which will go to New York. A. Hoover represents the owners.——J. Fraser has purchased two rich mines situated eight miles west of Sombrerete, for $15,000.

NEW ZEALAND.

Cromwell *Argus*: The Hartley and Riley beach deposit near Cromwell is being successfully dredged by a belt and bucket dredge. Considerable fine gold is coming up, though bedrock has not been reached.

Mines Record: The Excelsior mine on Old Man Range is working steadily, and is equipped with a 3-stamp mill run by a Pelton wheel. Owing to the high altitude (some 3000 feet above sea level) this mine can only be worked eight or nine months in the year.

The iron sands of New Zealand are mixed with clay and formed into bricks, in which condition they are smelted after drying. The mixture consists of 160 parts iron sand, 25 parts blue clay and 25 parts yellow clay.

PHILIPPINE ISLANDS.

Gold is found in a number of localities in the archipelago, from northern Luzon to central Mindanao. In most cases the gold is detrital, and found either in existing water courses or in stream deposits now deserted by the current. These last are called "alluviones" by the Spaniards. It is said that in Mindanao some of the gravels are in an elevated position and adapted to hydraulic mining. There are no data at hand which intimate decisively the value of any of the placers. They are washed by natives largely with cocoanut shells for pans, though the batea is also in use.

In the province of Abra, at the northern end of Luzon, there are placers, and the gravel of the river Abra is auriferous. In Lapanto there are gold quartz veins as well as gravels. Gold is obtained in this province close to the copper mines. In Benguet the gravels of the river Agno carry gold. There is also gold in the province of Bontoc and in Neuva Ejica. The most important of the auriferous provinces is Camarines Norte. Here the townships of Mambulao, Paracale and Labo are especially well known as gold-producing localities. Mr. Drasche, a well-known German geologist, says that there were 700 natives at work on the rich quartz veins of this place at the time of his visit about twenty-five years since. At Paracale there are parallel quartz veins in granite, one of which is 20 feet in width and contains a shoot in which the ore is said to assay thirty-five ounces of gold per ton. One may suspect that this assay hardly represented an average sample. Besides the localities mentioned, many others of this province have been worked by the natives. The islands of Mindoro, Catanduanes, Sinuyan, Panay, Zebu and Bohol are reported to contain gold, but no exact data are available. At the south end of the small island of Panaon, which is just to the south of Leyte, there are gold quartz veins, one of which has been worked to some extent. It is 6 feet in thickness and has yielded from $6 to $7 per ton. In the island of Mindanao there are two known gold-bearing districts, the province of Surigao, where Placer and other townships show gravels and veins, and the province of Miasmis. Near the settlement of Imponan and on the gulf of Maca-

jalar there are said to be many square kilometers of gravel carrying large quantities of gold, with which is associated platinum. The product of this district was estimated some years since at 150 ounces per month, all extracted by natives with bateas or cocoanut shell dishes.

SOUTH AFRICA.

The February production of the mines of the Rand district was 404,335 ounces, 410,145 ounces in January, 297,975 in February, '98, 211,00 in February, '97. For the first two months of this year the production was 814,480 ounces, against 611,801 in the like period of '98, 420,882 in '97 and 315,196 in '96.

South African *Mining Journal*: The City and Suburban has an extraction of 85.08%, or 12.26 dwts. per ton milled. During the past year 12,964 feet of development has been done and it is estimated 484,000 tons of ore are in sight.——Some changes are to be made at the New Primrose. The headgear is to be heightened 10 feet, room is to be made for a new sorting belt 50 feet long and new ore bins 200 tons capacity erected. When these changes have been made the output will be increased to 200 tons daily.——At the Geldenhuis Deep the engine at No. 2 shaft is being dismantled and a Whiting hoist being substituted.——The directors of the Geldenhuis Estate & G. M. Co. issued their report which covers a period of nine months, as it has been decided to close the financial year on December 31st. The profit and loss account shows that for nine months the company has been making an average profit of £25,018 19s 1d per month, or a total profit of £225,170 12s 1d. After the payment of 97½% in dividends, equal to £195,000, a balance of £125,270 16s 1d remains. Working costs stand at 18s 0.675d per ton, as against 19s 2.654d in the previous year. The yield works out at 46s 3.074d per ton, and the profit per ton is 28s 2.399d.

Mining Journal: The west shaft of the Knight Central, near Johannesburg, has reached the second of the low-grade reefs overlying the main reef at a depth of 1958 feet.——At the Glencairn, on the Rand, 300 native workers have been added to the force. A forty-drill compressor has been put in, and at the cyanide works electricity has given way to a rope drive from the mill countershaft.——The Nigel Deep, Witwatersrand, is a new producing property started in February.

Gold Fields News: Tenders have been given out for the erection of a new 80-stamp mill (1250-pound stamps) at the Sheba mine, for which the material is already being shipped.

THE KLONDIKE.

Following is a table of distances from Dawson City to the following points:

	Miles.
Fort Alliance	4½
Forty Mile	50
Fort Cudahy	50
Boundary Line	80
Eagle City	105
Seventy Mile	125
Circle City	320
Minook	650
St. Michaels	1,325

Personal.

H. A. LEE has been reappointed Colorado State Inspector of Mines.

J. W. NEILL has returned to Salt Lake City, Utah, from the East.

I. S. EDWARDS, late Supt. Chloride Point, Utah, M. Co., has resigned.

E. J. OLIVER is assayer at the Santiago mine, Fuerte, Sinaloa, Mexico.

W. F. C. HASSON, electrical engineer, is going from San Francisco to Honolulu.

JAS. HUTCHINSON is the Mgr. of the Con. Florida Mt. and Trade Dollar M. Co.'s, Idaho.

D. E. BIGELOW of the Union Iron Works of San Francisco has returned from Randsburg, Cal.

H. G. MURRY of Angels, Cal., has been appointed Supt. of the Lightner mine in that town.

LEWIS B. SKINNER, representing the Western Chemical Co., Denver, Colo., is visiting California.

FRED R. MELLIS of Baker City, Or., has been appointed Oregon's commissioner to the Paris Exposition.

F. F. OSBISTON, an old Comstock miner, has gone to New South Wales and is located at Campbelltown.

VICTOR M. CLEMENT AND R. T. GEMMELL have been making an examination of mines in southern California.

B B. THAYER is now permanently located at Pinos Altos, New Mexico, in the interest of the Hearst estate.

F. J. V. SKIFF is director of U. S. mining exhibits at the Paris Exposition, with present headquarters at Chicago.

J. P. HORGAN is the new Supt. Penna. M. & M. Co., Prescott, Arizona. E. E. Wann of Cripple Creek, Colo., is the Gen. Mgr.

H. MEADE, who for some time has been Supt. of the Little Butte mine at Randsburg, Cal., has taken charge of the Barstow, Cal., mill.

JNO. F. STEVENS has been appointed chief engineer Great Northern Ry., with headquarters at St. Paul, Minn., at an annual salary of $25,000.

LIEUT.-GOV. NEFF, Pres. California State Miners' Association, will not leave for the Hawaiian Islands, as contemplated, till next August.

MR. ROBT. S. MOORE AND MR. W. H. TAYLOR of the Risdon Iron Works, San Francisco, are expected to return from the Hawaiian islands next Saturday.

AT the annual meeting last Wednesday of the Manufacturers' & Producers' Association the following officers were chosen for the ensuing year: President, A. Sbarboro; first vice-president, J. W. Kerr; second vice-president, F. L. Brown; third vice-president, J. P. Currier; treasurer, A. Sbarboro; secretary, Lewis R. Mead.

H. WILSON, for several years chief engineer of the Broken Hill Proprietary Co.'s mines, N. S. W., has taken a similar position with the Austral Otis Engineering Co. of South Melbourne, Australia.

A. M. HUNT, electrical engineer, is on the Atlantic coast, looking at extensive electrical plants, in view of the requirements of the new Spreckels Independent Electric Co., recently organized in San Francisco.

J. W. NEILL, Gen. Mgr. of the United States M. Co., which recently bought the Niagara, Old Telegraph and other mines at Bingham, Utah, has returned to Bingham from the East to take charge of the property.

W. J. PETERS AND A. BROOKS, government geologists, will this season explore the sources of the Copper, Tanana and Habesna rivers, Alaska. F. C. Shrader and assistants will explore the headwaters of the Koyukuk in the Arctic circle. Both expeditions are sent out by Director Walcott of the U. S. Geological Survey.

Industrial Notes.

—The workable area of coal beds in Colorado is 18,100 square miles.

—Panama canal agents are at Jamaica to get 1000 additional workman.

—Denver's 150 miles of street railway are now operated by one consolidated company.

—The Southern Pacific Co. of California has ordered thirty-six new locomotives and 3000 additional freight cars.

—The prodigal sun in California valleys consumed considerable moisture this week, but all accounts point to big crops.

—Six months ago in the Argentine Republic a United States dollar was worth $3.60 in the legal currency of that country. It is now worth $2.

—During 1896-97 Mexico exported more tobacco to Cuba than to all the rest of the world. It reached the United States as "Havana" cigars.

—The subscription for the 6% first mortgage gold bonds of the Southern California Power Co. of Los Angeles, Cal., was closed in Boston last week. The bonds were largely oversubscribed.

—At San Francisco the business at the custom house has increased to such an extent that the Collector of the port has petitioned the Treasury Department for twenty additional inspectors.

—The Silverton, Gladstone & Northern Railway Co. has incorporated at Denver, Colo., capital stock $200,000, to build a railroad from Silverton, in San Juan county, to Lake City, in Hinsdale county—thirty miles.

—The El Paso & Northwestern is to be extended beyond White Oaks, N. M., and on the Kansas line. The road is now eighty miles in length and an eighty-mile extension to the coal fields is now being graded, over which trains will be running by August 1st.

—The Bank of London and Mexico in the City of Mexico will raise its capital $7,500,000, making it $17,500,000. A Mexican banker says: "If the United States annexes Cuba, our exports will have to encounter a formidable competition, and it will be necessary to furnish money at cheaper rates."

—William J. Ryan, a Denver, Colo., mining engineer, who recently made an extended trip through the States of northern Mexico, says that the people of that section of Mexico do not desire annexation. "Every Mexican above the peon class is making money. The mines are paying, agriculture is paying and the other industries are paying. They welcome Americans, especially those with capital, for what Mexico needs is brains, push and capital. Americans are afforded every facility for the development of business enterprises. Mexican mining laws are the best and most liberal in the world, and every protection is afforded to American investments. The mining laws are more liberal and better codified, as well as more uniform, than those in the United States or Canada, and there are no vexatious restrictions or taxes. The only tax to amount to anything is the 10% export tax on gold, which no one complains about."

—An unauthenticated statement is to the effect that by the recent acquisition of a small railway line from San Francisco to Santa Cruz, Cal., the Vanderbilts will, at the latter place, create a terminus for a transcontinental line of railway. The N. Y. Central from N. Y. City to Buffalo; the Lake Shore thence to Chicago; the Chicago & Northwestern R. R. to Omaha; the Union Pacific to Salt Lake City, Utah; the extension to Los Angeles are the links in the line that it is said the Vanderbilts contemplate in securing a through line from the Atlantic to the Pacific. The MINING AND SCIENTIFIC PRESS doubts the truth of the statement. The Vanderbilt policy has always been to get supreme railroad control east of Chicago and do nothing west of that city. The first Vanderbilt line was the N. Y. Central, 442 miles from New York City to Buffalo, N. Y. This absorbed the Lake Shore, 540 miles from Buffalo to Chicago. This nearly 1000 miles constitutes the main thoroughfare between the first and second cities of the country. It is possible that the great development of the West and the Pacific coast may occasion a desire on the part of the Vanderbilt interests to enter that field. The conditions are favorable. The Chicago & Northwestern runs direct from Chicago to Omaha, where the U. P. begins, the latter through its present building lines reaching for Pacific termini. But it is not likely that the statement now appearing is more than an outlined possibility.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING APRIL 4, 1899.

622,322.—EMBALMING BOARD—Boettiger & Schlueter, Woodland, Cal.
622,200.—FIRE KINDLER—L. & A. W. Brandt, Stockton, Cal
622,416.—ADVERTISING DEVICE—E. Cherry, Santa Rosa, Cal.
622,452.—DYNAMO—F. H. Donaldson, Garvanza, Cal.
622,333.—SURGICAL APPLIANCE—G. E. Dudley, Oakland, Cal.
622,421.—HARVESTER REEL—E. L. Fissel, Davisville, Cal.
622,215.—PRUNE DIPPER—E. C. Frazee, Santa Rosa, Cal.
622,216.—FRUIT GATHERER—E. C. Frazee, Santa Rosa, Cal.
622,619.—WEIGHING SCOOP—Granat & Lamott, Stockton, Cal.
622,356.—CURTAIN STRETCHER—H. Hickman, S. F.
622 365.—EARTH AUGER—T. J. Hubbell, Santa Cruz, Cal.
622,487.—STREET SWEEPER—T. R. Jones, Sacramento, Cal.
622,491.—BUTTER WORKER—J. T. Killin, Greenville, Or.
622,371—LOCK—G. W. Kunze, Bryant, Wash.
622,382.—DUMPING CAR—M. J. McKinnon, Portland, Or.
622,248.—ICE CREAM FREEZER—E. D. Middlekauf, S. F.
622,251.—RIVET HOLDER—Z. S. Moore, Oakland, Cal.
622,530.—MITER—V. A. Pernot, Colegrove, Cal.
622,531.—CONDUIT THREADER—F. A. Pooler, Los Angeles, Cal.
622,532.—GOLD DREDGER—R. H. Postlethwaite, S. F.
622,317.—INVALID'S BED—L. Zucker, Oakland, Cal.
30,463.—DESIGN, HAT HOLDER—Sarah E. Griggs, Woodland, Cal.
30,501—DESIGN, BICYCLE PANTS GUARD—J. F. Wright, Stockton, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DESIGN FOR HAT HOLDER.—Sarah E. Griggs, Woodland, Cal. No. 30,463. Dated April 4, 1899. This design comprises a rectangular fork formed of wires twisted together, the arms of the fork joining in the center, extending downwardly at right angles, and the twisted wires of which the stem is formed being coiled to form an inverted conical cut at the bottom of the stem. The two arms of the fork extend upwardly, approximately parallel at a distance apart, and at the top these arms are separated and bent to form rectangular heads which have their greatest length horizontally and are made concavo-convex. The outer edges of these bars may be serrated.

FRUIT GATHERER AND GRADER.—Edwin C. Frazee, Santa Rosa, Cal., assignor to Henry DeWitt Frazee, same place. No. 622,216. Dated April 4, 1899. The object of this invention is to provide a device for gathering and grading fruit, and it is especially adapted for gathering prunes, plums and other similar fruit which it is desirable to protect from being bruised, and also to separate into sizes as well as to clean them from leaves, sticks and dirt which may fall in with them. It consists essentially of a wheeled truck, the front of which is adapted to fit around the body of the tree. Upon this is a flexible, foldable and extensible hopper connecting with the truck sides, and a screen is fitted between the front extended ends of the truck which is adapted to receive and clean and grade the fruit which first falls upon the canvas or other flexible sides of the hopper and is directed down to the screen on these sides. The shaking device consisting of a reciprocating toothed bar and corresponding teeth upon the edge of the screen frame, and a pitman or crank connected therewith, serves to agitate the screen to separate the sticks and dirt from the fruit.

DEVICE FOR PENETRATING FROZEN EARTH OR GRAVEL.—T. J. Hubbell, Santa Cruz, Cal., assignor of one-half to Frank Fisher of San Francisco, Cal. No. 622,365. Dated April 4, 1899. The object of this invention is to provide a small, easily adjusted apparatus so constructed that it may be folded into a small compass for transportation, and which when set up is adapted to penetrate ground filled with small roots, gravel, or rock, or ground which is frozen hard, and which is in other ways difficult to penetrate. It is especially adapted for the drilling of prospect holes to ascertain whether the particular location contains gold or other valuable substance which it is desirable to obtain. It consists essentially of a perforating tool, a shank and means for connecting it therewith, a framework having upper and lower cross timbers and guides, through which guides the shank passes loosely, one being fixed and the other adjustable to bring them into vertical line; attachments for guy ropes by which the frame may be braced when set up, and adjustments for the length of the legs of the frame to suit it for uneven ground, and a turning handle by which the tool may be operated.

PRUNE DIPPER.—Edwin C. Frazee, Santa Rosa, Cal., assignor to Henry DeWitt Frazee of same place. No. 622,215. Dated April 4, 1899. This invention relates to a device for preparing prunes for drying. It consists essentially of a dipping tank, a basket having closed sides and a foraminous bottom and closed projecting ends adapted to rest upon the front and rear edges of the tank when the basket is submerged, one of said ends having upturned lips to form a discharge for the basket. Sockets are formed approximately central of the upper edges of the basket sides, and lever arms having bent portions which extend toward the sides of the basket with end journals upon which the sockets are suspended to swing. A shaft is journaled upon the front edge of the tank with which the arms are connected and a fulcrumed hand and foot lever and pitman connect the lever with the crank so that the basket may be raised from the tank. By means of a checking device the front of the basket is arrested after it has been raised from the tank, and this forms a fulcrum about which the rear portion of the basket is lifted and turned to discharge its contents.

CURTAIN STRETCHER.—Henry Hickman, San Francisco, Cal. No. 622,356. Dated April 4, 1899. This invention is designed for the stretching of lace curtains and the like so as to make them absolutely even in length and to cause the pattern and figure to exactly correspond, and the curtains to hang properly when in place. It consists essentially of a four-sided rigid frame having a brace bar connecting the side bars interior to one end with adjustable longitudinal and transverse bars connecting the end and side bars respectively, and means for detachably clamping the adjustable bars in place so that one end of each adjustable bar may be so swung inwardly to allow the edges of the curtain to be attached to pins which are fixed upon the bars, the edges of the bars being curved or beveled to form sustaining seats for the edges of the curtain.

EXTENSION REEL FOR HARVESTERS.—E. L. Fisel, Davisville, Cal. No. 622,421. Dated April 4, 1899. The object of this invention is to provide a reel such as is used for sweeping grass or grain toward the cutting sickle, and said reel is made adjustable to larger or smaller diameter to suit the condition of the grain which is to be acted upon. It comprises a central shaft with radial arms having guides supported upon them, supplemental arms slidable in the guides having reel bars fixed to the outer ends, rods divergent in planes which intersect the longitudinal axis of the shaft, and means for moving the rods in their supports longitudinally so that the radial arms carrying the bars upon the outer arms may be extended or shortened.

Commercial Paragraphs.

W. N. JEHU has moved his assay office from 536 Merchant St. to 606 Clay St., San Francisco—a larger and better location.

SMITH & THOMPSON, manufacturers of assay balances, Denver, Colo., have opened very neat salesrooms at 2205 Champa St., that city.

THE Denver Engineering Works Co. recently shipped a carload of electric hoists to Cripple Creek, a mine timber framing machine to Salt Lake City and one to Aspen, Colo.; also a 5-stamp sectional mill to Mexico. They have orders for a 150 H. P. electric hoist for Rossland, B. C., which, it is claimed, will be the largest electric hoist ever built in Colorado. They report the shipment of a carload of jigs and screens to Empire, Colo., and a 100 H. P. steam hoist to Prescott, Ariz.

THE Rix Engineering & Supply Co. have been awarded the contract for building a 4-stage air compressor to compress air to 2500 pounds to the square inch. This compressor is for driving compressed air auto-cabs and omnibuses in Chicago. The order comes from a Chicago firm, which lends interest to the matter, inasmuch as this is the first compressor ever built in California and shipped directly to the Eastern market. The cylinders are all arranged tandem to the steam cylinder, which drives them. The pressures in the cylinders will be respectively 45 pounds, 180 pounds, 700 pounds and 2500 pounds. These pressures divide up the heat and work evenly. The heat is taken out between the different stages of compression by passing the air through copper intercoolers located in the base of the compressor. This compressor will be tested about May 1 in San Francisco, and 2500 pounds to the inch will be pumped into a receiver. There is an opportunity at this test for anyone having any apparatus for liquefying air to make experiments. Mr. Rix, of the above firm, is now designing an apparatus for liquefying air and hopes to have it completed in time to use the above-described compressor to furnish the air for the experiment.

Catalogues.

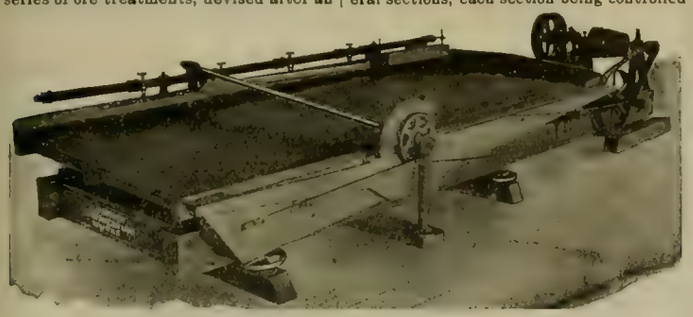
In last Saturday's issue considerable was said about machinery catalogues, their handsome appearance, progressiveness and technical value. These statements are emphasized by the receipt this week of three new catalogues—The Evans No. 5, Milling Machinery No. 12, and Gold Dredging No. 17—just issued by the Risdon Iron Works, Howard and Beale streets, San Francisco. Catalogue No. 5 is the third edition of that particular trade treatise on hydraulic mining machinery and the Evans hydraulic elevator in particular, the latter being especially of present prominence because of its use as the principal and necessary device in the work now going on of unwatering the old, deep, abandoned lower levels of the Comstock. The tables in this are of especial value to mining men. Catalogue No. 12 is the second edition of a treatise on milling machinery, illustrating and describing several forms of machinery and discussing different processes for working ore. Of considerable value also are the actual results, such as the Alaska-Treadwell Co.'s milling account for one year, the cost of one month's mining and milling in Amador county, Cal., "the history of the patio process," etc. Catalogue No. 17 is also in its third edition. It treats exclusively of gold dredging machinery, a branch of gold mining that seems destined to be as prominent in California as it has been proved in New Zealand. Of this pamphlet it may be said that no matter how much anyone knows about river dredging for gold he will very likely increase his knowledge by reading it. Catalogue No. 5 is sent postpaid from the Risdon Iron Works office to any address on receipt of 15 cents; catalogue No. 12, 50 cents, and catalogue No. 17, 15 cents.

The Cammett Concentrator.

Bulletin No. 1, issued by the Denver Engineering Works Co., is devoted to a discussion of concentration of ores and mainly a description of the Cammett concentrator, which they manufacture and supply. In the circular they say:

The development of milling processes for the concentration of metalliferous ores has presented many opportunities for some successful design of concentrating table, which will give accuracy and capacity by the employment of simple mechanical details and a system of ore treatment based on well established laws.

We maintain that no concentrator can be a complete system in itself, but simply one part of a series of ore treatments, devised after an intelligent study of the ore to be treated. The preparation of the ore, in the preliminary crushing by crushers, rolls or stamps, and subsequent classification, is just as important as the separation of the values from the gangue on the concentrating table itself. The experiments of Rittenger, and in later years those of Robert H. Richards, have shown that each size and quality of ore pulp requires a certain angle of inclination of the table surface, a proper supply of water, a correct speed of agitation, and a motion which best assists the laws of specific gravity. Hence it seems rational that a concentrating table, embodying as many suitable adjustments as possible, should best meet the wide field of variations required in the successful treatment of pulps.

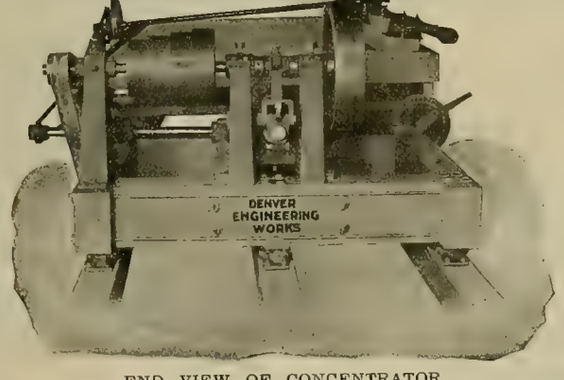


GENERAL VIEW OF CONCENTRATOR.

The Cammett concentrator is presented as a result of a thorough and systematic series of practical tests. All the details have been decided upon after actual practical tests, and the mechanical features of this concentrator are based on an accuracy of motion and a facility of adjustment which are ackowledged to be complete in every respect.

HEAD MOTION OF CONCENTRATOR

Description of Details.—The main frame of the table is made of best selected Oregon lumber, and framed to resist best the reciprocating movement of the table top proper. This frame, together with the upper working parts, is supported on three heavy hinges under the head end of the table, and by means of adjusting hand wheels and screws, the table may be given any necessary inclination lengthwise the table. The discharge end of the table may also be adjusted by means of these adjusting screws, so that one corner at the end may be raised higher than the other, depending on the requirement of the ore treatment. Hand adjusting screws, under the main frame about midway the length of the frame, serve to prevent any vibration whatsoever. The table top proper is supported on nine (9) cold drawn steel guides running on cast iron bearings, and lubricated by compression grease cups. These guides are supported on cross beams, which are also supported on one end by heavy hinges, and on the other by cams designed to give the requisite transverse inclination to the table top. This transverse inclination motion is controlled by a lever placed near the head of the table. The head motion is a simple mechanical device which is capable of producing a great variation in the revolutions, stroke, and character of the stroke. The revolutions may be changed, by a four-stepped cone, from 250 to 350 revolutions per minute; the stroke adjustment is from 0 to 1⅛ inches length; and the quality of the end reciprocation is such that pulp may be carried forward at any speed from 0 to maximum. The end reciprocation is not a sudden jerk, but a very smooth motion, and is a particular motion peculiarly adapted to proper stratification of the pulps. The pulp box is arranged with suitable partitions for delivering the pulp to the table in a manner well distributed. The water is delivered to the table by means of perforated pipes in several sections, each section being controlled by a separate valve. The perforations of the pipes are on the upper side of the pipe. Whenever a mill contains only one concentrating table, a return pump for the middlings is provided. This pump delivers the pulp, not into the main pulp box, but into a separate launder, which is arranged to deliver the middlings pulp along a considerable range up and down the table.



END VIEW OF CONCENTRATOR.

The table top is made of selected redwood, in two layers, with a canvas, painted with white lead, between the layers of redwood to prevent leakage. Each layer of redwood is grooved on the under side to prevent any warping, and the construction proves to be successful. The entire table top surface is covered with a special design of continuous riffles and grooves extending longitudinally from the head end to the discharge end of the table. The entire surface of the table is painted with paint specially prepared for this work.

The floor space occupied by this concentrator is 7 feet by 19 feet. With this table and included in the price are all attachments necessary for the complete operation of the table, and no expense is required to make table ready for running except that for labor of erecting.

To determine the power required to drive this table, a table was set up and run by an electric motor deriving its power from the electric plant at the works, and the power delivered to the motor was accurately measured by proper electrical instruments. It was found that with all adjustments of the table put at their maximum the power did not exceed 0.4 H. P. Under adjustments which would represent average working in practice the H. P. did not exceed 0.25.

Operation of the Table.—The pulp, after being properly sized in hydraulic classifiers, is delivered onto the table by the pulp box at one of the head end corners of the table. After giving a proper inclination, both transversely and longitudinally, to the table top and a supply of water through the various water pipes, the head motion may be adjusted to meet the requirements of a great variety of ore pulps. The end shake of the table produces a stratification of the pulp which settles the values to the bottom of the grooves, and carries the mass along until the height of the riffles between the grooves diminishes, and the transverse flow of water washes the light top layer of gangue across the table sidewise to the tailings launder. The heavier values proceed along the grooves without disturbance or change from a straight forward course, and are discharged from the entire width of the tail end of the table.

In plants where only one table is used the middlings pump returns the middlings back to a special launder on the upper side of the table. In plants where several tables are used we recommend the middlings from the several tables to be carried to a table which is especially adjusted for this class of pulps. In many cases these middlings would need to be recrushed for subsequent concentration.

While this concentrator will handle as coarse pulps as any of its class, we find it extremely accurate in the saving of fine pulps. The special form of grooves which we employ seems to produce very successful results in keeping the fines from discharging with the tailings.

So perfect is the classification or separation produced by this table that with a good class of ore adjacent grooves of the table will contain products differing from each other to such a degree as to be readily distinguished from each other by the eye.

This concentrator is manufactured under license from patent serial Nos. 614,322, 651,877, and 668,419; also other patents applied for.

The main office of the company is Thirtieth and Blake streets, Denver, Colorado.

How to Build a Rocker.

Written for the MINING AND SCIENTIFIC PRESS.

The accompanying drawings show the simplest form of construction in a rocker or cradle for separating gold from debris with the use of water. Miners are mostly familiar with the old rocker, but those who have newly engaged in the alluring pursuit of gold mining may find this sketch useful. Fig. 1 shows the rocker complete: *A* is a cleat tacked to each side of the interior to hold an apron (Fig. 3); *S* is the screen, riddle or hopper into which the gravel or other material to be tested is placed. It may be built of 1x4-inch board. The bottom is covered with a perforated sheet of iron or a coarse wire screen (½ inch). The hopper sets inside the upper portion of the body of the rocker, resting on cleats nailed to the side shown at *B* (Fig. 2).

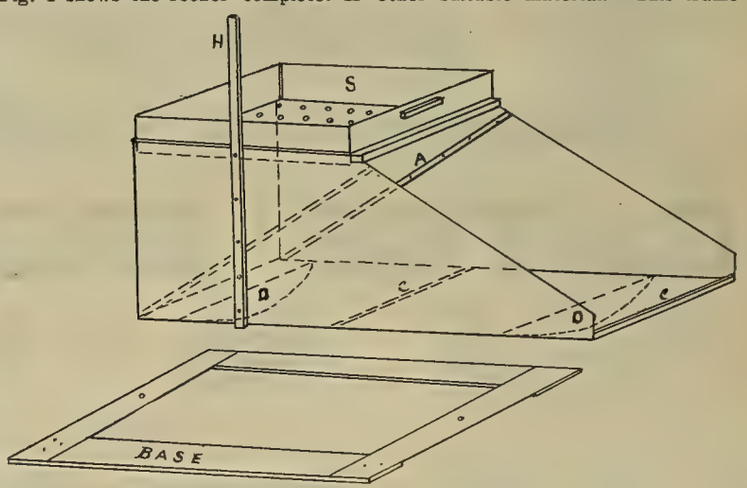


FIG. 1.—THE ROCKER AND BASE.

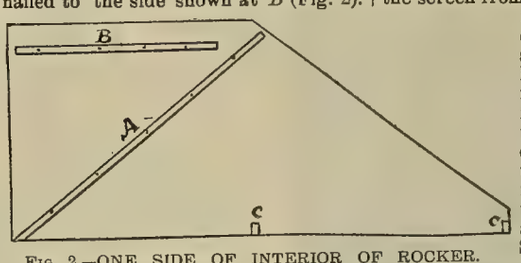


FIG. 2.—ONE SIDE OF INTERIOR OF ROCKER.

The apron is a frame of sticks ½x¾ inch firmly nailed at the corners and having "legs" at the lower end formed by the projection of the side pieces beyond the lower cross piece. Upon this frame a piece of canvas should be securely tacked, but it must "sag" at least an inch (more is better) at the lower end, indicated by the shaded portion Fig. 3, so that the earth falling through the screen upon this apron would be concentrated in the depression of the canvas, the lighter material passing over and the heavier (gold, iron, garnets, etc.) remaining upon the apron. This apron slides in from the top in front of and underneath the screen and may be quickly drawn upward and out and its contents dropped in a pan for further concentration. As an additional precaution riffles are placed in the bottom of the rocker, formed by nailing cleats across the bottom, as shown at *C C*, and are placed one midway and the other at the lower end.

FIG. 3.

Two segments of a circle are firmly nailed to the bottom of the cradle, underneath, forming "rockers," that the whole structure may be rocked backward and forward much like a child's cradle. These "rockers" should be provided with a piece of iron (a large nail will answer) fitted into the lower edge and projecting about an inch. The rocker is placed upon a frame made of four pieces of 2x4 or other suitable material. This frame should be bored with two holes at the proper distance to receive the lugs in the bottom of the rockers. This will keep the rocker from moving forward when in use, as the frame upon which it rests is stationary but is given more or less grade, to be determined by trial. The vibration or rocking motion is given by means of the handle *H*. Water is poured upon the material in the screen from a long-handled dipper in the hand of the operator. The rocking should be continuous as long as material remains upon the screen fine enough to pass through it. Stones and other objects remaining upon the screen may be removed by grasping the hopper in both hands and tossing them out. Several hoppers of gravel may be washed before cleaning up if desired. The operation of dipping water with one hand while vigorously shaking the rocker with the other is rather awkward to the beginner, but one soon becomes accustomed to it. Where the quantity of water is small a dam may be built which will provide enough for use, the water running back into the basin and being re-used until too "thick" with fine slimes.

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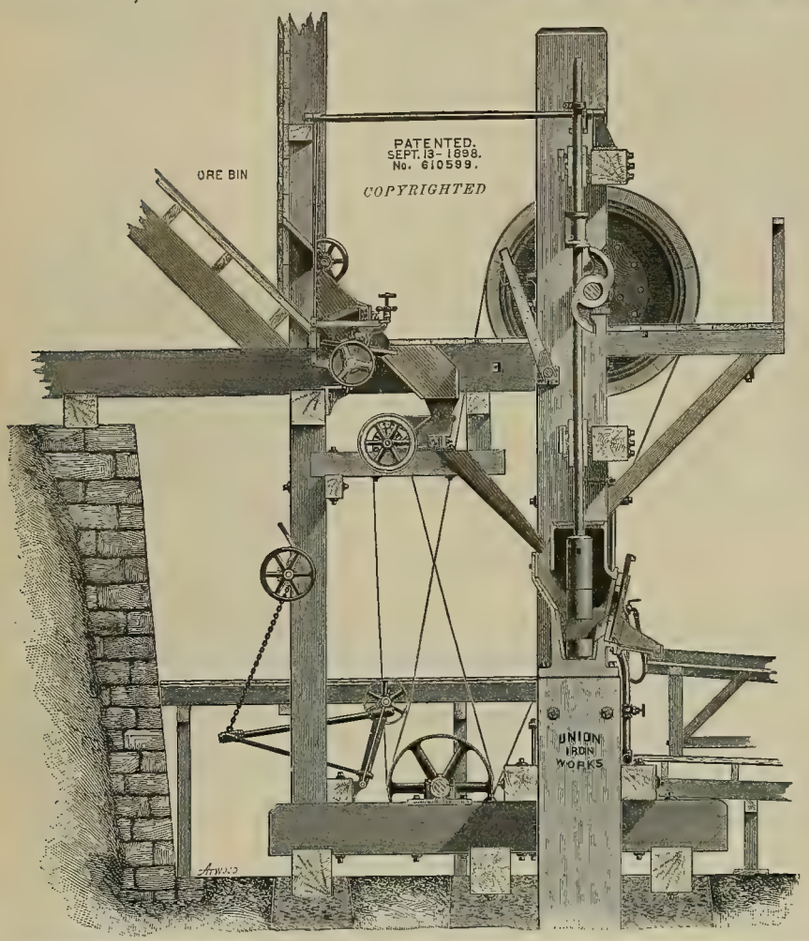

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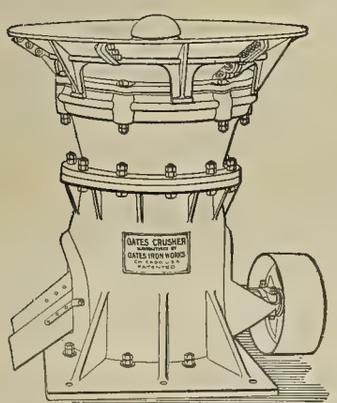

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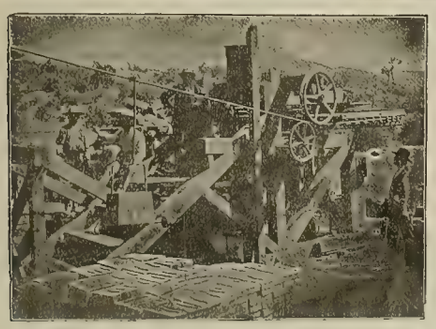

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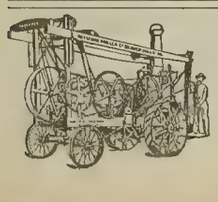

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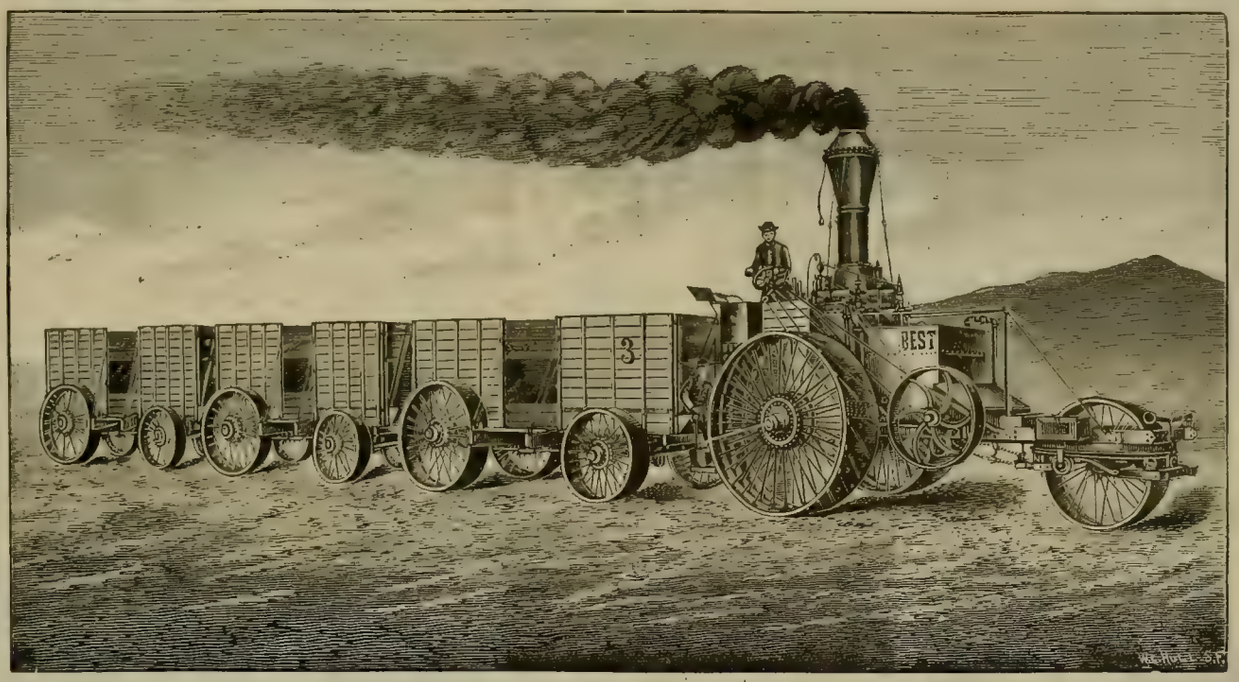

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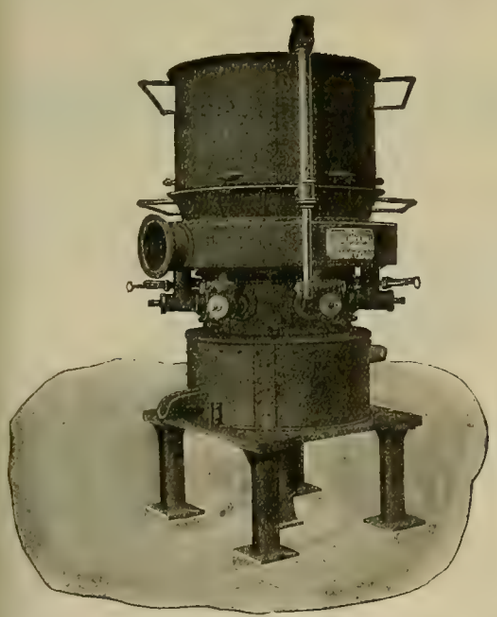

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(SEE PAGE 417.)

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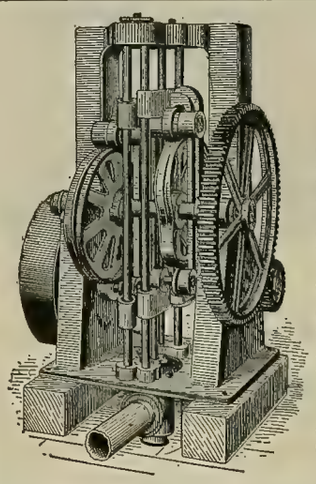

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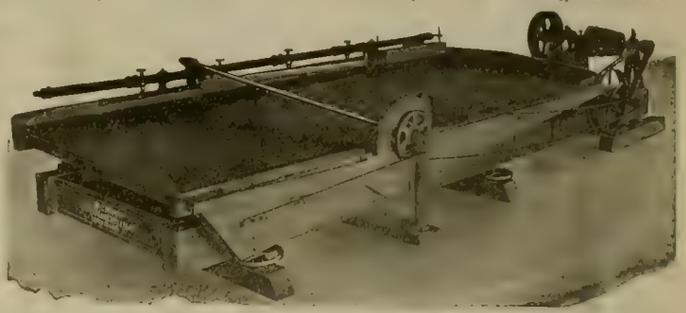

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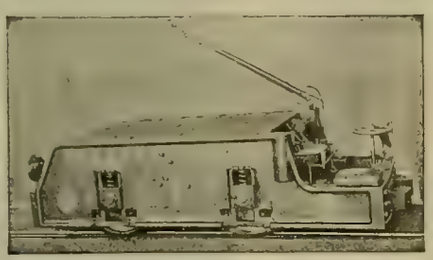

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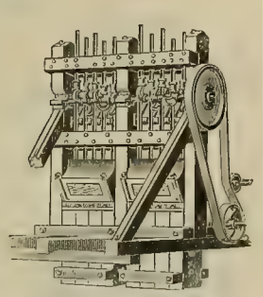

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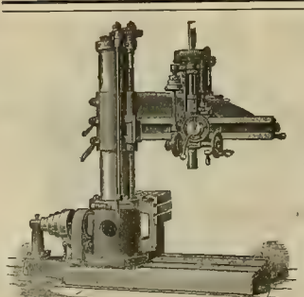

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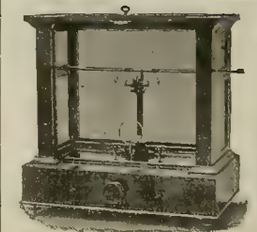

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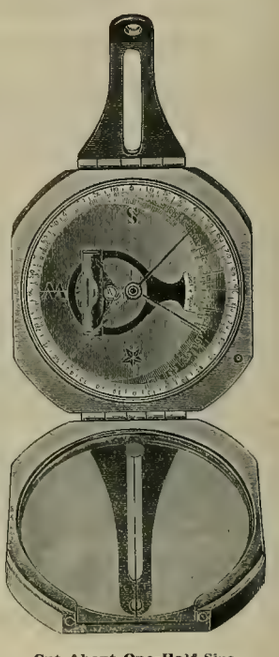

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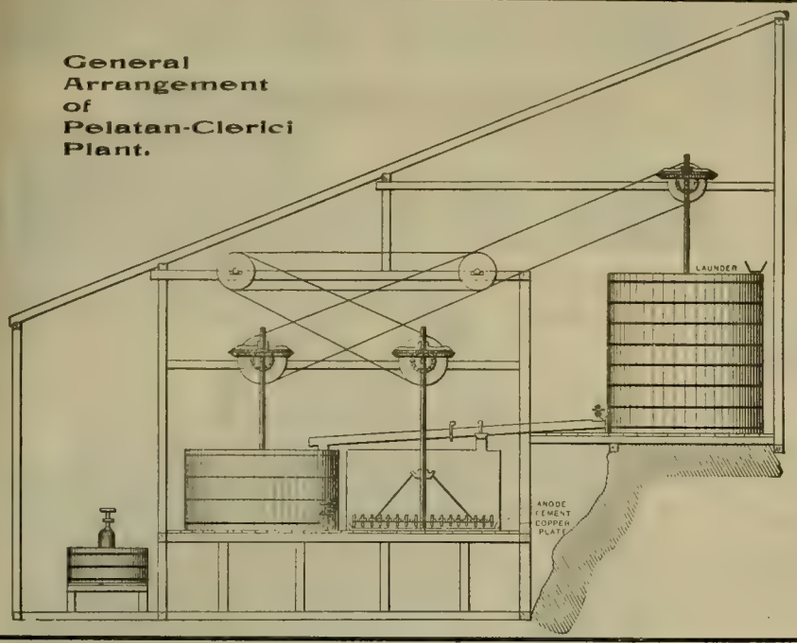

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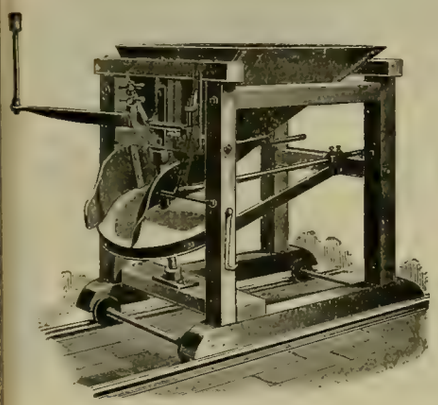

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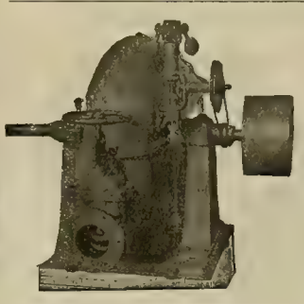

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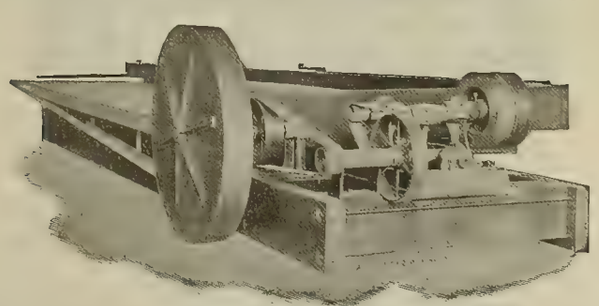

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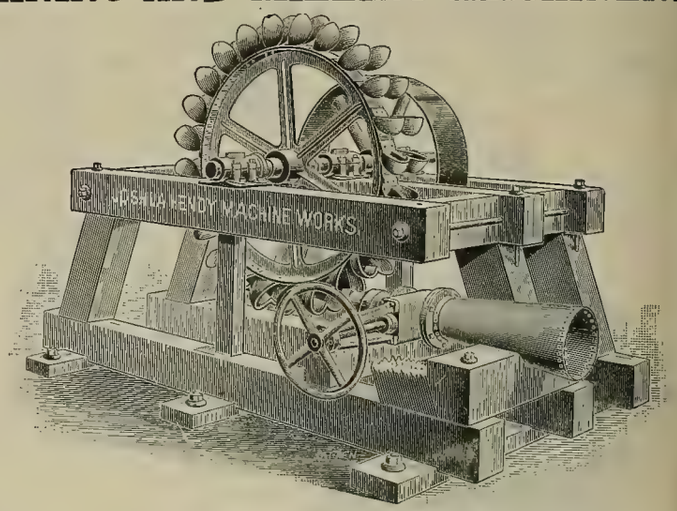

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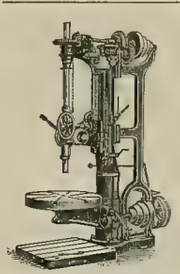

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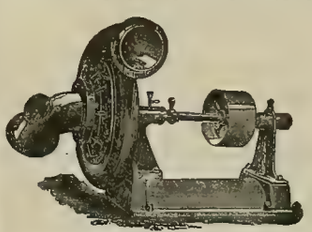

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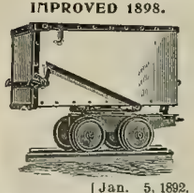

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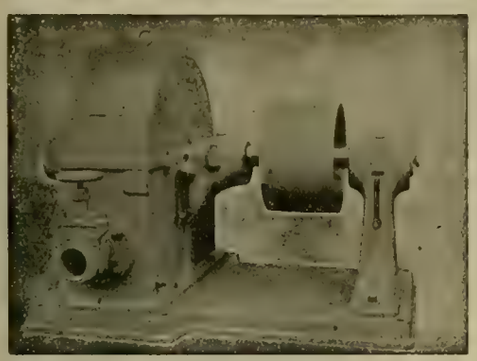

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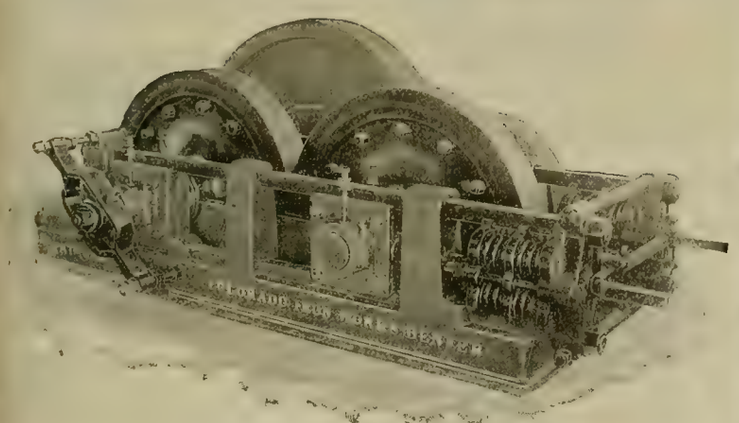

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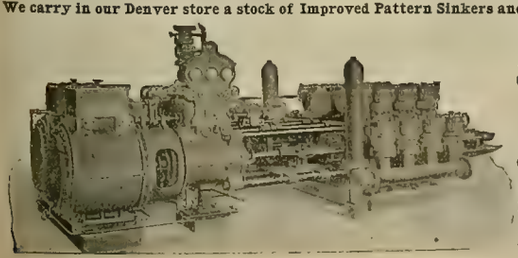

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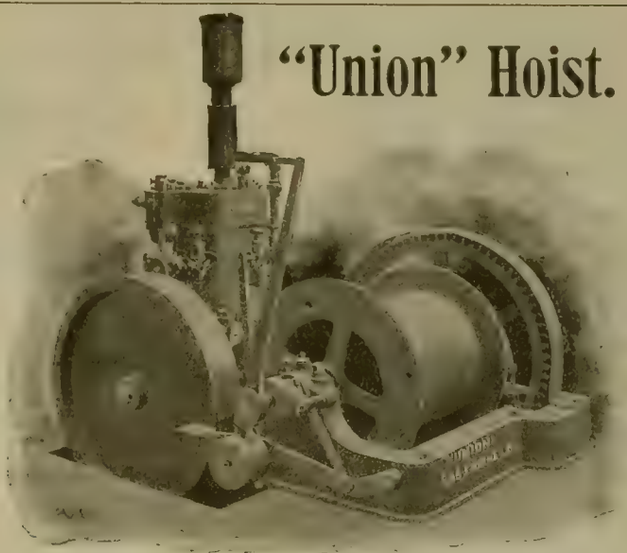

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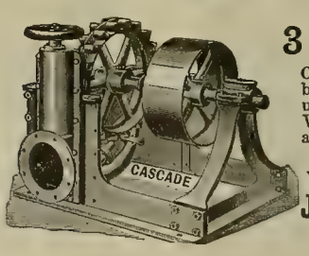

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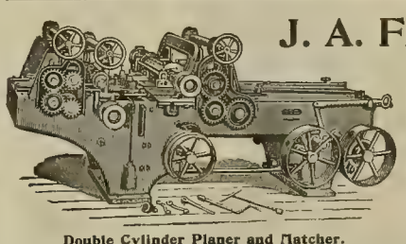

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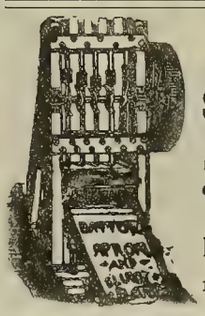

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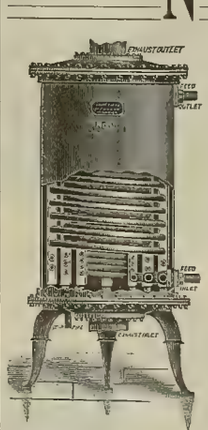

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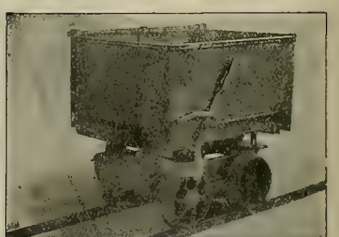

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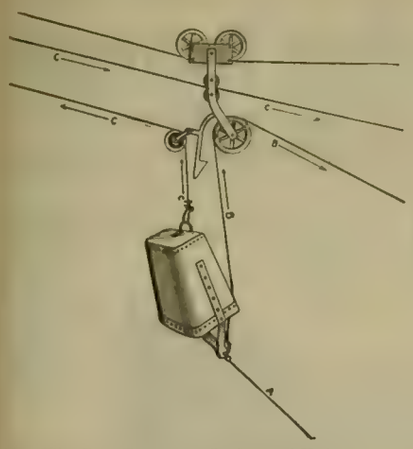

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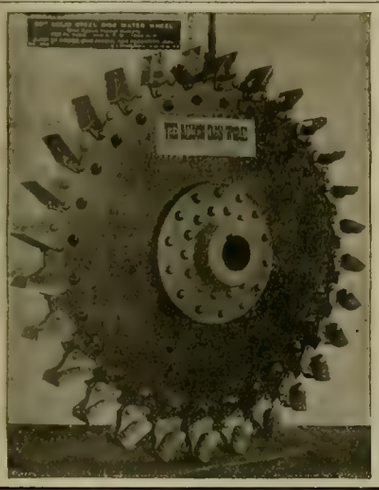

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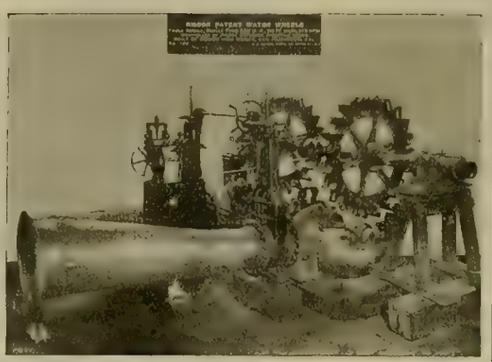

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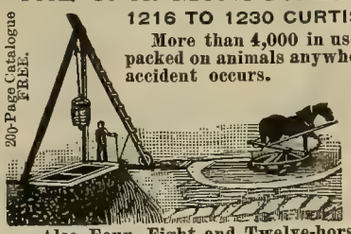

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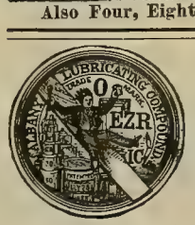

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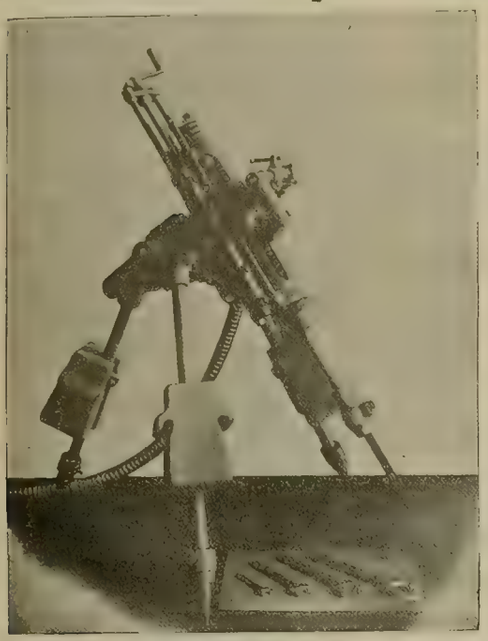

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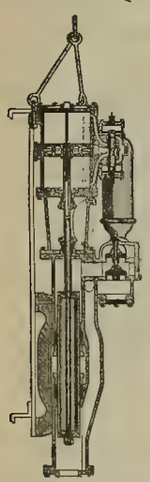

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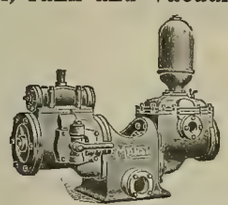

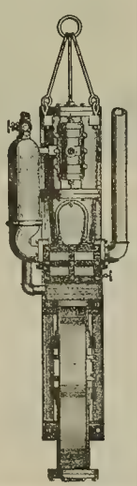

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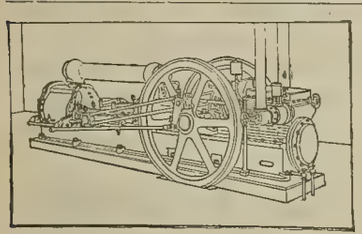

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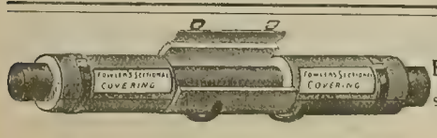

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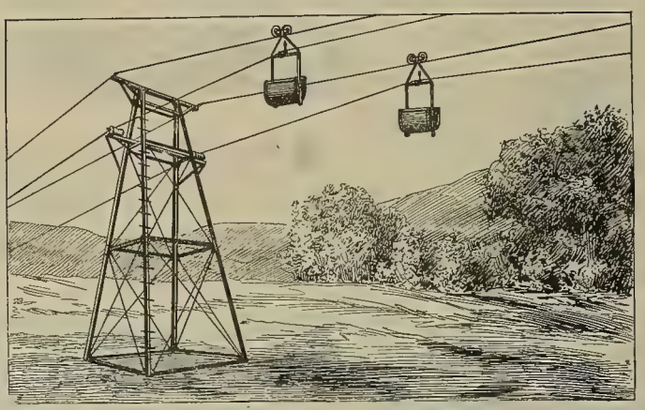

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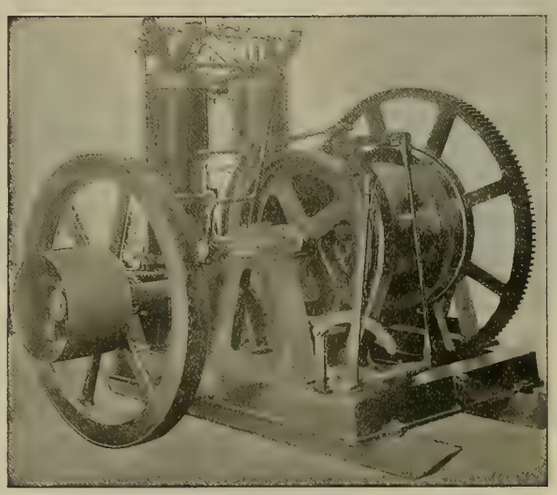
Improved Mining Hoist.



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THE MOTIVE POWER.
Will Raise More Ore at Less Cost Than Any Other.
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Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power Etc.

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TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.
These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

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We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

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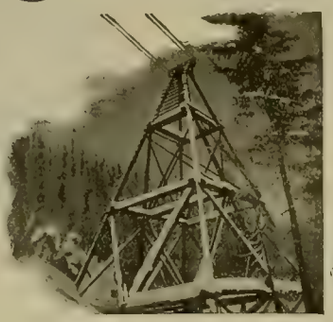
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



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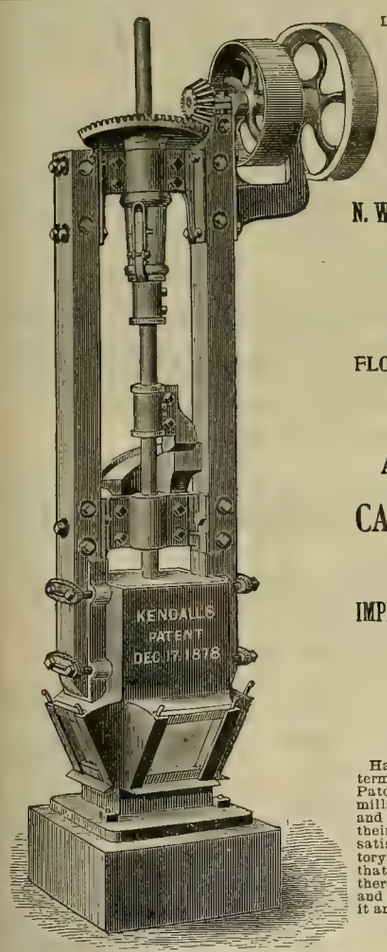

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Sole Manufacturers of

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Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

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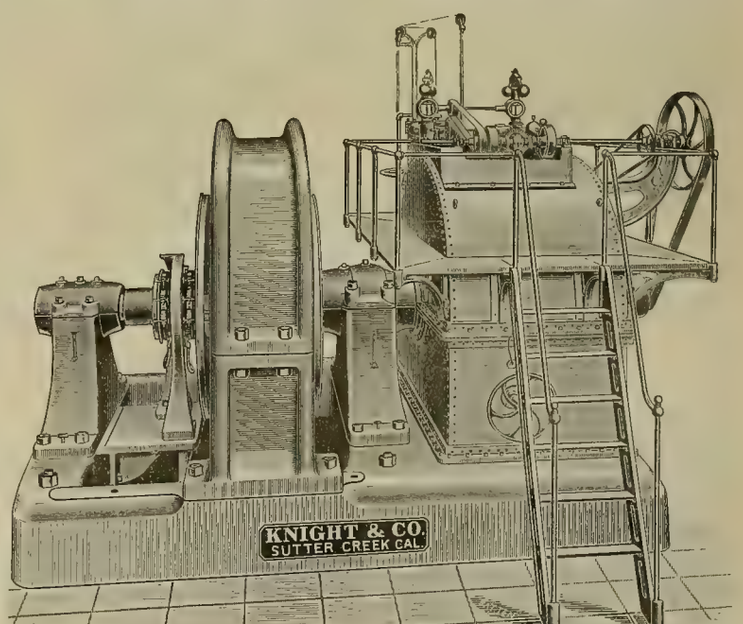
Send for Circulars and Price List.

KNIGHT'S WATER WHEEL.



The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**

WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.

Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.

For full particulars, send for descriptive catalogue.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

Suitable for all kinds of **Excavating Work,** making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

Market Reports.

SAN FRANCISCO, April 13, 1899.

SILVER. — London, 27⅞d; New York, 59¾; San Francisco, 59¾; Mexican Dollars, 48@48¼. New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.— New York reports quiet, $4.27½; brokers' price, $4.10.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 7c; bar, 7¼c.

COPPER.—New York reports Lake nominal, May $18; brokers' price, $18.25@18.50. Local, bar, 24c per lb.

IRON.—American, soft, $22@24 per ton; Scotch, $27. Local bar, 2½c per lb.

STEEL.—12½c per pound.

TIN.—Pig, 30c per lb.; Bar, 35c. New York reports lower and easy, $24.50 bid, $24.75 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8½c.

QUICKSILVER.—Local, $42.50@43; export, $39@39.50; carload lots, special rates.

San Francisco receipts of quicksilver for March were 1577 flasks. Sea exports were to Mexico, Central America, British Columbia and Siberia. In February there were shipped 2000 flasks to China, the first to that quarter for three years.

PLATINUM. — London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

RED LEAD AND LITHARGE.—One ton and over, at one purchase, 6¼c; 500 lbs. and less than one ton, 6½c; less than 500 lbs., 7c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; iess than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $8; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

CALIFORNIAN IMPORTS OF COAL.

From—	1895. *Tons.*	1896. *Tons.*	1897. *Tons.*	1898. *Tons.*
British Columbia.	651,295	551,852	558,372	651,208
Australia.	268,960	273,351	281,666	201,931
English & Welsh.	201,189	156,368	107,969	75,115
Scotch.	4,098	3,356	4,081	5,056
Eastern (Cumberland & anthracite)	26,863	17,907	21,335	37,560
Seattle (Franklin, Green River, etc	150,888	128,919	220,175	283,963
Carbon Hill, South Prairie, etc.	256,267	255,923	286,205	348,474
Mt. Diablo, Coos Bay, Corral Hollow	84,954	110,237	115,150	172,506
Japan and Rocky mountains by rail	9,015	2,247	6,587	26,560
Totals	1,653,520	1,505,660	1,601,540	1,832,273

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 2c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 4½c per lb.; borax, refined, 5@6c per lb.; chlorate of potash, 9½@10c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 15c; chlorate of potash, 25c; caustic potash, 12c.

Consul Skinner writes from Marseilles: "There is a considerable advance in the market price of sulphate of copper, which is quoted in this city at 64 francs ($12.35) per 100 kilograms (220 pounds). The price named is about 5 francs (96 cents) above the ordinary price for the quantity named. Large quantities of sulphate of copper are used in the wine-growing districts to counteract the pernicious effects resulting from the various cryptogamic diseases to which the vines are subject. During the year '98 there was exported from the United States sulphate of copper to the extent of 14,529,466 pounds, valued at $466,244. On these terms it would seem as though a considerable business might be done in France, especially under existing market conditions."

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5¾c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¾c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less, Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17¼c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia . ..)	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, April 13, 1899.

9:30 A. M. SESSION.

300 Belcher	40c	100 Mexican	63c
400 Best & Belcher	63c	700 Potosi	31c
200 Challar	37c	250 Savage	33c
100 Crown Point	24c	100 Union Con	52c
100 Gould & Curry	43c	300 Yellow Jacket	41c

2:30 P. M. SESSION.

100 Mexican	58c	700 Con. Imp.	01c
300 Gould & Curry	40c	200 Alpha	06c
100 Best & Belcher	60c	100 Sierra Nevada	$1 05
400 Con. Cal. & Va.	$1 80	600 Bullion	03c
400 Savage	29c	200 Union Con	50c
400 Challar	32c	200 Challenge Con	33c
1500 Yellow Jacket	38c		

Recently Declared Mining Dividends.

Grand Central, Utah, $37,500; April 10.

Swansea, Utah, $5000; April 10.

Centennial-Eureka, Utah, $15,000; April 10; total, $2,090,000.

Bullion-Beck, Utah, $10,000; April 10; total, $2,358,000.

Standard M. Co., Wallace, Idaho, $30,000; April 1.

Portland M. Co., Cripple Creek, Colo., 2 cents, $60,000; April 15. Total, $2,077,080.

Anchoria-Leland M. Co., Cripple Creek, Colo., quarterly dividend, 3 cents, $18,000; April 15. Total, $198,000.

Silver King, Utah, $50,000; April 15.

Rambler-Cariboo, B. C., $10,000; April 1.

War Eagle, B. C., $26,500; April 15.

Payne, Slocan, B. C., $25,000; April 10.

Anaconda M. Co., Montana, $1.25 per share, $1,500,000; May 3. Total to date, $9,750,000.

Books Received.

"*Hints on Amalgamation and the Care of Gold Mills.*" W. J. Adams, San Francisco; 111 pages, octavo, illustrated, neatly bound and full of concise but sufficiently comprehensive information for the mill man, whether experienced or not. A chapter is devoted to the characteristics of gold ores and methods of handling them. Then in turn are treated amalgamation, cleaning up, retorting and melting. The last chapters contain some practical suggestions on concentration of auriferous sulphides, particularly the fine high-grade varieties. The publishers are the Modern Machinery Co. of Chicago, Ills.; price $1.50.

Recent Mining Incorporations.

Chityna Exploration Co.; capital stock, $100,000; R. Nugent, E. A. Fotheringham, W. M. Wade, G. Cordrey, J. H. Mallett.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

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Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

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Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

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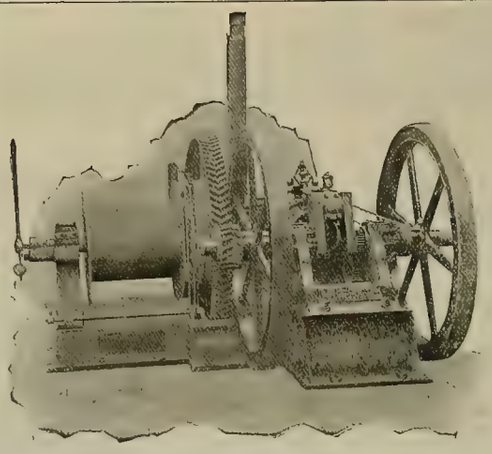

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Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1899, an assessment (No. 9) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 1st day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

G. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California. Office hours from 1 to 3 P. M.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of March, 1899, an assessment (No. 18) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of April, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOYONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3rd day of April, 1899, an assessment (No. 24) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of May, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 29th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

HEAD CENTRE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1899, an assessment (No. 7) of twenty (20) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of May, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of he corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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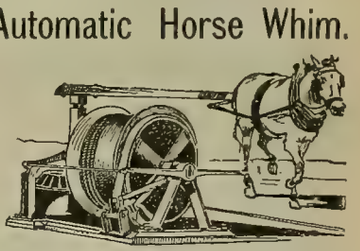

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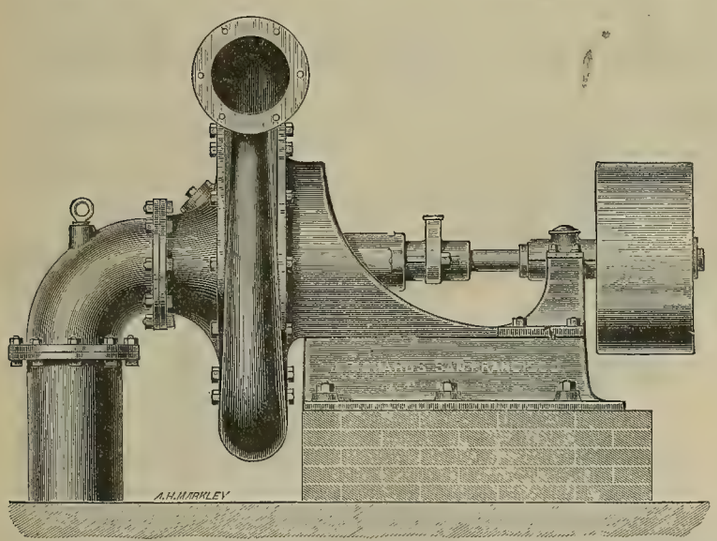

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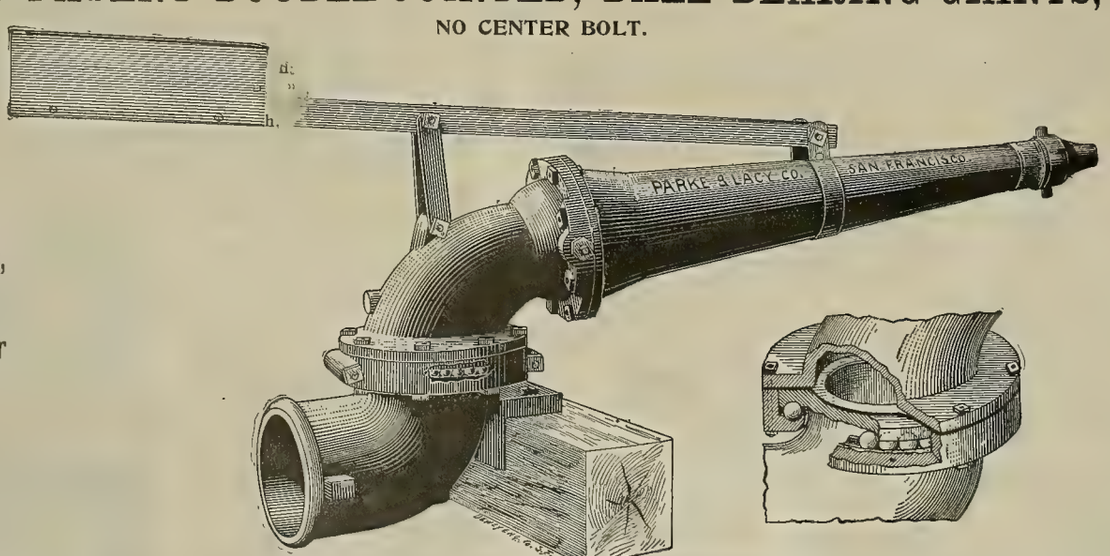

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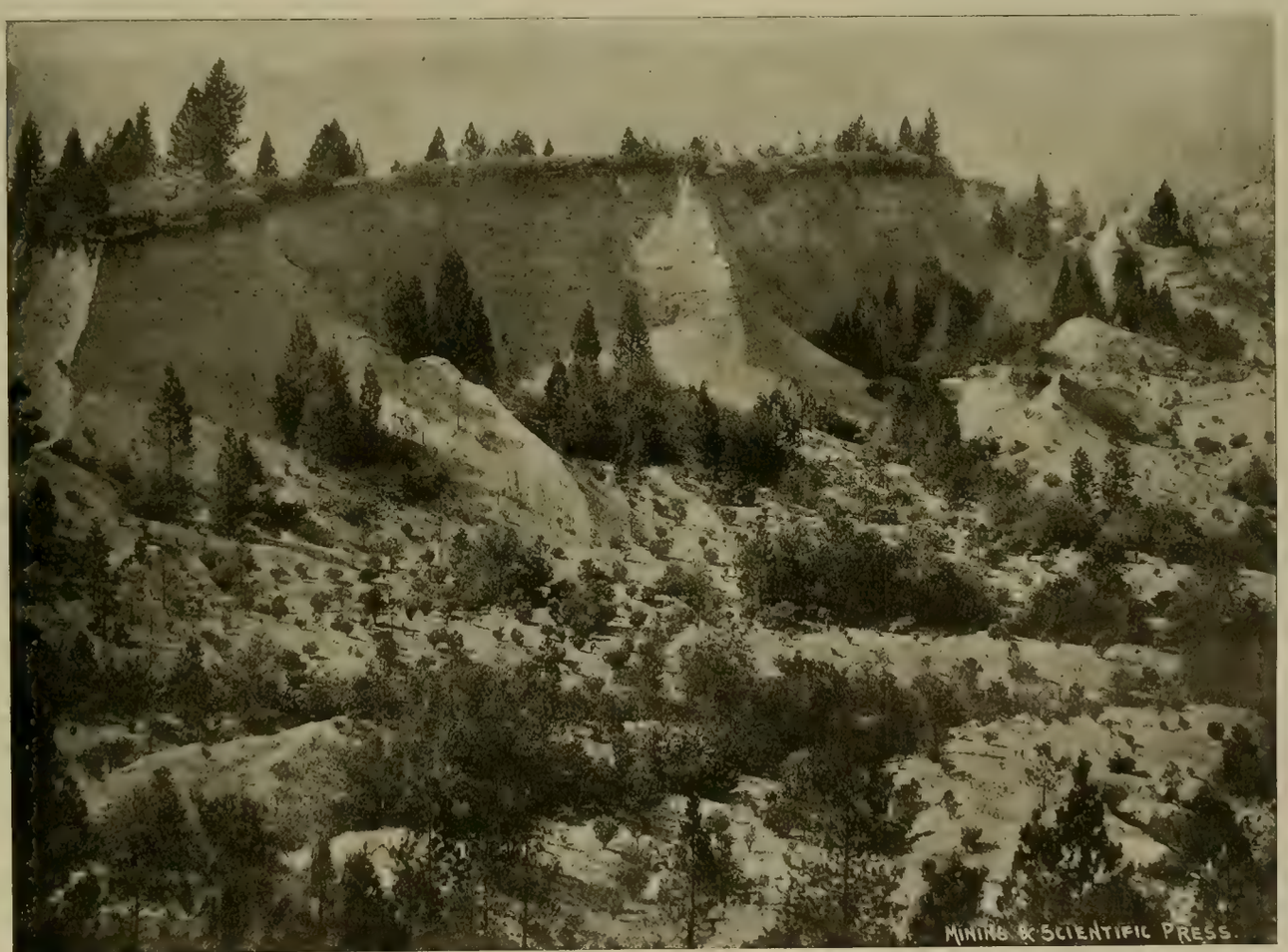
No. 2024.— VOLUME LXXVIII. Number 16. SAN FRANCISCO, SATURDAY, APRIL 22, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Growth of Trees in Denuded Areas.

When mining operations first commenced in California practically nothing was known of the conditions under which the much-coveted gold existed. The beds of the recent gulches and streams were the first to receive attention, for in these nature had concentrated the golden lumps and grains. The harvest was plentiful indeed. These crude mining operations led the workers to two sources from which the gold was derived. The first and really the primary source was the quartz veins. The second was the gravel deposits of the ancient rivers, which were, in fact, placers of an earlier age, originating in a manner identical with the formation of the more recent gulch and river deposits. In the smooth, rounded slopes of the rolling foothills of the Sierra Nevadas these early miners did not recognize this detritus as lying on the beds of prehistoric streams. Indeed, how could they? What was there to suggest it? The drainage system was perfect; these pine-clad or brush-grown slopes looked much the same as pine-clad and brush-grown slopes elsewhere. But soon the long lines of ditches and flumes lined the hillsides and the huge monitors were directing great volumes of water under tremendous pressure against these mounds of gravel, and the hills disappeared as snow banks melt under the rays of the spring sun. Great crater-like gaps were made in the hillsides. The effect was beautifully picturesque, too. The dark green of the pines and the lower tone of the sombre, greenish-gray of the chaparral and manzanita-covered hills were brightened by dashes of vermillion, buff and white, the prevailing colors of the oxidized portions of the gravel channels. The brush and even the trees were torn from their foothold in the gravel hills by the irresistible force of the hydraulic giants. The pits extended in length until they became valleys, miles in length, bright in color and remarkable for many curious features, of which not the least interesting were the immense boulders, entirely foreign to any rock in the vicinity. These valleys, the handiwork of the California miner, were treeless and more barren than the burning sands of the desert, for on these arid wastes one finds numerous trees and shrubs, and also many beautiful flowers, apparently as fresh and vigorous as any carefully reared plant in the semi-tropical gardens of California.

The hydraulic pits were cut down to bedrock, which, with its inequalities and absolute destitution of soil, offered little hope of the renewed growth of vegetation. Boulders, great and small, were strewn along the entire length of the artificial valleys, only adding to the desolation as well as the picturesqueness of the scene. It afforded an interesting study for the geologist, but the student of botany would have found little of interest there, unless it were to observe how completely all trace of vegetation and the soil that sustained it had been swept away. To have predicted at that time that trees and brush and flowers would grow again on these denuded tracts would have seemed to have required a stretch of imagination, but the same forces which in ages result in the degradation of mountains and the filling of deep valleys with the detritus from them were at work immediately, even while the miner was still employed in his work of destruction in his quest for gold. He thought little and cared less about the future growth of a forest on the site of his mine.



THE TREE GROWTH OF LESS THAN FORTY YEARS IN THE PIT OF A HYDRAULIC MINE, NEVADA COUNTY, CAL.

This occurred nearly fifty years ago; but time has wrought a change, and to-day these valleys, which mark the channels of the ancient river courses, are again covered with a growth of pines and other trees, and patches of brush again dot the once verdureless slopes. In another century these valleys will have again become densely timbered and the sharp scarp of their upper edges will have been gently rounded by the hand of time. The illustration accompanying is a characteristic scene in an old hydraulic pit near North San Juan, Nevada county, Cal. It will be noticed that many of the pines have already attained a height of 40 to 50 feet, and the smaller growth gives promise of eventually becoming a forest. The MINING AND SCIENTIFIC PRESS acknowledges its obligation to Mr. Geo. W. Dornin, of San Francisco, who took the photograph from which the accompanying illustration was engraved.

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....Publisher

San Francisco, April 22, 1899.

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THE leaven is working. The Franklin Institute of Philadelphia, whose indorsement deservedly carries great weight, has passed a resolution favoring the creation of a Cabinet Department of Mines and urging Pennsylvania's U. S. Senators to support the measure.

THE eight-hour law in British Columbia continues to be a source of trouble. The miners of the Slocan profess to be satisfied with the formerly existing conditions, and the new law is, as yet, inoperative. But at Rossland and some other districts the miners say they will insist upon its enforcement. The Government has the matter under consideration.

AMONG other sensible laws passed by the late Colorado Legislature is one forbidding the use of an iron, steel or other metal tamping bar. It seems strange that such legislation is necessary, for miners fully understand the danger which lies in the use of a steel bar in tamping holes charged with powder. But there is almost daily evidence that miners, surrounded constantly by the dangers incident to their calling, as a class are most heedless to their own danger.

A TEST of the Marconi wireless telegraphy system was made last week at the Washington, D. C., government buildings. The distance traversed by the sound waves was more than a mile. Words were intelligibly flashed through that space without the use of wire. On page 429 is the latest announcement regarding these matters from M. Marconi himself. The subject is an interesting one, but from a commercial point of view it is manifest it will not compete with the present system.

THE question has arisen in the Arizona United States Land Office at Prescott as to the valuation of work performed on a mine in doing assessment work or when application for patent is made. The law states clearly that $100 worth of work or improvements must be put upon the claim annually and that $500 worth of work or improvements are necessary to secure patent, though this latter work may all be done at one time. As to the amount of work requisite to constitute $100 worth or $500 worth, it must necessarily vary with the varying conditions found in different places, and also depends somewhat on the wage rate of each district. The law is specific as to the value of the work, but does not attempt to define how much rock or earth shall be removed, nor say anything of the nature of other improvements to be made.

Light Railway in a Mining Region.

The value of cheap transportation in the development of a mining country's resources is too axiomatic to need discussion. Nothing will so grandly aid the development of mines as a broad gauge plan of narrow gauge railways. Colorado and Arizona well illustrate what railroads can do in bringing a mining region to the front. In the latter Territory the operations of the Arizona Southeastern R. R. is a good example. Long since the Bisbee copper mine owners saw that the day of the mule team and trail wagon had passed, and while the merits of a traction engine were fully recognized, yet, at that time the oil-burning road engine had not arrived at its present improved state, and it was determined to build a light railway. The history of the building of this road was given in these columns at the time, and needs no more than passing reference. The first piece of road—thirty-six miles from Fairbank to Bisbee—was built in '87, on a 2½% grade, 40-lb. rail. In '95 the road was extended nineteen miles to Benson on the S. P. line. Of the entire line, but seven miles are on the level. Following is a record for ten years' work :

	Mileage.		
Year ending June 30th,	*Loaded cars.*	*Empty cars.*	*Total tonnage.*
'89	34,547	24,634	17,018
'90	65,943	43,536	32,934
'91	68,924	40,088	31,389
'92	73,530	48,474	32,345
'93	76,703	50,022	32,470
'94	80,689	59,982	38,014
'95	138,164	108,110	48,425
'96	218 539	152,185	65,905
'97	245,116	188,733	83,659
'98	263,344	156,385	84.739
Total	1,265,499	872,129	466,848

The light rail, the comparative small cost of the road, the amount of business, and resultant profit are sufficiently manifest to make application unnecessary. In Colorado the roads are constantly reaching into apparently inaccessible districts, and their owners and agents are constantly advertising the existence of Colorado mines. In unpleasant contrast is the policy of the principal California railroads, which seem afraid that some one will find out there is a mine in the State, the idea apparently being to stifle and suppress what it cannot usurp or control.

What can be done by a properly conducted and well managed little railroad running into a mining district is well illustrated by the Nevada Co., Cal., narrow gauge road. Run without any mine ownership but as a public business proposition, this line from Colfax to Grass Valley and Nevada City, in the foothills of the Sierras, in '98 earned $116,415 and spent $86,591. During the year the road kept up its equipment, bought steel rails to the amount of $5758, paid $9416 for two locomotives and eight flat cars, paid 7% interest on its bonds and left a dividend surplus.

Some years ago this paper suggested these matters in a series of articles that were the inception of the Sierra Valley Railway, now completed from Oakdale, Cal., to Sonora—forty-six miles, and projected to Summersville, nine miles farther. This is a standard gauge. The result of the building of this road is just what was prophesied in these columns—opening of new mines, resuscitation of old properties, a general awakening to possibilities of profit rendered impossible by the former prevailing era of '49 prices, cessation of which state of affairs was of course strongly opposed by those who believed it would injure their business, but who now with enlarged horizon begin to see wider scope of operations.

ELSEWHERE appears an article entitled "Some Characteristic Features of Veins in Granite in California." A careful perusal of it shows that these veins have certain well-recognized features and that there is little to substantiate the unreasonable prejudice of many against veins in granite. Some of the greatest mines in the world occur in granite. A few years ago it was not at all uncommon to hear the names of various rocks coupled together, mere mention of which was looked upon as synonymous with value. Such terms as "slate and porphyry," or "greenstone and black slate," "limestone and porphyry," etc., were the most common. There is nothing to justify these prejudices. Millions of dollars have been taken from veins in California which occur at or near the contact of black slate and diabase, and probably an equal number of millions have been taken from veins in granite. If a certain contact were all that is wanting, there would be thousands of miles of continuous rich gold-bearing quartz veins in California alone. But the fact that the contact is not so continuously occupied is in itself sufficient evidence that some other condition must exist to insure a profitable mine. As the genesis of ore deposits is better understood, these prejudices disappear, and the miner begins to look for some other indication of value besides the simple contact of certain kinds of rock.

Questionable Mining Schemes.

It is evident from the tone of numerous letters received that the present activity in mining has resulted in the flotation of some mining schemes, the character of which should be investigated, at least, by intending purchasers of stock. It is not at all uncommon to receive inquiry concerning this, that, or the other concern, the whereabouts of whose property can only be ascertained, if at all, with the greatest difficulty, and yet the prospectus of these concerns are most elaborate. One common feature of these wildcats is the coupling of the name of the property they are trying to boost with that of well known producers, the language of the prospectus leading the would-be investor to believe that they either join or are in the immediate vicinity of valuable mines, when, in fact, they may be many miles distant. Old mines with unenviable records are promoted under new names; the names of successful and valuable mining properties are applied, with slight variation, to new ones having little or no merit, actual or prospective, for the purpose of leading the public to believe that when purchasing stock in these concerns they are buying into a rich and going property. These and many other forms of deception are practiced to catch the careless investor. The simple fact of being in the same county, the same neighborhood, or even immediately adjoining a rich mine, gives no actual value to any other mine unless such mine has a valuable deposit of ore within its own ground, except for purely speculative purposes, but the idea is general that the "chances for striking it" are better in the neighborhood of a rich mine, when really there is much doubt about it; but the unscrupulous promoter makes the most of it. When it can be reasonably shown that a known and valuable shoot of ore in a claim passes beyond its end line into the adjoining property, then such mine, owing to its fortunate position, undoubtedly has a certain value.

There are meritorious new concerns in the market where there is a good chance to win by the economical development and operation of a promising prospect, but there are many others which have nothing to recommend them, the market price of the stock of which would indicate an actual cash valuation of many thousands of dollars. The reaction which always follows the bursting of these gilded bubbles has a bad effect on the industry of legitimate mining. Men have the legal right to associate themselves privately, or as corporate bodies, for the purpose of equipping, developing and operating mines, but the law does not give any one the right to make the grossest misstatements concerning their property when the purpose of these misstatements is to deceive.

NO ORGANIZATION has as yet undertaken the formation of a gold mine trust. Here is a field offering the broadest possibilities with the promise of the most satisfactory results. Any association of individuals that could control the gold output of the world would certainly have a fine thing of it. There are greater inducements in this line than in the alluring copper combine now forming. In gold mining there is no competition, no cutting of rates, no likelihood of overproduction or want of consumption; the customer seeks the producer, instead of the reverse, as in every other case; there is a minimum of transportation charges and a maximum of values. It is surprising that ere this some enterprising organizer has not essayed the creation of a gold mine trust. Compared with the petty $100,000,000 and $500,000,000 combines now forming, the successful organizer of such suggested combine would be at the apex of financial greatness.

Concentrates.

SHELDON JACKSON'S Laplander reindeer scheme for carrying mails along the Yukon river is a total failure.

THE New York price of tin Oct. 1, '96, was 13 cents per pound. The New York price to-day is 25 cents.

A CUBIC FOOT of newly fallen snow weighs 5½ pounds and has twelve times the bulk of equal weight of water.

DENVER, Colorado's, Mining Stock Exchange is about to receive a badly needed shaking up and reorganization.

IN a 12-foot boat built with good lines, with a 12-inch propeller, a ⅛ H. P. engine should make six knots per hour.

THE New York City street railways in '98 earned $13 per capita population; those of San Francisco $13.90; in Chicago $9.95.

IT costs about $14,000 to patent an invention "all over the world." There are sixty-four countries in which a patent may be procured.

THE only effectual preventive of electrolysis of water pipes is to have the entire electric power circuit effectually insulated from the ground.

SULPHIDE ores contain a large percentage of pyrites or other sulphides; basic ores contain lime, manganese, baryta, or iron oxide; acid or siliceous ores, quartz, sand, or silica.

WOLFRAMITE is tungstate of iron, and is a black heavy mineral of iron color. Wulfenite is molybdate of lead and occurs in beautiful honey yellow to orange red tabular crystals.

THE exhaust of a gas engine can be muffled to make it nearly noiseless by connecting with an iron box or cylinder of say four gallons capacity, with several diaphragms of ⅛-inch mesh wire cloth.

A SINGLE BELT 1 inch wide traveling at a speed of 1000 feet per minute is capable of transmitting 1 H. P.; a double belt 1 inch wide traveling with a speed of 700 feet per minute has the same capacity.

SUCCESSFUL conversation has been carried on over telephone wires between Little Rock, Arkansas, and Boston, Mass., a circuit of 1900 miles; and between San Diego, Cal., and Boise, Idaho, a circuit of 2100 miles.

ACCORDING to *Comptes Rendus*, the latest determination of the speed of sound has been made by A. Leduc, who finds that the rapidity of propagation of sound waves through dry air at 0° C. (32° F.) is 1088.58 feet per second.

TIME was when a California State tax of 10 cents on transfer of mining stock certificates was a source of revenue to the California State Mining Bureau to the amount of $2500 per year, but the tariff was abolished some years ago.

PROBABLY the cause of the deterioration of aluminum mentioned by E. J. F. of Butte, Montana, is an impurity in its alloying. The presence of sodium even to the extent of only .3 of 1% will make aluminum susceptible of attack by water.

PRACTICAL electricians say that current from street railway wires should not be considered available for light or power purposes in any building. Insurance agents are shy of placing policies where such a dangerous practice is known to exist.

FORMULÆ for the preparation of flash-light powder for photographic purposes have been repeatedly published herein. The following, it is believed, has not been previously given: Magnesium, 40 parts; permanganate of potassium, 40 parts; peroxide of barium, 20 parts.

SINCE his return from the Transvaal, South Africa, Chas. Butters has put a great deal of personal effort into experimental cyanide work at Shasta, Cal., and Spencer, Utah, but says he is not yet ready to give out anything in the way of definite results. He is at present in London.

THE present effort of the California Anti-Debris Association in Nevada Co. is merely an effort to show cause for continuance of its attorney's salary. The California Debris Commission has sole and final federal authority, and was thus taken out of the local courts six years ago.

GRAPHITE, if very pure, is of commercial value as a lubricant for machinery, and of fine quality makes "lead pencils." It is nearly pure carbon. An interesting expert article on graphite written for this paper by the State Mineralogist of California, appeared in the issue of Feb. 4th, '99.

LIQUID AIR has been used for blasting purposes as an experiment by Linde of Munich, near Cologne, Germany, the trial being reported to be successful. Details are lacking, but Mr. Linde has gone to Switzerland, where the new method of blasting by liquid air is to be adopted in running the Simplon tunnel.

THE relation between one avoirdupois ton of 2000 pounds to one troy ounce is the same as that between one assay ton, 29.166 grams, and one milligram; so that if one assay ton of an ore sample is used in a gold assay the weight of the bead resulting therefrom in milligrams indicates the value in ounces per ton.

SOME Paris Exposition mining exhibit propositions take unique form, as, for instance, the Utah miners' scheme to furnish $345,000 gold for a life size statute of a favorite actress. The resultant advertisement to Utah and the actress would justify the fulfillment of the idea provided the gold could be definitely considered in the light of a loan.

ALL nitro-glycerine compounds freeze and become hard at about 42° F. A contrivance for thawing giant powder was described and illustrated in the issue of Dec. 24th, '98. An apparatus especially designed for such purpose is sold by dealers in mining machinery. Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo., advertise such a device.

COLORADO advices are to the effect that above 8000 feet no snow has yet begun to melt. In some places over 40 feet of snow was reported. Traffic and general business has been resumed, and a big year is looked for. Throughout the California Sierras, generally, there was heavy snow. At the upper dam of the Tuolumne County Water Co. the depth was 12 feet, which, unless suddenly melted, should furnish abundance of water for the mines there long after the streams would have run dry. Like conditions are reported in Utah.

NOTICES are appearing in different California papers published in mining districts calling for miners' meetings to adopt the old mining district laws as to recording, etc., abrogated by the law of March 26th, '97, which was in turn repealed by the last California Legislature, thus permitting a reversion to the customs of the preceeding generation.

A NUMBER of grades recently made in hillsides on the sites of new mill or other mine buildings in California have been cut out by hydraulicking similar to the hydraulic mining method, the soil and loose debris being removed to bedrock. This has been done where the cost of preparation for the application of this method has not been too great.

IN a survey of mining claims upon which application for a United States patent is made, a surveyor may change his survey as marked on the land at any time before the return to the land office. But when an owner accepts a patent issued in conformity with the surveyor's return he waives all right to dispute the correctness of the boundaries as fixed by such return and the warrant.

TO FAIRLY and correctly state the relative advantages of roller mills and stamp mills would require an exhaustive treatise, and the conclusions would hardly be of general acceptance. The ore, its character, quality and amount; the locality and surrounding conditions go far toward determining which is best or more economical, and no general rule would apply to all local cases or requirements.

THE recent $5,000,000 organization of the North Star Mines Co. of Nevada Co., Cal., was, in connection with the North Star mine whose stock is to be listed in Boston, the same as Merced of Mariposa, Santa Ysabel of Tuolumne, and Pioneer of Placer, counties. Of the stock of the new New Jersey corporation $2,000,000 is to be exchanged for the North Star mine, and $500,000 offered to stockholders at $10 per share.

ELECTRIC currents have long been a disturbing element in observatories, it being found extremely difficult to separate in the record the variations produced by recorded changes in terrestrial magnetism from those caused by the trolley, and the former domain of the magnetic needle is seriously interfered with by the electric engineer. A correct and satisfactory solution of the problem presented has not as yet been reached.

CHLORINE and carbon dioxide have long since been liquefied—the former in its liquid form is used in the chlorination process in central California's leading gold producer, as narrated by that mine's superintendent in the issue of July 2nd, '98. All the elemental gases have been liquefied, even helium yielding to pressure, and the next advance in that direction may be the artificial production of solidified air, in blocks like any other inert mineral.

THE real economy of the electric motor does not lie in its ability to do any more work for each horse power than could be done by the steam engine, but in the fact that the power for many motors can be generated at one central station under conditions of much greater economy than can be secured in the locomotive or in small separate plants, and also in the greater efficiency, for special purposes, of a rotary motor over the reciprocating action of an ordinary steam engine.

A MINER was killed a few days since in the Norwegian mine in Tuolumne county, Cal., through the criminal practice of strapping timbers, lagging, etc., to the outside of the skip. The unfortunate man and a companion were near the bottom of the shaft when a plank which had been tied to the outside of a skip which was being lowered, becoming loosened, fell with the result stated. There is no excuse to justify this method of handling timbers or lumber in any mine.

ADMIRAL DEWEY'S "flag ship," the Olympia, is a "protected cruiser," 5800 tons, 340 feet long, 53 feet wide, with twin screws, each shaft driven by its own triple expansion engine. The normal coal supply is 400 tons. She was built by the Union Iron Works of San Francisco. The contract called for 13,500 H. P. On trial she developed 17,313. Her official trial speed is 21.68 knots. The total amount of power estimated as necessary for the Paris Exposition is 20,000 H. P., of which 15,000 is allotted for lighting and 5000 for motive power.

PRESIDENT MCKINLEY this week issued a proclamation setting apart 130,000 acres of land on the south side of Lake Tahoe, California, as a forestry reserve and public park. The proclamation defines the limits of Lake Tahoe forest reservation as follows: Townships 11, 12 and 13 north, range 16 east, Mount Diablo base and meridian, California; townships 11, 12 and 13 north, range 17 east, and south of township 11 north, range 18 east, as lies west of the Sierra Nevada range of mountains in El Dorado Co., Cal. Entries of lands already made are excepted from its reservation.

IN the case of Howeth vs. Sullinger, 45 Pacific Reporter, 840, the Supreme Court of California held that, "under the laws of the United States, Sec. 2324, which provides that the location of a mining claim must be distinctly marked on the ground, so that the boundaries can be easily traced, there is a sufficient identification of a lode claim where a stake or monument is placed at each corner, and at the center of each end, with one or more notices of location. It is immaterial that the lines and monuments of an official survey of a mining claim are not identical with those of the original location, the location being void only so far as it exceeds the statutory requirements."

A METHOD of depositing metals direct from the ore is reported from Germany, which is said to have proved so successful that a number of metallurgical works are to be equipped for this process of treating the ore. The process has been applied most for the refining of copper. The copper ore is first ground fine, then placed in a hot solution of copper chloride to dissolve the copper, silver, lead and nickel, and to change the solution to cuprous chloride. By the action of lime the arsenic, bismuth, antimony and iron are eliminated, and the solution, after being filtered, is passed into a receptacle divided by a diaphragm. Here electrolytic action occurs. The anode being carbon and the cathode copper, the copper of the solution is deposited in the cathode chamber, while the chlorine set free in the anode chamber combines with the solution to form cupric chloride, which serves to dissolve more of the copper ore. There is no loss of the solution, as the action is continuous. It is claimed for the process that the yield is far in excess of the usual methods, and that silver, lead and nickel are also obtained in a free state.

NO INFALLIBILITY is claimed for technical statements made herein, the idea being to attempt concise, correct answers to the great variety of questions asked. Where error is pointed out the mistake is cheerfully corrected, when manifest that a mistake was made. The exact technical nature of the information usually sought makes a high degree of exactness necessary for the answer to be of value, but at best and with the greatest care the result can only be approximately correct. Nor can answers be given immediately. It is always easier to ask questions than to answer them, and to properly answer an apparently easy question often takes considerable time.

NO PACIFIC COAST smelting company and no similar concern on the Atlantic coast is in the new smelter combine, which includes eighteen of the principal smelting companies in Illinois, Nebraska, Missouri, Texas, Colorado and Montana. It is understood that E. W. Nash is to be president, and S. B. Grant chief metallurgist, but this latter is not definite. It is stated that the policy of the combine will be to go slow as regarding the price paid miners for ores, looking rather to an advance price for the product. The total capacity of the combine is about 4500 tons daily. The main idea seems to be ability to fix the selling price of its product, and regulate the market itself, which is a comprehensive plan. The new arragements go into effect May 1.

MILL tailings at the Alaska-Treadwell mine average about 50 cents per ton. The concentrates are treated by the chlorination process, about 90% of the assay value being saved. Doubtless, as in other cases, a higher percentage might be saved, but where 90% is saved at a profit, it is more satisfactory from a commercial point of view than to lose money saving an extra 5%. There is no data to hand since the 520 new stamps began operations last month, but it is learned that during the preceeding ten years the mill crushed 2,536,013 tons ore, yielding $5,705,697.30 in free gold, and $2,183,170.64 in concentrates. During that time the average cost of mining and milling was $1.47 per ton, and, at times, the cost of milling was 30 cents per ton. During the ten years mentioned the aggregate profit was $4,167,154.99.

OF the 147,403 square feet of space allotted to the United States for display purposes at the Paris Exposition, 8000 square feet have been set apart for mines and mining, and 48,000 square feet to machinery and appliances allied to the mining industry. There are to be two distinct mining exhibits: one on the surface and one underground. The space above ground is for the display of mineral specimens and ore-separating machinery. Underneath the hill on which stands the Trocadero will be an exhibition of underground mining. What a revelation it would be to millions were such an exhibition of California hydraulic mining fitted up and shown as that which constituted so great an attraction at the Mechanics' Pavilion in San Francisco on the occasion of the Golden Jubilee and Mining Fair in February, '98!

POWDERED coal is utilized in the production of steam. Coal ground to pass through a 60-mesh screen is fed into a hopper in front of the furnace. At the bottom of this hopper is a grating which can be agitated 150 times a minute. The powdered coal drops through the grate into the bend of an air supply pipe which enters the furnace at the top of the furnace door. As it falls an induced draught carries it into the furnace which is lined with firebrick a length of 10 feet, and has two firebrick bridges. There is no grate and no fire doors, combustion being observed through two small apertures. Some Berlin experiments resulted as follows: The dry powdered coal evaporated from and at 212° 9.12 pounds of water per pound of dry coal as compared with 6.48 pounds solid coal fed by hand stoking. It is known as the Wegener system. It is figured that grinding the coal costs about 10% of its first value.

THE chief liability to explosion in a horizontal tubular boiler and any externally-fired shell boiler is from overheating of the shell, due to accumulation of mud, scale or grease on that portion of the shell lying directly over the fire, or a double thickness of iron with rivets, together with some scale, over the fire, or to low water uncovering and exposing an unriveted portion of the shell directly exposed to the hot gases. Vertical tubular boilers are, mostly, liable to explosion from deposit of mud, scale or grease upon the lower tube sheet, and from low water allowing the upper part of the tubes to get hot and cease to act as stays to the upper tube sheet. Locomotive boilers may explode from deposits on the crown sheet, from low water exposing the dry crown sheet to the hot gases, and from corrosion of the stay bolts. Double-cylinder boilers have exploded on account of the formation of a steam pocket on the upper portion of the lower drum, the steam being prevented from escaping from out of the rings of the drum by the lap-joint of the adjoining ring, thus making a layer of steam about one-fourth of an inch thick against the shell which was directly exposed to the hot gases. In the absence of details it is impossible to state the cause of the recent boiler explosion at Seattle, Wash.

HOW TO TEMPER and magnetize steel rods was the subject of a "Concentrate" in the issue of the 15th inst. Another method is to wind three or more layers of insulated copper wire around the full length of the steel to be magnetized, leaving two ends of the wire exposed, which are then connected with either two or more batteries or to a dynamo current. The latter is considered best, as it will magnetize in a shorter time. Care should be taken to have the steel thoroughly clean, free from rust, dirt and other substances which are liable to prevent the charge from entering the steel with its full capacity to obtain the very best results. The best results may be obtained by annealing and polishing a piece of cast steel before charging it. Certain specimens of magnetite surpass most kinds of steel in their capacity of retaining magnetism. Specimens of magnetite from Moravicza, in Siebenburgen, recently tested, have been shown to possess a greater degree of permanent magnetism than steel manufactured by the puddling, Bessemer or Siemens processes, but are surpassed in this respect by certain crucible steels and by tungsten steel, a Westphalian specimen of the latter showing a permanent magnetic moment of 62 units, as against 37 for "diamond steel," 34 for Reschicza crucible steel, 29 for Martin steel, 15 for puddling steel and only 3 for Bessemer steel. In 122 days a rod of magnetite only lost 1.5% of its permanent magnetism.

Some Characteristic Features of Veins in Granite in California.

Written for the MINING AND SCIENTIFIC PRESS.

Skirting the foothills of the Sierra Nevada mountains in California are three well recognized and distinct mineral zones or belts. These are known as the west or copper belt, the mother lode and the east lode. They are approximately ten to twelve miles apart, converging somewhat northward. The copper belt also contains gold mines, but the central and east lodes are chiefly gold-bearing, though copper ores also occur in a few places. The veins of the east lode traverse slates, mica schist, quartzite, limestone and other metamorphic rocks, and also occur in diorite and granite or, more properly, in grano-diorite, and it is more particularly to the latter occurrence that attention will be directed. Granite areas in which gold-bearing veins occur are found in Riverside county west of Perris, in Madera county near O'Neills, in Mariposa county near Hite's Cove, in Tuolumne county near Groveland, and at Summersville and vicinity, in Calaveras county at West Point and vicinity, in Amador county at Pioneer, in El Dorado county at several localities, and in Nevada county at and near Grass Valley and Nevada City.

In the several granitic areas referred to occur a large number of veins, some of which appear entirely independent of all others, and in other instances are found systems of connected fissures which were evidently produced by a common cause. These veins have definite characteristics, and the ores are noticeably similar throughout the entire granitic region referred to. They are usually easily distinguishable by their physical appearance from the ores occurring in other formations, whether in the same vicinity or from some distant point.

The strike and dip of these veins in granite are not at all uniform, in this respect differing greatly from the veins of the central belt which almost universally strike west of north and dip easterly. In the granite areas the veins have no uniform strike, but are found from true east and west courses around to north and at all angles between them. The dip is no more uniform than the strike. Whatever the direction of dip of a vein it is usually not persistent at or near any particular angle, but varies from a low angle to nearly or quite perpendicular. Not infrequently, in depth a vein will dip in an opposite direction from that at and near the surface.

The veins occur along lines of fissuring. These fissures are found singly, in pairs and in many places as zones of fracture of varying width, comprising several fissures having an approximate parallelism. These fissures, singly and in groups, are often planes of movement, as evidenced by slickensides, clay and gouge seams. In many cases these zones of fracture are found to consist of crushed granitic material, greatly altered, and in some instances containing vein quartz in a granulated condition, indicating that a movement of the rock masses has taken place subsequent to the deposition of the quartz. In certain more rare cases this brecciated or granulated quartz has been cemented by a still more recent infiltration of silica. In these crushed zones the feldspars are thoroughly kaolinized; the bi-silicates are altered to chloritic mineral and the whole mass is soft and, when wet, sometimes mushy, forming dangerous ground to mine. Often it is gold-bearing, too, though seldom rich.

In the same fissure plane or zone are found the concentrated mineral deposits forming the ore bodies proper of the mines. In some cases they lie at the side of these crushed, partially silicified zones, either in direct contact with them or separated by a rib or wedge of hard granite, but little altered. In other instances they are found as separate ore shoots, connected with the previously described crushed zones only by a clay seam. Other masses of quartz occur in these fissures which contain very little of either gold or sulphide mineral.

The veins are undoubtedly the result of substitution of silica, calcite and other minerals for the original soluble constituents of the granite, having been conveyed to the point of deposition by mineral solutions, probably derived from a deep-seated source. The most complete replacement has evidently occurred where the fissuring and crushing has been greatest. The vein quartz is found exhibiting every phase of condition from a partial alteration of the granitic mass, almost a normal granite (though the feldspars are always carious, and a small percentage of finely divided iron sulphide may usually be observed) through the various stages of transition, finally reaching the most complete alteration to crystalline quartz, sometimes heavily impregnated with the sulphides of iron, lead, copper, zinc and silver, with gold and other minerals more rare. Calcite is a frequent accompaniment, both in the quartz and in the crushed zones of granite. The vein quartz occurs in a variety of conditions—as a vitreous, colorless, granular rock; a milk-white, semi-greasy kind; a bluish-black variety, usually vitreous; also in alternating bands of bluish and white rock, and as granulated quartz. All of these varieties are gold-bearing and again all kinds are barren. All are associated with sulphide minerals and all again occur with scarcely a trace of them. The banded varieties are usually of fair grade in gold, and the appearance of galena is often an index of value. Some of the zinc ores are also high grade. The sulphide minerals contain from $50 to over $1000 per ton in gold and some are also correspondingly rich in silver, though the silver contents are usually relatively small. The sulphides are pyrite, marcasite, chalcopyrite, galena, blende and pyrrhotite. The latter is peculiarly characteristic of granite formations throughout California, particularly in the ore bodies of larger size. Tellurides of gold occur sparingly in several localities.

The ore shoots vary greatly in width and length and occur as lens-shaped masses, often of irregular form. Some of the shoots are several hundred feet in length and have a width of 30 feet or more, as in the Black Oak mine in Tuolumne county. Ordinarily, however, the shoots are less than 100 feet in length and average between 6 inches and 2 feet in width. Often the lenses have an average length of 20 feet, but succeed each other immediately, the ends often overlapping, thus forming practically a continuous shoot of considerable length.

Occasionally are found two veins approximately parallel and separated by 1 to 4 feet of granite in a more or less advanced condition of alteration, as is the case in the Good Hope mine, near Perris, in Riverside county. The branching tendency of the fissures is a pronounced characteristic. Usually one wall at least is well defined—generally the foot—the zone of fracture and crushing extending to various distances into the hanging wall. Now and then a perfectly defined hanging wall will be found, but progressing along this wall it is seen to diverge gradually from the plane of the foot and its influence as a bounding plane is lost, another slip or wall taking its place. This continues indefinitely until the identity of the entire vein is lost in the numerous branching cracks which extend into the granite. Often a well-defined vein several feet in width will thus pinch out to the merest crack in which is found no sign of clay or of movement, and it requires the most careful observation to follow it at all; but usually by persisting in the general direction of the course of the vein, it may be found to reopen and new shoots of ore found. Sometimes, however, after drifting fruitlessly some distance, a crosscut is advisable. In some instances these pinches are more than 100 feet long and the ground very hard.

The formation of many short shoots of rich ore in portions of the fissure where the walls are several feet apart is an interesting feature. It is not uncommon to find a wedge of quartz forming on the footwall, which gradually widens to 1 or 2 feet, when it leaves the footwall, crosses the fissured zone at a low angle and joins the hanging wall, where it thins out and is lost. Between the short shoot of ore thus formed and its parting from the footwall there may be found several stringers of quartz parallel with the foot, or the entire space may consist of a reticulated group of small veins and seams, while along the footwall a second wedge-shaped vein of quartz will appear which will repeat the peculiarities of the shoot adjoining, as described. The granite adjacent to the vein, and occurring as horses within it, is frequently gold-bearing to a considerable extent, sometimes in sufficient quantity to be visible to the eye.

It is the custom to sort out the granite as waste, but it should be done with caution, for it not infrequently pays to send the entire contents of the vein to mill, when in the pay shoot.

The fact that several old dumps have been worked at a profit is evidence that early methods were careless in this regard. In some respects these mines are worked at a disadvantage, for it is easy to lose the vein where a pinch occurs, and it has led in numerous cases to the closing of what are probably good mines. What has been described as occurring along the vein horizontally is equally applicable to the fissure in depth, and a pinch in the shaft does not signify that the limit of the vein has been reached any more than it does when occurring in the face of a drift.

These disadvantages are generally offset, however, by the high grade of ore, which is uniformly much higher grade than that in larger veins in other formations. Often the ores from the veins in granite may be shipped to distant smelters with profit after rough sorting.

Dykes are of frequent occurrence throughout the granite area in the neighborhood of the mineral belt. They are of various types, but the most common are granitic dykes of coarse crystallization and dark green diorites of fine grain, extremely tough and hard. The former are characterized by the occurrence of masses and crystals of albite, tourmaline and biotite. The peculiar interwoven, grate-like structure of quartz and feldspar, known as graphic granite, is of frequent occurrence. These granitic intrusions are usually older than the veins, though there are exceptions. The diorite dykes, however, are generally younger and cut the veins. The dykes, as a rule, cross the line of strike of the veins, though not always. Whether or not these dykes have any important influence on ore deposition is a question.

In some instances ore shoots are found lying with the granitic dykes, the downward pitch of the ore body being coincident with the dip of the dyke. The influx of large quantities of water is a usual accompaniment of the development of these veins. It often comes with a rush at unexpected times. A mine may be developed to considerable depth and have encountered but little water, when without warning a blast will break into what is called by the miners a reservoir or pocket, though usually, in fact, a system of fissures filled with water derived from the surface. The deeper the point in the mine at which these water crevices are struck the greater the force of the water. Often the lower levels are completely flooded, and weeks are required to pump out the water, but in time the reservoir is exhausted and things resume their usual condition. Another water rush may not occur in many months, and again in some cases they have been found in quick succession. In one instance a water crevice was broken into in the Black Oak mine in Tuolumne county at a depth of 600 feet. With considerable difficulty a bulkhead was constructed and the pressure gauge indicated at one time a standing pressure of 180 pounds to the square inch, indicating that the height of this reservoir was not less than 400 feet. The flow being controlled by means of a valve, the pumps in time removed the water and a normal condition was again reached. After several months the bulkhead was torn out and a round of holes was drilled in the face and discharged, upon which the water again rushed into the mine workings in as great volume as before.

The probability is that in some manner the vent to the reservoir had become clogged and the flow of water stopped. The force of the blast removed the obstruction and the water again poured into the mine workings, but it finally was drained to a considerable extent. This shows the necessity for an abundant capacity to handle water. Some claim that large flows of water are an indication of valuable ore deposits, but there is really no apparent relation between ore deposits and large flows of water. The ore was deposited by ascending currents and the water found in mines is always found coming down from the direction of the surface. Sometimes water may be seen bubbling up from the lowest levels of a mine as though from an ascending current, but a case of this kind is due to hydrostatic pressure, the water flowing in coming from some point higher, through a series of connected cracks or fissures.

A peculiarity of these veins in granite near the surface may often be observed in the occurrence of open cracks, traversing the vein in a horizontal direction, reaching from wall to wall, and dividing the vein into blocks by a series of floors, as it were, at quite regular intervals of a foot or thereabouts, depending somewhat upon the width of the vein. The blocks are separated by 1 to 4 inches of space, in which have accumulated clay and grit, quartz crystals, iron oxide and other secondary products and gold. The amount of gold is often largely in excess of the amount found in an equal weight of quartz of the vein itself. This peculiar occurrence is undoubtedly due to a sort of molecular expansion of the granitic mass, chiefly due to the alteration of the feldspars, and in a less degree possibly to the change which has taken place in the other constituents of the granite caused by surface decay and meteoric agencies generally. It is an interesting fact, and affords food for study and investigation.

The occurrence of gold in the silt-like material lying on these floors may be due partly to the quartz itself, but more probably comes from the oxidized sulphides and also in part perhaps by infiltration from the selvages of the vein, if not from the granite itself, which may have become gold-bearing by impregnation from the fissure. Attrition, due to movement, may also have been partly responsible for the occurrence of this gold. When the oxidized zone is passed and the granite becomes normal these floors no longer appear.

In many places the quartz is perfectly free from both walls, and again but one wall is free, the opposite side being frozen. In an equal number of cases the vein is frozen on both walls. These variations are not constant, for a vein may be free at one place and frozen in another. These changing conditions may be considered as indicating something of the relation of the original fissure to the ore deposit. Where both walls are free, it is not unlikely that the ore is filling the space bounded between two fissures. Where one wall is free the mineralization has progressed along one side of a fissure plane only; and where both walls are frozen, it would seem to indicate that ore deposition progressed outward from a single crack, or possibly, in the case of a large ore body, the mineralization has impregnated the walls beyond the limiting planes of the fissured zone, to an extent sufficient to constitute ore and has stopped only when the mineral solutions were unable to penetrate farther from the fissure plane itself.

W. H. S.

EVERY commercial and manufacturing industry is either directly or indirectly dependent upon mining in some form or other. Even those which seemingly are the farthest removed will, at a moment's thought, be seen to depend upon the mines for existence, whether it be for coal, iron or some of the base metals, or for gold or silver.

Some Experiences of a Working Miner.

NUMBER X.

Written for the MINING AND SCIENTIFIC PRESS.

Some men have queer ideas of the eternal fitness of things. Now, there was S—— up at A——. He owned several mining claims, and had a little money. He also had friends, and he organized a corporation to equip and develop his mines near A——. There were several veins on the various claims, but they were not all alike. Some were free milling and some not. Of course the proper thing to do was to first develop the mines, and this was done to a considerable extent. Shafts were sunk on several veins and numerous tunnels run. The workings demonstrated that they were good, strong veins and that these veins carried gold. The free gold vein was the one to which attention was first directed, but this seemed too easy, too much like following a deep rut in the road. So it was determined to make an effort to treat the base ore, which was higher grade. The first attempt failed, but S——, being full of determination and confident in his own ability to successfully treat this stubborn ore, stuck to the proposition. He rebuilt his mill several times, substituting various new devices for those previously tried, but always with the same discouraging result, until at length the resources of the company were exhausted and they either could not or would not put up another dollar. At this late hour S—— turned to the free milling vein again and tried to convince his company that he could soon recover his losses if they would allow him to try that proposition, but they decided unanimously that S—— and his mines were frauds, and left him to struggle alone. He is there yet and so are the mines. Here and there, lying about, are old, rusty iron castings of odd shapes, the original use of which it would be hard to guess, but no one goes near the mines—they have been effectually queered by a man who lacked the first requisite in mining success—common sense.

Miners do not always recognize a good thing when they see one. Some years ago two energetic prospectors located a claim and drove a tunnel into the hill on a small vein. The vein carried a nice prospect in free gold but it was far from being rich, considering its size; still they stuck to it and worked every day. After a while they struck water, and as the face of the tunnel advanced the flow of water increased until they had quite a stream flowing out of the tunnel. One day they struck a crevice in the rocks and the water more than doubled in volume. As this was not a dry country by any means, and as water flowed down the gulch in front of their cabin they did not need nor want this water, so when the superintendent of a large mine several miles away came riding by, they engaged him in conversation and showed him some "average" prospects carefully saved during the course of development. The manager of the great corporation appeared much interested in this little mine, but hesitated about going into the tunnel on account of the water, as he didn't like to get his feet wet; but they quickly provided a pair of rubber boots and he made an examination lasting nearly half an hour. He took a few samples from the dump and told the boys to come down to the H—— mine almost any day, and he would decide what to do after thoroughly testing the ore. They went down the following day, and the assays not having been finished they were obliged to wait until the following day, when, after considerable bargaining, the price was agreed upon, and the transfer was made. The miners were jubilant, and proceeded to celebrate the event in proper mining-camp style, and incidentally let it drop that the manager of the big mine was pretty easy game. After they had celebrated to a satisfactory extent they returned to their camp, but imagine their surprise to see a number of men working on a new flume which led them up the gulch toward their camp and finally stopped at their tunnel, across the mouth of which a strong bulkhead had been constructed. Then for the first time they realized that they had underestimated the caliber of the manager—it was water for the big mines he wanted and not the little vein at all. Had they realized its value they could have easily gotten ten times the amount which they had received. They thought it would be a good scheme to repeat the experiment and accordingly drove another tunnel, in which they got neither gold nor water.

One of the biggest humbugs in mining camps is the wet process and blowpipe assayer. The volumetric assay of many ores is a splendid process and is absolutely dependable when properly made, and the blowpipe in proper hands is also worthy of every consideration and is reliable in its results, but it is not to this class of chemists I refer, but to another class of men entirely. To illustrate, I knew one of these impostors at D——, his name was B——. A prospector would bring in a piece of rock and B—— would proceed to examine it critically under a magnifying glass. Then, after a few appropriate remarks, such as "This is from the Archo-cretaceous," or from the "Cambreo-tertiary," he would go on and at length explain to the astonished prospector the genesis of this particular rock and finally tell him it was gold or silver ore, or some other ore, and he would assay it for $1. This was quite an inducement, as the regular price for assaying by competent assayers was $3 50. B—— would pulverize the ore, boil it with nitric acid, add salt, and borax, and then bi-carbonate of soda. A brisk effervescence followed, after which the solution was decanted, the pulp washed and dried and treated with the blowpipe. The next process was washing (vanning) down in a little porcelain saucer until the specks remaining were so small no one could tell what they were without the aid of a microscope. This old fraud would then dry and pretend to weigh the "buttons," and would gravely announce the value of the ore to be $187.42 gold, 317.76 ounces silver and anything else he happened to think of, and would hand his dupe a printed slip purporting to be a certificate of assay. He took in hundreds of dollars in this way from unsophisticated prospectors. On one occasion I took him a piece of white friable quartzite in which could be seen a multitude of dark colored specks. These were chloride of silver. A similar sample of ore assayed 1800 ounces silver. B—— examined it in the usual way and said in such a patronizing way, "My friend—common sandstone, a waste of money to assay it." "What are those black specks?" I inquired. "They," said B——, seriously and as I thought, pityingly, "are fly specks, my friend." I could do no less than thank him, and, putting my $1800 fly specks in my pocket, walked out. I have known of other pretenders no more reliable than B——, who had a pretty good outfit of furnaces, scales, etc., but knew practically nothing of their use.

I walked up to a prospect shaft on the P—— Q—— mine one day. It was about 80 feet deep. Two men were windlassing. As the bucket approached the surface I watched them land it on the platform. I have seen many devices for attaching a rope to a bucket about mines—plain hooks, safety hooks and other hooks, including the outrageous "pig-tail" variety—but these fellows had the latest scheme. They had made a loop about a foot long at the end of the rope. This loop they passed through the ring in the bail, then turning the end upward the upper portion of the loop was drawn through the lower portion and a piece of stick 8 inches long and 1½ inches thick thrust through to hold it. To me it seemed a very dangerous thing to work under, and I promptly declined an invitation to go down the shaft. I told them I considered their device dangerous but they assured me of its perfect safety and also enlarged upon its convenience. One of them called down the shaft to "Scotty," who was at work in the bottom, that a stranger was afraid to come down on account of the loop. This amused Scotty greatly. Within two weeks this same bucket fell from a point near the surface and Scotty's mining days were over. The poor fellow was killed instantly. How it happened no one seemed to know, but I am satisfied as to how it occurred. MINER.

Marconi's Wireless Telegraphy System.

In the issue of Jan. 8th, '98, the latest in "wireless telegraphy" was given. Since then there has been further advance, some of which is embodied in a recent address by M. Marconi, from which it appears that the best results are secured when the signaling circuits at the terminal stations are connected to vertical conductors, the lower ends of these being earthed. The addition of a capacity, such as a hollow metallic box or sphere, at the tops of the vertical circuits assists the working of the apparatus. Regarding the height of the poles on which these vertical circuits are mounted, it has been found that

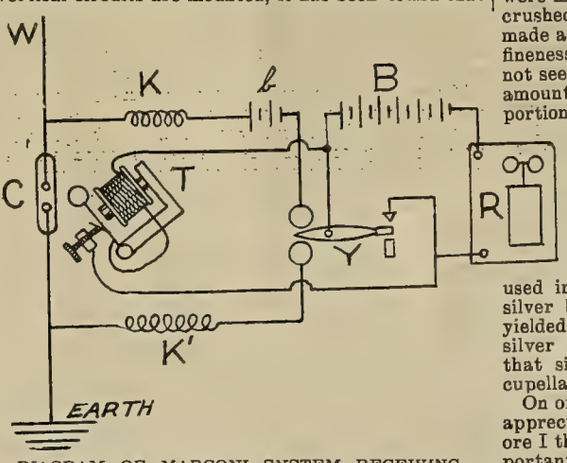


DIAGRAM OF MARCONI SYSTEM RECEIVING STATION.

with poles 20 feet high messages may be successfully transmitted to a distance of one mile. Poles 40 feet high are sufficient for four-mile transmissions, and in general the distance to which a message may be sent varies as the square of the vertical height of the terminal circuits. Over land the distances practicable are not so great as when signals are sent over a water surface, though the effect of intervening hills, trees, houses, etc., is lessened when high poles carrying the sending and receiving circuits are employed. As to the arrangement of the apparatus, M. Marconi found that, for a sending station, a coil giving about a 10-inch spark is best, the discharge taking place between brass balls 1 inch in diameter. This arrangement, when the balls are only about ⅝-inch apart, gives better results than the Righi oscillator formerly used. It is said to work better when the balls are dull than when they are polished. The object of using so large a coil for this short-spark distance is to insure a regular and steady stream of sparks.

The arrangement of a receiving station is shown in the accompanying diagram. The coherer *C* is connected with the vertical wire *W* and also to a small battery *b*. Included in the circuit with this battery and the coherer are small working coils *K* and K^1, which compel the rapidly oscillating currents set up in the vertical wire to travel through the coherer rather than through the alternative path presented by the battery circuit and sensitive relay *Y*. The signals actuate the relay, which closes the large battery *B*, through a Morse recorder *R* and a tapper *T*, similar to an ordinary electric bell. This rapidly taps the coherer tube, loosening the filings contained in it, but this action is so rapid that the tongue of the relay does not have time to move, and hence the recorder makes a continuous mark while the wave signals are coming in. To avoid the disturbances that would be set up in the coherer by sparks at the tapper contact and elsewhere through the instruments, high-resistance, non-conductive shunts (not shown in the cut) are bridged around each gap.

The latest feat is the successful interchange of messages between Dover, England, and Boulogne, France, a distance of thirty-two miles, on the 28th ult.; the rate of transmission was about fifteen words per minute. It has been urged that Marconi can do nothing commercially with the system, because the transmission of messages is too slow for public requirements, and also because it is impossible to maintain absolute secrecy. Any one possessing an apparatus can receive the message destined for another person.

Loss of Gold by Absorption in Cupellation.

TO THE EDITOR:—I have recently been making some tests to determine the loss of gold by absorption into cupels during cupellation. Thinking that the fact of there being such a loss might be new and interesting to some of the readers of the MINING AND SCIENTIFIC PRESS, I send you the following results of my experiments:

I frequently have assays to make of chips from gold bars, and having no bullion rolls I beat my cornets out on a small steel anvil with a light hammer. This almost invariably leaves a slight discoloration of iron on the cornets, which is not removed by the subsequent boiling in acid during parting.

Thinking that this might be removed by cupellation, I rolled some of my weighed cornets in sheet lead and recupelled them. On weighing the purified beads, I found that they had lost about three-thousandths in the operation of cupelling. As this loss seemed excessive, I recupelled some of the beads several times and found that there was a constant loss of weight with each repetition of the process. I then pulverized and assayed some of the cupels, and found that I could recover about 98½% of the lost gold.

Concluding that the bone-ash of which the cupels were made was of too coarse and porous a texture, I crushed some of it to pass a No. 120 mesh sieve and made a few cupels for experimental purposes. The fineness of the bone-ash or texture of the cupels does not seem to make any particular difference in the amount of gold absorbed, which seems to be in proportion to the quantity of lead and richness of the alloy. Thus 500 milligrams fine gold cupelled with 20 grams lead lost 1.15 milligrams gold; 1000 milligrams fine gold cupelled at the same time with an equal quantity of lead lost 2.3 milligrams gold, while a third test of 500 milligrams of gold with 5 grams of lead only lost .54 milligram in weight.

An assay made of a cupel that had been used in refining a few pennyweights of gold and silver bullion of about 700 points fineness in gold yielded by crucible assay at the rate of 22 4 ounces silver and 6 6 ounces gold per ton, thus showing that silver is absorbed far in excess of gold during cupellation.

On ordinary low-grade ore assays the loss is not appreciable, but on large shipments of high-grade ore I think an assay of the cupels would be very important.

The absorption of gold in my cupels may be due to some chemical defect in the bone-ash.

If any of your readers have ever experienced a similar difficulty and can suggest a remedy, I will be glad to hear from them.

W. E. DARROW, M. E.

Sonora, Cal., April 7th, '99.

Electric Street Lighting.*

By ALBERT SHEIBLE.

Street lighting, as a whole, had become quite common for large cities before the event of electric lighting practice; indeed, Pompeii had its street lamps, and even the use of gas for street lights dates back almost to the time when Davy discovered the electric arc. Paris was lighted with gas as early as 1817, while Berlin and Dresden followed nine and ten years later, so that the extended street lighting of large cities from a central point had passed the experimental period more than half a century before the days of electric lighting. What is more, our larger cities twenty years ago seemed to be well aware of the two prime objects of street lighting, namely: path finding and crime preventing.

But it was the arc lamp that came first here and the Jablochkoff candle in Europe. Both of these were lamps of high candle power, and in admiring their great brilliancy most people forgot the formerly well-known objects of street lighting. Wherever the arc lamp or the Jablochkoff candle was shown the high candle power made the old gas or naphtha lamps seem very dim and ineffective; hence the cry went up immediately for electric street lamps—powerful street lamps, dazzling street lamps. Mr. Brush himself likes to tell of the first electric street lighting in this country, when a dozen tower lamps were placed on the public square at Cleveland, and when many in the crowds that gathered brought dark spectacles with them. It was not so much the illumination that they were watching for, but rather the dazzle and the glare; and once having seen these dazzling lights and noted the intense illumination near them the people were not satisfied with anything less brilliant, so that high candle power of lighting units became a requisite of lamps for street lighting.

As for the lamps themselves, electric street lighting has, for the most part, been done with just the same types of arc lamps that have been used indoors, the works of the arc lamp being somewhat protected from the weather by means of a sheet iron hood over it. Only within the last half dozen years have there been lamps with a proper weatherproof casing so as not to need this hood. The so-called 2000 candle power (460-watt) and 1200 candle power (300-watt) arc lamps are used almost entirely, though here and there we find some smaller sizes, which I believe will be used more largely in the future. The term "2000 candle power" in itself impressed the people in the towns lighted as something worth having, and if they happened to find out that the lamps really gave only about a quarter of this candle power the electric light men had no difficulty in convincing them that "the 2000 candle power lamp is one which sends 500 candle power in each of four directions from its place over the street crossing." Incandescent lamps have been most commonly used in the 25, 30 and 32 candle power sizes, with a few of 50 or 75 candle power, and some of only 16 or 20 candles. However, the distribution of the light from these lamps has almost always been aided by the reflector over them, which is not the case with the arc lamps.

As a distribution system, the series circuit still holds almost a monopoly for street lighting. It lends itself so readily to the connecting of lamps scattered over a large territory that it was used with the Brush arc lamps just as soon as the differential winding made the operation of arcs in series a possibility. The number of lamps on a circuit and consequent voltage was limited only by the ability of the dynamo builders to properly insulate the parts of their machine. Eighteen years ago a circuit of 16 or 18 arcs was a high voltage circuit, although the lamps then used were the so-called short arcs, requiring only 25 to 30 volts each. Bare copper wire was used at that time, but sad experience with it led to the "underwriters" and later to the so-called "weatherpoof" wire, which is still used almost exclusively except for wires leading into the casing of weatherproof arc lamps, for which purpose rubber-covered wires are now preferred.

The size of the dynamos was at first larger in Europe than in America, as the forty-eight Jablochkoff candles installed twenty-one years ago in the Place de l'Opera at Paris were run on multiple circuits from three alternators (each with its own exciter), driven by three 20 H. P. engines. This meant sixteen lamps per generator, while the earliest Brush arc dynamos built at about the same time were made for a single arc lamp, and the two-light and four-light machines which followed them had the lamps in multiple. Then when the series lamp was perfected, circuits of twelve to eighteen lamps became common, and dynamos increased in size up to the so-called 60-light or 50-kilowatt type, which for years has been the accepted unit. However, the development of much larger constant-potential generators and the evident increase in efficiency with the larger sizes stimulated the builders until now we have arc machines supplying as many as 150 of the 2000 candle power lamps or 200 of the 1200 candle power. Some of these are so arranged that the lamps, while all in series, are distributed over three circuits, so that the voltage on any one circuit is only about a third of the total. Meanwhile there have been great improvements in the alternating current arc lamps, and the perfection of such lamps for use on series circuits seems close at hand. When it comes we shall be able to run both our arcs and incandescents from the same machine, so as to use the 200 or even 500-kilowatt generators (which already have reached such high efficiency) without needing the rectifiers now used to some extent in England for supplying current from alternators to arc lamps in series.

Incandescents for street lighting are usually connected in series across the primaries on the alternating generator, each lamp being provided with a suitable cutout device to automatically close the circuit when the filament gives out. An exception to this is the Westinghouse plan of having an inductive or so-called "kicking" coil in shunt with the lamp, the coil being of too high resistance to consume much current ordinarily, but which will offer an inductive counter electro-motive force equal to the voltage of the lamp when the latter gives out.

The method of supporting the lamps varies from place to place, and, as a rule, has not had the proper amount of thoughtful attention paid to it. In the early days, when the number of arc lamps used was very small, these were put up on tall masts or towers, and were supposed to light a wide area. Such towers are still in use altogether at a number of places, and have also been retained in parts of other towns. They have the great advantage that they hold the lamp high enough not to glare into your eyes when walking toward them, but tall trees or buildings of any considerable height usually interfere with the distribution of light from them. Such towers generally had from two to six arc lamps each, and the next step was the placing of each of these lamps over a tall pole, so that the lamps could be distributed over the area to be lighted. The poles, being set inside the curbing, brought the lamp so close to the line of the shade trees as to cut off most of the light from the walk on the nearer side. To overcome this, lamps were hung out at the end of iron mast-arms, these being 10, 12, 15, or even 20 feet long, and, as a cheaper substitute, the cross-suspension wire method was then introduced, though mast-arms can now be put up as cheaply as the cross-suspension. Each of these methods has given good average results.

For a wide distribution of light from a lamp the latter ought not to be less than 30 feet above the street, hence the mast-arms or cross-suspensions were at first made to support the lamp over the center of the street and some 30 or 35 feet high. This brought the lamp above the foliage which shaded and darkened the walks; so that the lamps were lowered to the common height of only 18 or 20 feet, bringing them so nearly on a level with the eyes of the teamsters as to seriously dazzle them when driving toward the lamp. Reducing the candle power of the lamp reduces the intensity of this glare, so that a 340-watt or 240-watt is less offensive than the 460-watt arc, and a 105-watt incandescent lamp still less so. (The energy required for the 460-watt arc will supply four or five incandescents scattered like our gas lamps, to give a more even distribution for lighting units.) Happily, the enclosing globes used on long-burning arcs are reducing the glare, and the same is true when ground, opal or fluted globes are used.

To sum up the changes in street lighting practice: Yesterday the cry was for large lamps and intensely bright illumination of some picked spots, regardless of the equally intense shadows intervening. To-day there is the tendency to have the rays of light overlap and to use lower candle-power lamps in the alleyways and other dark nooks and on the streets of the outlying districts. To-morrow we may look for smaller units and a great many more of them.

Yesterday the type of lamp and method of support, picked for the business district, was used throughout. To-day many towns use the bright display lighting only in the business section and a milder one for the residence portion. To-morrow we may look for a mild but uniform illumination, both for the residence district and for the business portion after midnight.

Yesterday the lower efficiency of the incandescent lamp kept it back. To-day our ability to distribute light more uniformly with the incandescents has caused them to be used in many places, and to-morrow we may look for small arcs or incandescents of higher temperature and, therefore, higher efficiency to bridge the gap.

Yesterday the naked arc, being all the more dazzling, was welcome. To-day enclosing globes are mellowing the effect on the eye. To-morrow the use of naked arcs out of doors and less than say 30 feet above the ground ought to be prohibited by law.

Yesterday only large cities felt the need of street lighting. To-day even towns with a population of less than 1000 have their streets electrically lighted.

Yesterday a thousand towns secured the advantages of electric light and power by giving lighting contracts at a fair profit to proposed plants. To-day the same towns begrudge the help they have given toward modernizing their city, hesitate to pay even the actual cost for lighting by contract, and make the central stations look to the sale of exhaust steam and like sources of extra revenue.

Yesterday towns were lighted either with arcs or incandescents. To-day both are used in the same city, each in its proper place. To-morrow we may have some lamps of intermediate candle power to supplement the arcs and incandescents.

Yesterday every circuit of one dozen or two dozen arc lamps required its own generator. To-day we have from 100 to 200 run from a single generator, and to-morrow we may have 400 or 500 arcs, all run from the same alternator.

Yesterday a circuit of 1000 volts was hard to insulate, and might have to be shut down during rainstorms. To-day we have circuits of 7000 to 8000 volts giving uninterrupted service, in spite of wind and weather.

Yesterday little attention was paid to the fittings as long as the lamps, dynamos and circuits were all right. To-day they must be firm and durable. To-morrow the lamps, supporting fixtures and all parts of the circuit will need to be good-looking.

Last, but not least, electric street lighting has become an object of careful study and is receiving skilled attention. Yesterday the size and distribution of lamps and the methods of supporting them were decided chiefly by the salesmen of the firms supplying the material. To-day such organizations as the American Society for Municipal Improvements and the National Association of Municipal Electricians are making a serious study of street lighting in its general bearings and are getting back to due consideration of the prime objects of all street lighting—path finding and crime preventing. What is more, while some manufacturers and consulting engineers have made a specialty of long-distance power transmission, others of the lighting system for modern buildings, and still others of the applications of electric motors to special classes of machinery, we also have some who have been studying the problems of electric street lighting. It is only by such special study, both on the part of the engineers in charge of the work and of the makers of the needed devices, that we can expect to raise the present standard of effectiveness of our street lighting. And I think it is high time that both the general public and our electrical fraternity were made aware of the importance of these problems, so as to help us all in having electricity become by far the best means for properly lighting our outdoor pathways.

*Condensed from a paper read before the Chicago Electrical Association, March 10th, '99.

A Necessity to the Mining World.

The San Francisco MINING AND SCIENTIFIC PRESS is without a peer among journals of its class. * * * People who desire to keep in touch with all that is latest and up-to-date in mining and milling cannot afford to be without the MINING AND SCIENTIFIC PRESS.—Telluride, Colo., Journal, April 15th, '99.

A SOMEWHAT curious action was recently decided in the law courts. The plaintiffs agreed to give the defendants the benefit of what they claimed to be a "secret process" for casting copper, and brought an action against them for payments in connection therewith. The defense was that the plaintiffs had no "secret process" at all; and on their combating this allegation they were challenged to produce the "secret process" in open court. The argument of the defense, which was to the effect that the "secret process" if once disclosed would be secret no longer, appears a legitimate one. But, nevertheless, they were called on to disclose it, and, on their refusal, the case was adjudged against them.—Industries and Iron.

ACCORDING to the census of 1890 the entire capital then employed in the manufacturing and mechanical industries in the United States was $6,525,000,000. According to the New York *Journal of Commerce*, which has been at pains to bring together and add up the capitalization of the trusts and combinations now in the field, there has been created a stock and bonded indebtedness on their account of $5,832,882,842.

ELECTRO MAGNETS are to be used for recovering a large load of steel rails which was sunk in the Ohio river some time since. A crane boat will be equipped by a Pittsburg company with the necessary magnets and other machinery capable of lifting 4000 pounds each. The work will be done by a Pittsburg company.

THE battleship Iowa will leave San Francisco for Port Orchard, Wash., next month. It is interesting to note that the Iowa is to be repaired by the builders of the Oregon. The Oregon's great trip to Cuba and her present trip to Manila, in face of the failure of the Iowa to accompany her, is also interesting.

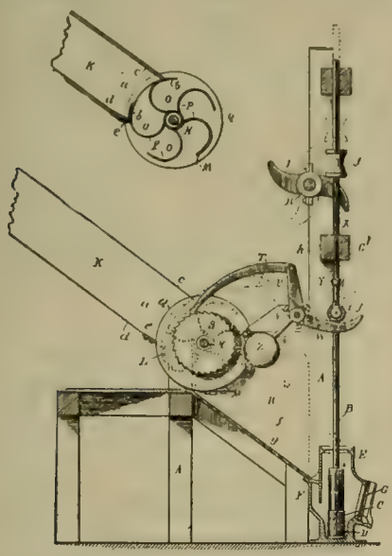
THE Supreme Court of California has rendered a decision upholding the right of labor organizations to boycott obnoxious employers, and denying an injunction except upon a showing of specific acts of a criminal nature.

Latest Mining and Metallurgical Patents.

Patents Issued April 4, 1899.

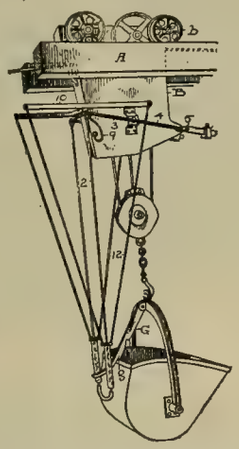
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ORE FEEDER FOR STAMP BATTERIES.—No. 622,763; C. M. Dobson and T. S. Alexander, New York, N. Y.



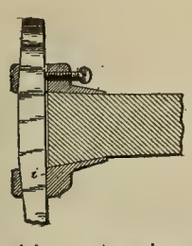
A revolving ore feeder, in combination with a bumper rod adapted to be operated by an ore stamp, a lever operated by rod connection between lever and feeder for operating the latter from the lever and means for restoring the lever and bumper rod, lever and rod having the one a cam face and the other a reciprocal face engaging and traveling on cam face, for graduating the speed of movement of the lever relatively to the speed of movement of the rod. A drum, in combination with a shaft *V* having arms *U* and *W*, a cam face *j* on arm *W*, a ratchet *S* on drum, a pawl *T* connected to arm *U* for operating ratchet, a bumper rod *X* adapted to be operated by an ore stamp, and in operative engagement with the cam face on arm *W*, and an adjustable stop *Y* for rod.

MEANS FOR TRIPPING BUCKETS.—No. 622,840; L. A. Cook, Conneaut, Ohio.



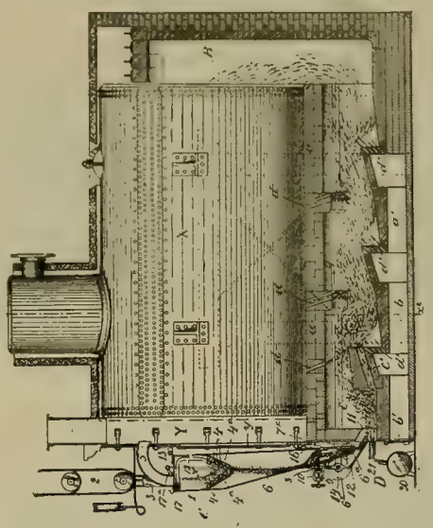
In a hoisting and conveying machine, a carrier and a bucket operated and suspended through carrier, a latch for bucket, in combination with a balancing bar pivoted to carrier and having a suspending member to engage latch, a counterweight to balance bar and member to prevent a premature tripping of the latch when the bucket is traveling or first lowered, and means to limit the free movement of bar and member to finally trip the latch.

MINER'S PICK.—No. 623,025; J. B. Lucas, Valley Springs, Cal.



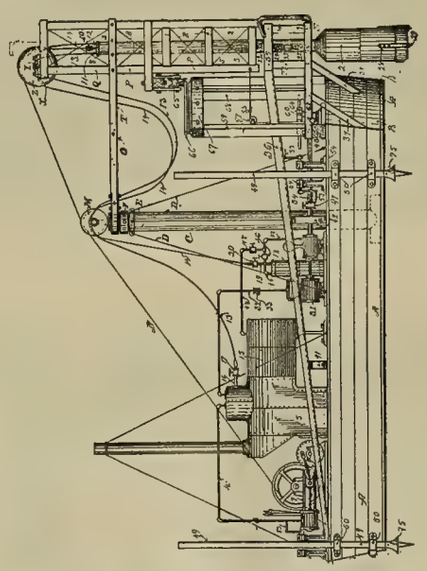
A pick, comprising a tapering eliptical socket provided with straps or loops projecting outwardly beyond the mouth thereof, each strap having a flaring passage formed by beveling the inner face of its outer wall, one of the straps having its inner wall extended to form a seat or projection which contracts its passage with respect to the passage of the other strap, a pick blade adapted to be inserted and withdrawn through the larger passage of the latter strap and provided with shoulders to abut against the beveled outer walls of the straps, a set-screw working in a threaded opening in the inner wall of the larger strap and impinging against the blade to force the same against the beveled outer wall of the strap, and a handle having a wedge-shaped butt inclosed in the socket and terminating in rear of the blade.

MEANS FOR FEEDING AND BURNING PULVERIZED FUEL.—No. 622,935; W. Westlake, New York, N. Y.



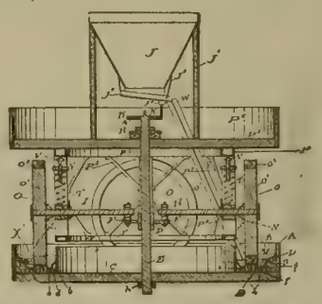
The combination with fuel receiver and chute or trunk 6 extending down therefrom, of a feed regulator consisting of a scolloped plate 7, in the chute or trunk, and movable plate 8, which may be shifted in or out over the plate 7, to regulate the size of the opening through which the fuel must pass in its descent to the furnace mouth. A fuel feeding and drying device, comprising a receiver 1, a V-shaped drier therein consisting of the steam pipes 4, and the plates 4^a situated beneath and near to said pipes, the agitator in said receiver above the drier, and chute 6 adapted to lead the powdered fuel by gravity down to the furnace mouth, and the feed regulator in chute.

DREDGE.—No. 623,111; A. J. Severance, Denver, Colo.



The combination in a dredge of a vacuum suction lift tube consisting of a tube containing a long body portion containing an enlarged suction or mouth portion, water and steam flexible supply pipes, steam and compressed water supplies, air inlet, a door hinged to mouth to swing both in and out and arranged to fold upon itself in either direction at substantially its width, and one or more self-closing valves adjacent to the mouth end of tube, spring keepers arranged to support door across the mouth of the tube positioned on opposite sides of tube to engage the parts of door at their pivotal hinge, an inverted lip or toe on keeper arranged to support the free end of door across the mouth of tube, being, altogether a dredge for raising gold-bearing gravel from the bottoms of rivers, comprising a vacuum suction lifting tube, having a door at its suction mouth and adapted to swing both inward and outward, means for locking door across mouth, tube having its upper end closed, a supply of steam arranged to be fed at will into the top portion of tube, a perforated diaphragm in the top portion of tube, a supply of water under pressure arranged to be delivered to the top of tube above diaphragm, an air inlet valve on tube, one or more self-opening and self-closing valves near the lower end of tube, and suitable means, including a supporting boat, steam generating, hoisting and pumping machinery, and supporting and operating mechanism for operating vacuum suction lifting tube.

ORE-CRUSHING MACHINE.—No. 623,088; C. C. Lane, Los Angeles, Cal.



A combination of the circular pan *A*; dies *B* resting on the bottom of pan *A*; the central vertical shaft *E*; the removable circular plate *F* formed with slots *F'* movably mounted on the shaft *E*; ring *P'*; standards P^4 mounted on ring *P'*; actuating drum P^6; swiveled journal boxes *N* movably mounted in standards P^4; spring *T* mounted between standards P^4 over journal boxes *N*; screws *V* with threaded screw-followers *V'*, the followers slidably mounted in standards P^4 over springs *T*; shafts *I* mounted in journal boxes *N* and having the bearings for their inner ends laterally adjustable in the slots *F'* and the edge-runners or crushing rolls *O* mounted upon shaft *I*.

BLASTING POWDER.—No. 622,990; H. Boyd, Tamworth, England.

A fumeless explosive, consisting of a mixture of nitrate of soda, sulphur, picrate of ammonia, bichromate of potash, peat dust, lime, and cotton-seed oil.

A New Smokeless Powder.

Ansil Moffatt of Indianapolis, Ind., is said to have perfected a new smokeless powder, the secret of which he and his friend J. R. Francis have kept quiet for a long time. For nearly four years Mr. Moffatt has worked at his laboratory and in the field with his new explosive, and as a result of the outcome as well as the tests made according to the government regulations, a company was incorporated with a capital stock of $150,000 to engage in the manufacture. Ansil Moffatt, inventor of the new explosive, says: "I have confidence in its immediate success. Its chief characteristics are safety of manufacture and use. All the extreme dangers of powder are eliminated by this process, and explosions of powder will be a thing of the past. It is a wet process, and the finished powder may be stored in water indefinitely without deterioration. It has stood all of the usual government tests. It makes the least smoke of all the smokeless powders. By comparative tests it shows wonderful projectile power, yet, owing to its peculiar nature, it may be used in a shotgun with the same safety as black powder. Less than one-half the quantity in weight is necessary for a load. One feature is that it can be used in all the old style gun shells. Our explosive will start a new era in mining. When exploded in a mine it leaves so little smoke, and absolutely no poisonous fumes, that the miner is enabled to immediately resume work. Thus from 15% to 25% of mining time will be saved. 'Azo' contains no nitro-glycerine, as dynamite does. In using dynamite the greatest number of accidents occur warming or thawing it out. 'Azo' explodes frozen as well as warm. Although 'Azo' contains no nitro-glycerine, if, for any purpose, an explosive of extreme violence is necessary, we can run it up to a power 25% greater than that of a pure nitro-glycerine. The mining interests of the West will be supplied from local factories located at convenient places. For mining purposes we can compete with the cheapest grades of explosives. For projectile purposes we will enter the market with a better smokeless powder than any now sold, and at a price of ordinary black powder. The first western plant will be located at or near Bozeman, Montana."

CONSUL SCHUMANN writes from Mainz, Germany: "The telephone service of this country is a public institution, controlled and managed by the Department for Posts and Telegraphs. The rates are certainly very low, the charge for a local telephone being $38 55 per annum, including the rental of the instrument. The service, however, is lacking in enterprise. I applied on February 20 to have a telephone placed in my residence, and was told that the connection could not possibly be made before May or June, as they did not string wires in winter."

The Genesis of Petroleum and Asphaltum in California.

NUMBER XII.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

What evidence is there that water circulates and circulated through these formations? The presence of calcareous tufa at the outcrops of the strata; the presence of bitumen in the cracks and seams of the shales and in the interspaces of the sands floated up by associated waters—if the bitumen was forced up exclusively by gas it would not have been so evenly and generally disseminated throughout the shales and sands; springs of water accompanied by natural gas and oil issuing from the outcrop of strata which dip towards the source of the water, and the absence of these springs from the outcrop of strata which dip away from the source of water; the seams of hard shale, called "shells," silicated by infiltrating silicious waters; nothing but molds and casts of fossil shells, the carbonate of lime having been removed in solution in water. Near the outcrops of these strata in the creek and river beds the sands and gravels are cemented together with carbonate of lime, forming conglomerates.

What is the effect on deposits and accumulations of bitumen by circulating waters, fresh and mineral? Petroleum oil when exposed for a long time to water containing sulphuretted hydrogen is resinified by being sulphurized; especially is this true where the sulphur is liberated by decrease of pressure or by the oxidation of the hydrogen. The sulphurizing of petroleum oils by sulphuretted hydrogen is a chemical combination, but if only a mechanical combination it is so intimate as to resemble a chemical combination.

Petroleum oil will be oxidized when exposed for a long time to water containing oxygen, or atmospheric air. Oxidation converts the oil into petrolene and greatly increases its gravity. As slight quantities of petroleum oil are dissolved in fresh water, the lighter parts are dissolved, consequently the effect of circulating fresh water is to carry away the lighter parts of the oil, leaving the heavier parts behind. Water saturated with salts has but little effect on petroleum oil. Sometimes the salts, through the agency of water, are mechanically and intimately mixed with the bitumen so as to render their separation difficult.

Besides these chemical effects of water on the bitumen, water exerts the following described hydrostatic and hydraulic effects: In cases where strata are rendered leaky by denudation, and water in ascending to the surface through the same, the petroleum oil is floated out on the surface of the water and lost. Meteoric water, which falls on higher ground, penetrates the earth, sometimes to great depths, through inclined and porous strata or through fissures, cracks, seams and joints of rocks; and, after flowing a distance, sometimes the distance being very great, it must ascend through permeable strata to the surface, or, hidden, find its subterraneous way to the sea. The course of water flowing underground is not strictly analogous to that of a river on the surface, there being in one case a constant descent from a higher to a lower level, from the source of the stream to the sea, whereas in the other the water may at one time sink below the level of the ocean and afterwards rise high above it by hydrostatic pressure, due to the superior level at which the rain water was received and the encasement of permeable strata by impervious strata.

It must be borne in mind that the circulation of water through the rocks can be extremely slow. On account of the broken condition of the rock on the anticlines, caused by the acute curvature of the anticlinal arch and its greater exposure to denuding agents, far greater quantities of rock have yielded to erosion than in the syncline where the rocks have been hardened by lateral pressure and cementing by the infiltration of mineral waters. This broken condition of the backs of the anticlines permits water to enter them more freely than the synclines or the slopes of the anticlines, and also permits more readily the escape of petroleum, oil and natural gas. The accumulation of petroleum oil must have commenced when these rocks but slightly underlated. The former and ancient features and state of a formation should be taken into consideration, as well as those existing at the present time, in the examination of an oil field. If there is no opposing force or intervening obstacle, gas, petroleum, oil and water distribute themselves in porous or seamed strata in accordance with the difference of their gravity. The gas lies above the petroleum oil, and the oil floats upon the water. It must be remembered that under ordinary pressure oil and water do not mix, and that the gravity of the petroleum oil is less than that of water, but for which little would have been seen on the face of the earth. If petroleum oil is introduced into the bottom of a vessel filled with water it will rise to the top of the water, and if water is placed on the surface of oil it will sink to the bottom of the oil.

The pressure of water is exerted below the petroleum oil, and the pressure of natural gas above. Porous strata encased in nearly impervious strata must be considered as conduits for the fluids, petroleum, oil and water. When petroleum, oil and water flow in the same direction, the porous and seamed strata are liable to be barren of oil. Where the oil and water flow in opposite directions, the porous or seamed strata are liable to be fruitful with oil.

Many years ago, before the denudation occurred, these strata were encased in an impervious cover; the righthand dip of the anticline was towards the mountains; meteoric water falling on the mountains entered the porous strata at *A* and finally flowed up the righthand dip of the anticline *B* as shown by the arrows, being impelled forward by hydrostatic pressure in the higher levels of the mountains, and the associated oil which entered these strata by its inferior gravity when compared with water, flowed in the same direction as the water, therefore this dip of the anticline is barren of bitumen. In the lefthand dip of the anticline *B* the water flowed downward, impelled by gravity and probably hydrostatic pressure, seeking an exit as springs in the valleys, or, unseen, found its way to the sea; the oil, by its inferior gravity, was buoyed up by the water or ascended in a contrary way to the flow of the water—consequently the pores and seams in this dip are filled with bitumen. These same conditions exist in the Zaca anticline, Las Pozitas anticline lying west of Santa Barbara, and at Summerland and many other places.

The following is an exception to the accumulation of oil in the dip, remote from the source of circulating water. Petroleum oil is nearly always accompanied by natural gas. If the porous or seamed strata, serving for conduits for water or oil, have vertical curves or summits, and such summits are sufficiently tight as to hold the gas, in time the gas will accumulate in such summits and occupy a considerable part of the sectional area, and it will continue to accumulate until the velocity of the water or oil is sufficient to carry the gas forward, and down the incline. If the pressure never reaches such a point as to effect the removal of the gas, the flow of the water and oil will be more or less obstructed; and finally, if the gas is not removed or escapes, causes the flow of water or oil to cease. In this case oil will be found in the dip of the anticline, which is towards the head, from which the water emanates.

SECTION NEAR LA BREA CREEK, SANTA BARBARA COUNTY, CAL.
C—Sands and shales containing bitumen.

(*To be Continued.*)

Geological Note on the Rand, South Africa.

One of the most interesting features to be met with in the mineral geology of the Rand, says the *South African Mining Journal*, is graphically set forth in the mine plans of the Rose Deep, where a hillock or "roll" occurs in the plane of the Main Reef series in the upper levels of that mine. The only other somewhat similar occurrence, on a scale large enough to afford a useful object lesson, is a flat (or slightly depressed saucer-shaped) area of reef in the Simmer and Jack mine. This "roll" in the plane of the reef apparently enters the northern boundary of the Rose Deep about midway between the two present shafts, just about where the main incline shaft of the New Primrose mine will reach its lowest level. Thence its strike is roughly northeast by east as regards the Rose Deep mine, and presumably southwest by west in the outcrop mine. This peculiarity comes into the workings of four levels between the two present shafts. Mr. Cazlet has made a glass model illustrating this latter occurrence, and it is recognized as being a most valuable help to the clearer understanding of several points in Rand mining geology. This peculiarity of the reef at the Rose Deep is another instance in which a clear understanding of the occurrence would be wonderfully helped by this sort of graphic representation. The best way of imagining what exists is to fancy the hanging wall of the reef series removed and to picture the whole of the workings as open-cast, thus making the reef in its dip practically a hillside. As far as present indications go, the little valley that separates the spur from the main hillside contains a very appreciable thickening of ore deposit. Should this feature be confirmed by subsequent developments, it may speciously be argued that the thickening of reef in this gutter or valley is proof, probably corroborative of Mr. Bleloch's theory, of the conglomerate beds being formed on a more or less gently sloping beach line.

Economy in the Use of Water.

Written for the MINING AND SCIENTIFIC PRESS.

There are many places where the cost of water makes it a very important item of expense, and not only in California, but elsewhere, there are numerous places where it is a matter of economy to run the tailings of quartz mills into reservoirs, and from the overflow to pump back the water for re-use in the mill. Where the tailings contain sufficient value to make their later treatment desirable by cyanide or otherwise, dams may be built across gulches or other depressions and the water returned by pumping, and when the reservoir has been completely filled another may be prepared and this filled in its turn. Where, however, the tailings are practically valueless and may be allowed to escape without material loss, a succession of dams may be constructed, so arranged that the tailings can be settled in the upper basin, the overflow passing to the second, from which the water is pumped back. When the upper basin is full it may be sluiced out, and allowed to refill as before. An arrangement of this kind was made years ago at the Homestake mine in South Dakota. The mill tailings were allowed to flow down the gulch — Gold Run, which below the mine becomes a narrow gorge. Across this two dams were built of cribbed timbers filled with rock, and sheeted on the inner side with boards to make it tight. In the center of these dams were constructed boxes about 3 feet square reaching from top to bottom of the dam. These boxes or shafts, as they might be termed, were closed permanently on three sides, the fourth side being provided with plank sections lying horizontally. The shaft of the upper dam connected at the bottom with a culvert constructed of plank and about 3 feet square. This extended under the upper dam, entirely through the lower basin and underneath the lower dam. The shaft at the lower dam was also connected with the culvert. When it was desired to fill the upper dam, the horizontal sections of the upper shaft were placed in position, and the sand-burdened water gradually filled the reservoir, overflowing at a weir into the lower basin, which had been prepared to receive it. The sectional-closing arrangement of the shaft has no important bearing on the filling of the reservoirs, but is designed to discharge the tailings gradually when the basin is emptied, so as not to choke up the culvert. It required six hours to fill the reservoir with water, all the coarse sand remaining in the upper basin, the slimes passing over into the lower one. Every day the upper reservoir was sluiced out by removing the planks one at a time, the water carrying off the sand which passes through the culvert discharging into the canyon below. It took about four hours to accomplish this. The lower dam was cleaned whenever it was necessary, perhaps every sixty days. An arrangement such as above described can be built at moderate cost, and will be found to operate satisfactorily. When it is desired to save the tailings, they may be impounded below these dams.

Wyoming Irrigation Reservoirs.

Water storage is the key to water use. To regulate the flow in time and in volume is the secret of highest value and effectiveness in any broad system of irrigation. Consequently any proposition to the fullest utilization of flowing water extends upward to its source and to the manner of its release. Reforestation of mountain sides to prevent useless or ruinous flood, restraining dams in the outlets of lakes, dams to backwater over waste flats or in wild gorges, are all phases of water storage which are involved in any broad view of irrigation possibilities, and are interesting in varying degrees to all students of irrigation affairs. The progress made in reservoir surveys in Wyoming is of interest to this entire west half of America, and that if the United States Government can be shown the desirability of proceeding in that State for the reclamation of the desert lands, it is only a question of time when similar work will be undertaken elsewhere. State Irrigation Engineer Elwood Mead has prepared Senate Document No. 124 which is a strong argument for reservoirs on the basis of their essential character as the foundation of timely and effective water distribution. The entering claim is that it is the weakest link which measures the strength of a chain; so in the use of rivers in irrigation, it is not their flood volume, but the discharge at time of greatest need which measures their usefulness and value to farmers along their banks. A river which carries a torrent in December but is a bed of dry sand in July is of little value to irrigation if left as Nature made it. There are hundreds of such streams in the West. They wind their lonesome courses through lands of unsurpassed fertility, where the climate is salubrious and healthful, and where only a perennial supply of moisture is needed to secure the growth of products of great diversity and value. On some the flood period comes too soon; on others months too late. The first objection applies to nearly all the rivers in the northern half of the irrigated region; the second to those in the southern half. The important function of reservoirs is to bring the total supply into agreement with farmers' needs, in order that the water may be more completely utilized. The further the natural flow falls short of accomplishing this the more important are reservoirs and the greater the necessity for their construction.

Prof. Mead writes forcibly also of reservoirs as an aid in distributing water to crops and gives excellent data derived from his long experience as State Engineer of Wyoming. He gives other States credit also for the results of some private irrigation enterprises and shows that in no part of the United States has irrigation wrought a greater transformation or created greater increase in values than in southern California. In much of this region reservoirs are not merely an instrument for the extension of the reclaimed area—they are an absolute necessity. The streams are intermittent in character; instead of having a perennial flow they are torrential in winter, but in summer and fall, when most needed for irrigation, are almost dry. The Sweetwater river, the site of the famous Sweetwater dam, is a typical stream. The winter storms would bring its volume up to from 500 to 1000 cubic feet per second, to recede again in a short time to 10 or 20 cubic feet per second. After the close of the rainy season in March it would shrink to 1 or 2 cubic feet per second, which sometimes ran through the year, but not always. A water supply of this character is of no use to irrigators. Without this reservoir the lands which this river has been made to reclaim would have remained practically worthless.

Prof. Mead also urges reservoirs as a promoter of better methods of irrigation, by doing away with much wasteful and injurious practice and he alludes also to reservoirs as equalizers of stream flow, etc. Herewith is presented some views of proposed Wyoming irrigation reservoirs which combine the useful and the ornamental in an eminent degree, serving good purpose as attractive mountain lakes and suppliers of needed water to fertile fields below.

Cloud Peak Lake, Wyoming.

Outlet Cloud Peak Lake, Wyoming.

Jackson Lake, Wyoming.

Mead Lake, Wyoming.

Elk Lake, Wyoming.

Saving Fine Gold in Sluices.

To the Editor:—I was interested in reading in a recent edition an account of saving fine gold in sluices, and will contribute my experience.

I have experimented in fine-gold diggings in Douglas county, Oregon, where the gold is very fine and very light, another disadvantage being the quantity of heavy black sand. The ground from the grass roots down shows from 20 to 300 colors to the pan. While experimenting, I tried several different ways, of which the following was the most satisfactory: I used fifteen 12-foot sluice boxes, 12 inches wide and 10 inches deep. In the first box the ordinary Hungarian riffles, the next two empty; in the fourth a ½-inch undercurrent; in the fifth a $\frac{3}{16}$-inch undercurrent out of the ½-inch undercurrent. Thus I have three divisions in the box, the remainder of the boxes being the same as No. 5; first division for the small rock, the second for ½-inch gravel and the third for sand and very small gravel. I cover the bottoms of the undercurrents first with a layer of flour sacks, commencing at the lower end and allowing each to overlap the other. In the same manner, on the top of these, I lay strips of blankets, burlaps and carpets, and secure them with strips of wood nailed to the sides of the undercurrent, and every 2 feet nail laths crosswise on top of the burlaps, which keeps them in place and prevents sand from working underneath. This worked very well for some time, but after four days' run without cleaning up a portion of the gold was lost, and, as it was tedious to clean up, I made an improvement by cutting a slot out of the bottom of the $\frac{3}{16}$-inch undercurrent, 15 feet from the end of the sluice boxes, allowing the contents of the undercurrent to flow through this opening; 18 inches under this I placed a box 5x14x15 inches deep, containing from fifteen to twenty pounds of quicksilver. The stream of the undercurrent falling into the box drives the gold and sand into contact with the quicksilver, where the former amalgamates and remains in the box; the sand is boiled out by the force of the water. This worked well, and the loss from the undercurrent was saved in the quicksilver box. It is unnecessary to clean up oftener than every three or four weeks. When I take the sacks out I roll them up and burn them in an iron pot; the ashes are panned with quicksilver. The other riffles I clean up in the ordinary way. The flour sacks are for the purpose of catching the gold that works through the burlaps. I use a good head of water with the undercurrents set on a grade of 1 foot in 12 feet. Whenever considered necessary, the quicksilver box can be detached and the contents strained. E. Peiel.

Iron Mountain, Cal., April 3rd, '99.

Continuous Bucket Dredges.

To the Editor:—I see an article under the head of "Dredge Mining in California" in your valued issue of April 1st, on which I should like to be allowed to make a few remarks. I notice that the information is evidently derived from the owner of one of the shovel dredges, and is doubtless correct for that style of dredge, but is quite unreliable when applied to one of the continuous bucket dredges. To anyone interested in this work I shall have much pleasure in showing books of account which will conclusively prove that the daily cost of running a continuous bucket dredge as built by the Risdon Iron Works does not exceed $55, allowing for very heavy interest and depreciation; the actual wages sheet and firewood account does not exceed $30 per day. The number of yards which your correspondent states is being lifted per day is much understated in regard to the continuous bucket dredge, which has a theoretical capacity of 2500 cubic yards per day. The actual amount lifted depends largely upon the

skill of the winchman, but, taking it at 1000 cubic yards, an amount which can easily be increased, and generally is, some 50%, or 1500 cubic yards per day, the balance sheet, taking your correspondent's basis of value as 20 cents per yard, comes out very differently, and stands somewhat as follows:

1000 yards at 20 cents	$200
Cost of handling	50
Balance profit per day	$150

One of the best proofs that the balance sheet as shown by your correspondent is not correct, at any rate for a continuous bucket dredge, is the fact that new ones are constantly being built.

R. H. POSTLETHAITE, M. I. E. E.

San Francisco, April 12th, '99.

Shaft Sinking Under Water.*

By J. BURLEY SMITH, C. and M. E.

The Sultana lode is situated on the eastern shore of Bald Indian bay, Lake of the Woods, and about seven miles south of the town of Rat Portage. The mine has large croppings extending thousands of feet, and in a southwest direction passes beneath the waters of Bald Indian bay. Some portions of the vein carry only the merest trace of gold, but several diamond drill holes made on these large lenses of quartz show that they do not continue to any great depth—50 to 60 feet at the most—giving place to large lenses of auriferous quartz, which are characteristic of this remarkable lode.

One of the claims on this lode is wholly under water, the only land on the claim being one small island. This necessitated sinking a shaft through the water to reach the lode. The Sultana deposit or lode may be described as composed of huge masses of auriferous quartz, of lenticular shape, interbedded in the Keewatin schists (Huronian), at or near their contact with the granitoid gneiss (Laurentian).

Sometimes extending for a considerable distance as one enormous lens, again of a number of smaller lenses lying near together and separated only by a few feet of schist. There are no walls to define the width of the zone. It is noteworthy that the schists separating the lenses of quartz is often found auriferous.

A diver was employed to carefully examine the bottom, and finally a location was found having a covering of from 10 to 15 feet of fine plastic blue clay over the rock.

It was intended to sink a crib 60 feet square on the outside and 40 feet inside, using an inner caisson for a water-tight compartment in which to sink the shaft and to then carry a steel lining from a depth of 20 feet in the rock up to the deck of same, and afterwards to build a wall of concrete masonry around the shaft carried up to the same level. The space between this wall and the inner walls of crib to be braced strongly together with timbers and filled with rock.

Owing, however, to unexpected delays, the lateness of the fall season and the stormy weather to be expected at that time, and that we were unable to secure any land in the immediate neighborhood on which to frame the crib, plans had to be changed.

It was decided to build a water-tight caisson on the Queen Bee island, one mile from the proposed site of shaft.

A sloping beach of sand was selected in a sheltered bay, ways were laid down and the work of building the caisson commenced.

Its dimensions are 60 feet square on the outside, 40 feet on the inside (leaving a box space all around about 10 feet wide for the rock ballast to be used to sink it), and 24 feet high. It was strongly ribbed and braced and sheeted throughout with 8-inch square timbers, the whole bolted and spiked together in the strongest possible manner. The heavy 8-inch sheeting being caulked and pitched right up to deck. Valves were provided inside the caisson to admit water, as it was known that the structure could not contain sufficient weight of rock to sink it without this addition.

The time occupied in building the caisson was something under two months. At the end of November, '97, it was launched and towed by tugs to the proposed site of shaft, and a few days later it was frozen hard and fast in position by the ice. Shortly after this the caisson was filled with rock and sunk to the bed of lake.

To make doubly sure an inner cofferdam was constructed inside the hollow square of the caisson.

The water was pumped out with a centrifugal pump and the clay inside the inner cofferdam was excavated down to bedrock. The shaft was excavated the full size of the inner cofferdam, 12 feet into the solid rock.

A strong water-tight shaft-casing formed of timbers 8 inches square and carried up to the deck platform of caission, which had previously been raised 6 feet higher to be safely above flood water mark of the lake. Behind this casing and under its foot, careful sealing with the rock was made by caulking with oakum and filling in with hydraulic cement; the remainder of this space was then filled in with concrete up to some feet above the surface of the rock bed of lake.

From this point upward to platform the space between shaft-casing and cofferdam was filled in with puddled clay. The space still left between the inner cofferdam and inside walls of caisson was filled in with clay and rock, after being securely framed and braced with timbers.

The platform on top was decked in the usual way, and on this platform are erected the temporary buildings containing the machinery and plant of the mine, and a temporary pit-head framing.

The sinking plant and machinery consist of one Ingersoll-Sergeant air compressor and three rock drills; one 80 H. P. boiler, one 8x10-inch duplex double drum steam hoist; one portable steam derrick hoist; one direct-acting steam centrifugal pump, and some ordinary sinking pumps.

The shaft is 6x12 feet in the inside, and is now down to a depth of 153 feet. At a depth of 107 feet a crosscut level was driven southeast towards the shore as a test, and as expected crossed a lens of auriferous quartz 8 feet wide, 35 feet from the shaft.

The shaft was continued down to a depth of 140 feet when quartz was again struck, showing visible gold in places.

The lode dips to the northwest. The shaft is perpendicular and was expected to strike the deposit at a depth of about 150 feet, which, however, was reached at 140 feet or thereabouts.

Very little water has found its way into the shaft through seams or fissures, and we have every prospect of having a dry mine.

*Condensed from a paper read before the Canadian Mining Institute in March.

Sand Blast in Coal Mines.

Written for the MINING AND SCIENTIFIC PRESS.

The sand blast apparatus has come into use for many purposes in coal mines. The cutting power of the jet of sand can be used for cleaning purposes, cutting slag, etc. To make a sand blast, first construct a wood case (*A*), Fig. 1, about 2x2 feet and 4 feet high. Put a T-joint in a pipe at *B* and arrange for the sand to fall from the case to this joint through an inch pipe *F*. Let the air blast from the left through pipe *C*. The air will strike the sand in the globe of the T-joint and combine with it. The discharge of sand passes through *E* and out through a hose *D*. The workman can guide this hose so as to direct the jet of sand against any point. Two forms of sand blast are employed, and both are qualified to operate with either sand, emery or corundum. In one form the discharge of a fine jet of sand or other material is accomplished by means of a blast of air. In the other form the blast is effected with steam. A great velocity is obtained with both types.

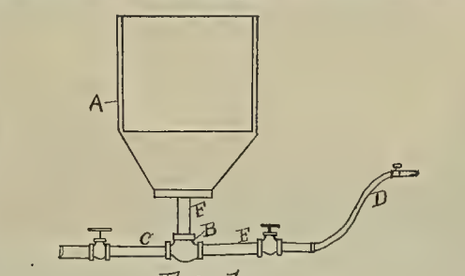


FIG. 1

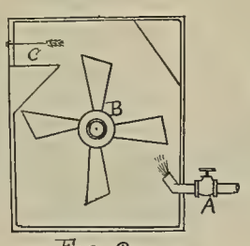


FIG. 2

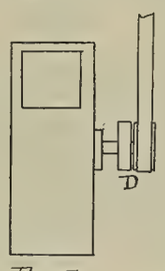


FIG. 3

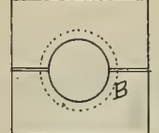


FIG. 4

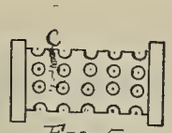


FIG. 5

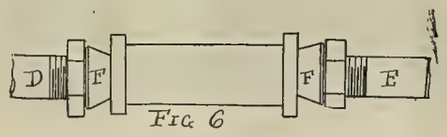


FIG. 6

PLAN OF SAND BLAST APPARATUS.

Practical Points.—Crushed quartz is usually employed in sand blast apparatus. At the same time the work is so varied that several other grades of sand are essential. The sand should be graded by means of sieves, ranging from 8 to 140 wires to the lineal inch. The grade 12 means, as is known, that the sand in this grade passed a sieve with 8 wires to the inch and was held by one with 12 wires.

The shape and condition of the surface of sands has much to do with the effectiveness for cutting, etc. The rock which is broken up into the sharpest sand of all is not as good as some of the natural sands, probably owing to the extremely smooth surfaces. Trap rock is not as sharp as Florida rock, but gives much better results on some classes of work on account of the surfaces of the grains being very rough. The granite is about the same as the trap rock. The comparison of the beach and river sands, with a few exceptions, has proven the latter to be the best for general purposes. The rounded surfaces of sands from beaches are good for cutting, but the time-worn edges might not touch hard slag. Pulverized glass is also used with effect in the sand blast. The specific gravity of the different kinds of glass varies from 3.2 to 4, plate glass from 2.4 to 2.6.

Air Blower.—Fig. 2 is a suggestion for making a small-sized compressed air blower to scatter the air current for light operations. The air current is through the pipe *A*, and passes out through *C*, impinging on the blades of the fan wheel *B* in the meantime. Fig. 3 is another view, showing the plan of the driving mechanism at *D*.

Points on Bearings.—Wood shaft boxes and metal linings are useful in many power drives in coal mines. But in a case recently observed the moisture caused the ends of the boxes to swell and close down on the shafting. No top oil holes were provided, but the oiler once a week would try to force oil from the sides along the shaft into the center to reach the metal bushing *B* (Fig. 4). This he usually failed to accomplish, resulting in the heating and burning out of the busings. This trouble was fixed by providing oil holes leading from the top of the shaft. Bearings of the kind shown in Fig. 5, when worn on one side to a taper, as at *C*, can be trued in a lath on a shaft *D* (Fig. 6). This shaft is cut with a thread and cones *F, F*, screwed on and into the ends of the bearing, holding the latter firm and true during the truing operation. A great many forms of so-called oilless bearings are used in power systems of coal mines, especially in places where it is hard to reach the bearings to oil them. One form is made of glass. I will give directions for making one type of bearings from glass which have worked with practically no oil at all in the box journals of the bearings for a power haulage system. I first glazed a face on the bearing with fine emery wheels. I refined all the glass used for the bearings by pouring it in a molten state. The glass is thereby disintegrated, and, falling in a coarse powder, a portion of the saline impurities is dissolved out. The glass on being drained dry is mixed with fresh raw material. The melting plant I used was a crucible. For hardening I used a mixture of two quarts of olive oil, three ounces of tallow and a quarter pound of beeswax. As soon as the part was cooled sufficiently it was taken out and wiped, then placed over the coke fire until the grease coating was in flames and had burned off. I finish the face of the bearings with rubbers and Venetian powder. The powder contains only a small portion of oxide of iron, mixed with earthy matter. It admits of being mixed with water, and thus reduces friction and prevents the glass from becoming heated by the action of the rubbers. Tripoli, crocus or putty powder used with water are too active to produce a high polish on glass bearing surfaces, but they may be employed dry for the last finish in hand polishing.

Repairs.—Special care is needed to keep in repair such mechanical apparatus as is in constant service in coal mines. The mechanism of cable systems, underground wheels, etc., require regular examinations. It will pay to clean the rust off the machine and polish it up with a wire scratch brush. A vigorous use of this tool, reinforced by a cold chisel and hammer, will work a transformation. An underground machine, once clean, should be painted with boiling hot gas tar and allowed to dry at least two hours—better two days—before putting back into the pit. The case should receive the same treatment. Bolts, nuts, gears, cranks and cams are used to a greater or less extent, and these small fittings are invariably destroyed by rust before the larger parts of the machinery have gone bad. F.

THE present activity in the mining and metallurgical world has resulted in bringing the process man to the front again. Almost daily new processes are heard of which promise to revolutionize mining and cheapen the cost of the recovery of gold to such an extent that the entire operation of gold recovery is placed by some at a lower figure than the actual cost of reduction of ore to pulp by ordinary methods. One statement is made by a Duluth, Minn., process man that his process has resulted in lowering the cost of a 100-stamp mill $15,000, which stamps the whole thing as ridiculous. Radical changes in processes are usually the outgrowth of long-continued, careful experiment.

Mining Summary.

ALASKA.

D. A. MacDonald of San Francisco has a letter from B. B. Earl, dated St. Michael, Dec. 1, '98, in which the writer, among other statements, says: "Dr. Kittleson arrived here Nov. 28th and reports great finds at Cape Nome, about five miles from shore. So far but two creeks have been worked. They found coarse gold 2 feet from the surface. Things are booming on the upper Neukluk river and claims are prospecting well. The Cape Nome mining district has been formed and takes in a square of twenty-five miles, with Dr. Kittleson as recorder.

"A rich discovery has been made on the Casadepaga, thirty miles northwest of Council City, which shows the source of the gold is farther in the interior than was supposed.

"Ophir creek, in El Dorado district, is rich. It is reported that $48,000 has been taken out on No. 4 above discovery. Another strike this winter was made on the Tubucktolik river on Nov. 20th. MacDonald creek, on the Anvik river, where the first discovery of gold was made in paying quantities in northwestern Alaska, has turned out well. The gold is coarse.

"A miners' meeting was held in Council City and Recorder Blake was impeached for being absent from the district for thirty days. Blake declares the meeting illegal and refuses to turn over the books to the new recorder. Council City has 500 population and contains about seventy-five log houses."

It is reported that there are eleven steamers icebound in the Yukon river at various points, which on the breaking up of the ice will be wrecked.

Juneau *Miner*: The season is more favorable for early work at the Silver Bow Basin placer mines of the American G. M. Co. this spring than it has been for several years. The basin has not as much snow as usual. It is thought that by April 15th the giants will be at work. ——Prospecting has been in progress at Ketchikan and vicinity for the past year. A number of promising ledges were discovered and development has proceeded steadily. Some discoveries of quartz have been recently made.——W. J. Terry made the trip from Dawson to Skaguay in eight days, riding a bicycle.

Juneau *Miner*: The production of gold from Cook inlet this season will probably double that of last year when the water was very high and much interruption was experienced by miners, and their works carried away. The estimate made last year was $100,000. A. Beedy and his brothers have been mining in Cook inlet for several years. They sold their Bear Creek hydraulic property last year to Boston parties for $10,000, and the deposit will be worked this season. It has a small plant upon it, which will be increased. Beedy Bros. intend to hydraulic their mine on Palmer creek, and their Canyon creek property will be worked by shoveling into the boxes. Several hydraulic plants will be in operation this season on Six Mile creek and Bear creek. One large plant was put in on Bear creek last spring, too late to be of advantage. It will be worked this year; the mine is owned in Phidelphia.

ARIZONA.

(Special Correspondence). — The new purchasers of the Mollie Gibson mine at Chloride have commenced putting things in shape to begin work. As preliminary the water in the 80-foot shaft must be pumped out, when timbering begins. The timber will be framed at Flagstaff. This completed, sinking will begin to 200 feet, through the ore body. The ore is rich, much of it containing wire silver. The mine was sold for $8000.

The late discoveries of new and rich ore bodies in the Tennessee mine has resulted in an increase of the working force. The new concentrator is doing satisfactory work. The ore dump, which accumulated during the erection of the new works is disappearing, the new and richer ore taking its place. The concentrates go to the railroad at Kingman. Three shifts are working.

An accident happened at the Elkhart a few evenings ago resulting in the instant death of John D. Young, bookkeeper for the company. Robt. J. Ferguson, the superintendent, was showing Judge Sloan of Prescott the mine. They were at the bottom of the main 280-foot shaft and Young stepped into the bucket to go down when it became detached from the cable and went to the bottom. The bucket had dropped once before within a week. Work continues as usual in the mine. There is a large quantity of ore on the dump, but no water to operate the concentrator. The concentrates from the Elkhart are high grade.

Chloride, April 18th, '99.

Near Globe the Live Oak M. & S. Co. is shipping about fifty tons of bullion a week and chloriders are shipping fifty tons of ore daily.

Anthracite is reported discovered near the border of Sonora and Arizona, samples of which have been sent for investigation.

Needles *Eye*: The Little Jessie mine at Chaparral, twenty miles southeast of Prescott, has been incorporated. The mine has paid well. The ore is pyrite running seventeen ounces gold per ton.

Yuma *Sun*: The 100-ton cyanide plant at the Fortuna mine, eighteen miles northeast of Yuma, was started up this week. The tailings on the dump average about $5 per ton. ——The owners of the Ray copper mine in Pinal county are making arrangements to put in reduction works on their property. London capitalists are in the deal and a railroad will be built from the mine to the Southern Pacific.——Work on the Planet Saturn mine in Fool's gulch has been resumed and a force of men are busy developing the property. A 10-stamp mill has been ordered and an air compressor and drills will be used. The present work is an experiment. The property was once abandoned, but it is thought that by a new process the ore will pay.

Journal-Miner: W. H. Ferguson has gone to the Ridenour mines, in Mohave county, as Supt., accompanied by J. S. McDonald, who takes the position of foreman of the mine. He has sent two twelve-animal freight teams with $1600 worth of supplies. Mr. Ferguson has employed sixteen miners, which number will be increased. The claims are known as the Grand Canyon group and are located north of Aubrey, on the Santa Fe Railroad. It is expected that a carload a day will be shipped from the mine to the Pueblo smelter.

Arizona *Republican*: Mining in Cochise county is advancing. Nearly every day brings representatives of Eastern capital looking for copper and gold properties.——D. J. Dwyer, Supt. Helvetia copper mines, now being developed, has arranged for the shipment of machinery to the camp. Six carloads of machinery were received during the past twenty days.

Mineral Wealth: A contract has been let on the Midnight mine at Chloride to sink a double-compartment shaft 200 feet. Levels and crosscuts will be run.——B. Hastings, Supt. of the gold mines at Virginia Camp recently purchased from Cooke Bros. & Blythe, will sink two shafts on the property.——Stetson & Nugent have had a carload of ore worked at the Kingman Sampling Works from the Segregated Blackfoot, and W. C. Mayes two carloads from the Loomis mines in Virginia Camp.

Mojave *Miner*: E. J. Montrose's gold mine, south of Coyote Holes, has turned into a copper producer.——W. Nelson has located the old Hornet Nest mine, near the Little Boy, Stockton Hill, has sunk a shaft 100 feet in depth, and is shipping ore found all the way down. It is the intention to sink another 100 feet and block out the ore body. The ore carries a high percentage of copper.——Five more stamps will be added to the mill at Virginia Camp to work the ores of the Klondike mine. Other machinery will also be put in. ——It is reported that a 15-stamp mill will be put in at El Dorado canyon. Gasoline wagons will haul the ore from mines to the mill. The fifty-ton cyanide plant is in operation.——It is reported that W. C. Bishop has struck a rich body of ore in one of his Stockton Hill mines, where he has been working three or four months.

Bisbee *Orb*: The new three-compartment shaft being sunk by the Copper Queen Co. is down 40 feet. The gallows-frame is to be of steel set on a stone foundation and will not be connected with the collar of the shaft in any way. Three eight-hour shifts of four men each are in the shaft and two windlasses are used to hoist. Plans for the hoisting works are completed and a large hoisting engine and pumping plant will be put in.

Jerome *Reporter*: In the shaft on the News mine at a depth of 124 feet they have struck a vein of copper sulphide 4 feet wide. The shaft will be sunk 600 feet before drifting. A hoisting outfit is on the way and power drills will be used.

Tombstone *Epitaph*: J. S. Tebbets, Mgr. of the Duquesne M. & R. Co. in Washington Camp, fifteen miles from Nogales, says the ore runs 10% copper and five ounces silver, also some gold. The mine is developed and a special process has been devised for treating the ore, it being sulphide. The company will build a branch railroad.

Prescott *Courier*: J. Phillips at the Tip Top mine, a few miles from the old Dosoris, has started two tunnels on the property. The ore body is 4 feet wide. The pay streak ranges from 1 inch to 1 foot in width and the ore carries from $50 to $700 per ton. The gold is coarse.

CALIFORNIA.

Alameda.

Oakland *Enquirer*: It is reported that a gold-bearing quartz ledge has been struck in a tunnel in the hills near where the Thorn road crosses the boundary line between Alameda and Contra Costa counties, by men who were tunneling in search of water.

Amador.

Amador *Record*: It is reported that work will be resumed at the South Spring Hill mines, Amador City.

Jackson *Ledger*: The shaft of the Gover mine near Drytown has been caving during the winter. The hoisting machinery, located on the hanging wall of the shaft, commenced to settle and was moved back.——At the Amelia operations are confined to keeping the water out of the shaft. It is reported variously that prospecting through the old shaft will be resumed; that the present shaft is to be abandoned and a new one sunk near the Muldoon shaft; that operations are to be suspended permanently.——At the old Bunker Hill mill near Amador City, which was destroyed by fire last year, men are at work cleaning up.——The Anita mine near Jackson has shut down and the machinery removed. The hoist was not capable of continuing sinking and handle the water and a new plant will be necessary if development continues. ——At the Keystone, Amador City, the gasoline engine put in to run twenty stamps it is claimed runs at the cost of water.——A contract has been let to sink the shaft on the Amador Queen No. 1 200 feet from the 1130. It was awarded to Crocker, Kearn, Benwald & Schott.——A 75 H. P. boiler has been put in at the Ivanhoe and a new engine and hoist will be put up. One run has been made with the 20-stamp mill.——Supt. Parks has made the monthly shipment of bullion from the South Eureka mine and also from the chlorination works at the Kennedy mine at Jackson.—— A large body of milling ore has been found in the south drift at the 1600 level of the South Eureka mine. The drift has been driven alongside the ore 60 feet and has not reached the end of it. A crosscut 12 feet has been made in the ore body.

Jackson *Republican*: Shaft repairing is in progress at the Zeila mine.——At the 500-foot level of the Lincoln mine a crosscut is being run north. The shaft is down 900 feet; 1200 feet is to be reached before opening new levels.

Calaveras.

San Andreas *Citizen*: The clean-up of the new 10-stamp mill at the Ford mine, San Andreas, was satisfactory, yielding a profit over expenses. The sulphurets were shipped to the Selby Works.——There was a clean-up at the McSorley hydraulic mine near Mokelumne Hill on Thursday.——The Boston mine, near Mokelumne Hill, is running with reduced force.——At the Mayday tunnel, run from the Murphy-Altaville grade to tap the Mayday lead, work has been resumed.——The Central Hill Co. hydraulic mine at Murphy's has made a clean-up after a run of two months. It will take but a short time to work the channel out. ——The Lightner Co. at Angels will increase their mill from twenty to forty stamps.—— The Angels M. & M. Co., operating the Fox mines at Angels, the property of J. V. Coleman, is planning to operate on a large scale. ——The St. Lawrence M. Co., developing the Brunner mine, three miles south of Angels, is sinking a three-compartment shaft. They are down 200 feet.——Greenwalt & Gazzola have been awarded the contract for excavating for the 120-stamp mill at Robinson's Ferry for the Melones M. Co.——The Yellow Aster at West Point has started up under the management of its new owners—Morgan, Doane & Jackson.——The Lockwood, three miles south of West Point, and Lone Star, two and one-half miles north of West Point, are to be started again, also the Blizzard in Sandy gulch, under the supervision of Mr. Griswold. There is a pump on the way for the last named mine.——Ore from the Occidental mine, owned by Figueroa & Araya, is being hauled to the Nixon Reduction Works.——The Defendant mine, near West Point, has been sold for $6000.——P. Lewis, owner of the Poorman mine near Glencoe, is having the shaft retimbered.

Del Norte.

(Special Correspondence).—Agents of English capital are here inspecting copper propositions throughout the county.——W. McKee has uncovered a ledge of decomposed quartz in his placer claim on Garrison gulch, Bald hills, which prospects well in fine gold.—— The tunnel work on the property of the Jones Creek M. Co. is progressing slowly, something like 200 feet being cut at last accounts. ——Jenkins Bros. & Lewis are grinding ore. Judging from pan prospects, they should make a good cleanup.——The black sand mine below Crescent City has resumed operations. ——From reports prospectors will be numerous this summer in the hills of Del Norte.

Crescent City, April 14th, '99.

Del Norte *Record*: W. F. Fleming has returned from Low Divide and reports that work of clearing out old drifts in the Union copper mine is progressing.

El Dorado.

J. Melton, at the Joe White claim on Poverty Point, is running the 15-stamp mill. The mine is equipped with a compressor plant.

Dench & Craddock are reported to have struck rich ore in their claim adjoining the Limpensel, near Placerville. The streak is said to be 8 to 14 inches wide and will go $150 to $200 per ton.

In the Diamond district the work of development is being actively prosecuted.

A strike is reported on the 200 level of the Marguerite mine; also, on the 600 level of the Griffith Con., near Placerville. The Marguerite M. Co. of Placerville bought the Marguerite mine six months ago and have done considerable development work. Chas. Lilly is Pres.; P. Maul, Vice-Pres. and Supt.; W. W. Tenney, Sec. and Treas.

At the Crown Point, south of the Griffith, high-grade ore is reported on the 400 level.

Development is to commence on the Big Sandy mine, Kelsey district, by an Eastern company.

Placerville *Nugget*: A strike is reported in the Ribbon Rock mine, Diamond district.—— The German mine, near El Dorado, is adding ten stamps to the mill. —— At the Strahle slate quarry, near Placerville, work has recommenced.— Clarissee & Hill are developing the Log House and Golden Eagle claims, near Nashville. A tunnel on the Golden Eagle is in 90 feet.——H. S. Casey & Sons, at the American River mine, five miles below Coloma, are taking out good ore.——Larkin Bros., owners of the Coma quartz mine, Diamond district, are having 100 tons of ore crushed at the custom mill in Placerville.

Georgetown *Gazette*: The Ralston Divide G. M. Co. will run four new tunnels this spring. A large force of men are at work developing the claims.

Amador *Dispatch*: Mining is active near Gold Hill since the Cambria Co. started up. A 10-stamp mill has been erected and the ore yields $12 per ton.——J. Nouges Jr. of San Francisco at the Josephine mine near Georgetown in tunnel No. 5 has a vein 9 feet wide. The 15-stamp mill will start up next month. ——The 15-stamp mill at the Poverty Point, owned by J. Melton, is in operation. The ledge is 40 feet wide, all of which pays.

Placerville *Nugget*: It is reported that the Gentle Annie mine, near Placerville, has been sold. The sale is conditional, the purchasers having a short time to prospect the property. A Pittsburg syndicate, the prospective purchasers, took possession of the property on the 18th inst. H. E. Picket will be the resident manager and P. C. Gorrie will be in charge at the mine. The Gentle Annie has a 10-stamp mill and is developed to a depth of 400 feet.

Inyo.

Walker Lake *Bulletin*: H. Cook and partners of Salt Lake, Utah, who for years have been driving a tunnel in Mazourka canyon, are in 1400 feet and have a vein of rich quartz.

Lake.

Napa *Register*: During the month of March the Great Western quicksilver mine, near Middletown, shipped 100 flasks of quicksilver.

Los Angeles.

Los Angeles *Mining Review*: The 3-stamp mill on the Los Angeles G. M. & M. Co.'s mine at the head of Sepulveda canyon, near Hollywood, is in operation, the ore milling $20 per ton in gold. Over 200 tons have already been taken out.

Madera.

The Lilly and North Lilly mining claims, two miles from O'Neill's, have been incorporated at Rossland, B. C. They were purchased by D. J. McDonald and Alex McDonald fifteen years ago and developed and a quartz mill built, which was burned, and the property sold to an English syndicate. The property has now been acquired by a syndicate made up of D. J. McDonald of the Columbia-Kootenay, A. Dick, R. Thompson, D. M. Linnard, C. R. Hamilton and H. McRae of Rossland and A. M. McDonald of San Francisco. The mine is opened by an incline on the vein to a depth of 375 feet and 1000 feet of drift. A. M. McDonald, recently Supt. of the Kanaka mine in Tuolumne county, has been appointed Supt.

Mariposa.

The Mount Gaines mine, five miles west of Hornitos, is again in operation with a full crew. The installation of electric power is contemplated.

There are a number of small rich veins on the Mariposa Estate which could be worked with profit by leasers if suitable arrangement could be made.

Mono.

Bridgeport *Chronicle-Union*: It is reported that the Dunderberg mine is to be reopened.

Napa.

Napa *Register*: In March Napa county quicksilver mines shipped as follows: Napa, 600 flasks; Ætna, 200; Vallejo, 16. This is a decrease of 54 flasks from February. The Ætna reports gross receipts of $35,405; operating expenses, $20,954; net earnings, $14,450, out of which a dividend of $10,000 has been ordered, leaving a surplus of $4450. The Napa Con. reports gross receipts of $65,700, and $32,931 for operating expenses, $32,768 net, out of which a regular dividend of $10,000 and an extra of the same amount have been declared, with a surplus of $12,768. These dividends make $1,000,000 for the Napa in twelve years.

Nevada.

Nevada City *Herald*: It is reported that Brown, Cairns & Co. have struck a ledge near Nevada City that is very rich.

Grass Valley *Tidings-Telegraph*: The Gold Point mill at Grass Valley, recently completed, started ten stamps. The rock is not of good quality; considerable work is necessary before a pay shoot is reached. F. Richards is Supt.

Grass Valley *Union*: The W. Y. O. D. mine at Grass Valley, of which T. H. Simonds is Supt., employs sixty men on day's pay. The mine is reported looking well in the lower levels.

Nevada City *Herald*: A new shaft is to be sunk on the Holbrooke gravel mine near Grass Valley, 700 feet south of the old shaft, so as to be able to work up the channel.

Placer.

Colfax *Sentinel*: It is estimated that twenty-three mines of the Ophir district have produced $1,576,000. There are several other important mines whose output is not included.——W. Houchin of Auburn, owner of the extensions east of the Centennial, Hope and Conrad ledges, is now engaged sinking a shaft down 112 feet on the ledge in slate and granite contact.——The Crandall mine on Duncan Hill is a new enterprise, owned by W. A. Freeman and B. F. Hartley of Auburn, the latter being Supt. The new 5-stamp mill is running steadily. The tunnel runs on a 5-foot ledge. Twenty men are employed at the mine. For power 40 inches of water is used under 240 feet head.——At the St. Lawrence mine, owned by C. A. Reed of Ophir, the ledge runs from 1 to 3 feet. The tunnel is in 800 feet. Stoping is in progress at a point 600 feet in. The mine has a Huntington mill and a 5-stamp mill. Power is derived from 30 inches of water, 160 feet of pressure.——At the Bellevue quartz mine the shaft is down 170 feet. Drifts have been run east and west at the 140-foot level, producing good free-milling quartz.——At the Gold Blossom mine at Ophir forty-eight men are employed; W. B. Fisher is Supt. Fifty-six tons of quartz are mined and run through the 20-stamp mill each day.——At the Hathaway mine, A. B. Eastwood, Supt., has twenty men on the payroll. The 20-stamp mill is crushing an average of twenty tons of $8 quartz per day. The shaft at the mine is down 630 feet.——At the Black mine an Eastern company has commenced the development of the property. The shaft is down 300 feet.——The most extensive quartz mining development in this county is in progress under the direction of E. W. Chapman at the Three Stars mine, seven miles west of Auburn in Ophir district. The mine is being opened up by three shafts. The Star shaft is 725 feet vertical; the Belmont shaft is 230 feet deep. Compressed air power is used. A pipe line conveys 120 inches of water 5280 feet.

Nevada City *Transcript*: The Gold Channel Gravel M. Co. near Emigrant Gap at a recent meeting in Grass Valley decided to proceed at once to put up new hoisting and pumping machinery and proceed with development. The owners are G. Mainhart, A. W. Hyett, R. Scanlon, W. L. Baker, G. Gehrig and C. Pecor.

Republican-Argus: The Lost Camp mine at Blue Canyon has been shut down owing to a cave in the main tunnel.——At the Gold Blossom mine, near Ophir, sixty men are employed in mill, hoisting works and mine, under Supt. W. B. Fisher. The mine and mill have been in operation for fourteen months, after a long

idleness.——At the Grass Ravine mine, near Ophir, last week, the new 5-stamp mill and hoisting works were burned, a day or two before crushing ore was to have commenced. T. W. Waterhouse, Supt., has fixed up a temporary hoist and work upon the mine has been resumed.

Plumas.

Marysville *Appeal*: F. H. Rood will employ four or five men to reopen the Star of Plumas mine, Buck's Valley, running the tunnel to develop the channel of auriferous gravel.

Riverside.

Redlands *Citrograph*: At Ingersoll & Esler's Virginia Dale mines one shaft is down over 200 feet. Development is progressing, only enough ore being extracted to pay expenses.

San Bernardino *Transcript*: In the Paradise mountains, on the desert, parties are developing the Dream and Guardian claims. Not over a half-mile distant are the claims of H. Galerone, in which a number of San Bernardino people are interested. The Galerone party are at work and are down 35 feet on the Ontario. They have taken ore from the Klondike claim to the mill.

Los Angeles *Mining Review*: The Good Hope mine, four miles southwest of Perris, is being worked by leasers, it is reported with satisfactory results. The old tailings dump is being worked by cyanide.——Several parties have been investigating the Santa Rosa mine, six miles west of Perris, and it is expected that pumping will commence next week. The mine has been idle several years and is flooded.

Riverside *Press*: Hammitt & Cage have sold one-fourth interest in the Federal Loan and Bess mines, west of Perris, to a Riverside man, the consideration being that he erect a 5-stamp mill on the property. Assays lately return $4.50 to $6.——It is reported that W. F. Bray has secured for Los Angeles parties an option on the Santa Fe group of mines, six miles west of Perris.

Sacramento.

Folsom *Telegraph*: Prospecting will be resumed on Sailor Bar, near Folsom, 400 acres of which is under bond, and if the property meets the expectations of the syndicate, a Risdon gold dredge will be built upon the bar. The syndicate contemplates building three or four dredges in this vicinity, and there is enough land under bond for that purpose.

San Bernardino.

The copper properties near Kleinfelter, now being developed by Witt, Knight & Anderson, are looking well. Copper values run up to 40%.

Copper occurs in the low limestone hills west of Manvel in the form of chrysocolla (silicate of copper), also in the Exchequer district, north of Homer station.

It is reported that there are large deposits of zinc ore in Old Woman's mountain, south of Danby.

San Diego.

Escondido *Times*: The new 5-stamp mill recently put up at the Escondido gold mines by the Cleveland-Pacific M. Co. is in operation. These mines were first opened and operated years ago by Mexicans, who crushed the gold in arrastras. More recently a rotary mill was built and after a brief period was shut down. The new stamp mill is returning to the recognized successful method and success now depends upon the mine and management.

Shasta.

(Special Correspondence).—There is great activity in mining in this county. Individuals and corporations are camped in various sections of the county, making locations and developing properties. The daily output of the Mt. Shasta Co. near the town of Shasta averages about twenty-five tons, which is hauled nine miles to the smelter at Keswick. I am informed that the Mt. Shasta Co. has secured within ten days eighteen new claims.

Moore & Small last week sold three claims to San Francisco people, who have begun operations. The property is pretty well opened.

A. E. Pryor of San Francisco has opened a large ledge of fair grade ore in Shasta district.

R. Shaw recently sold three claims to the Mt. Shasta Co. and is developing three claims, from which he is hauling ore.

J. W. Lees & Co. are developing four claims about four miles from Shasta. They have a 140-foot tunnel on a 10-foot ledge of $6 ore. On another claim they have a 7-foot ledge of fair grade ore, all of smelting character.

J. L. Herbert is developing a claim near the Mt. Shasta mine, in which he has a 4-foot ledge of good ore.

Pryor & Lees are developing a claim in which they have a 6-foot ledge.

B. McGinnes is opening a ledge in which he is following a seam that is paying above operating costs.

Pugh & Menzel are taking out ore which yields fair returns by concentrating.

Dr. Crabb has a 200-foot tunnel in good ore.

J. Meier is employing eight men, running four tunnels and taking out sulphuret ore.

The Bully Hill mine at Copper City has been bonded to C. A. Hamilton of San Francisco.

The German syndicate developing copper properties at Stillwater are receiving proposals for a smelter. The company's representative is Geo. Boyha, at Redding.

The Ballakalela group of thirteen claims at Windy Camp is bonded to Eastern people and a sale is pending. The agents recently secured, in addition to the Ballakalela holdings, one-half section of ground and seventy-six locations. There has been expended on the Ballakalela copper property over $30,000 in development. The property is owned by Murray & Co.

Work is progressing in reopening the Black Bear mine an Muletown mountain.

The Black Spider mine near Keswick has reached 65 feet depth on a 25-inch ledge of high-grade ore.

J. Kahny & Co. are developing a property near Shasta that is one mile by half a mile in extent.

Price & Watechek are opening a property on a large scale in Muletown district.

Saeltzer & Co. of Redding are opening several claims near Stillwater in which they have copper, and a ledge of silver ore that carries good values.

W. Russell is shipping $12 ore to Keswick from Muletown district.

Taylor & Epperly are developing a large ochre ledge in Shasta that carries values.

There are in Shasta county sixty-eight idle mills, monuments to lack of knowledge of the ores in days gone by. Now these base ores are being successfully treated and mining has taken a new impetus in these parts. As yet the cyanide process is still in the experimental stage in this section, though I am told that Mr. Charles Butters is putting in an experimental plant at Kennet, which, it is thought, will be in operation late this summer.

Shasta, April 18th, '99.

At the Mount Shasta mine the purchase of ore for flux by the Mountain Copper Co. of Keswick, twelve four-horse teams being constantly employed, creates considerable activity.

Mountain Copper Co. stock at present sells at $35 per share, which would represent a value of $8,725,000 for the property.

Redding *Free Press*: Work on the Jackson group of mines in Backbone district has been ordered discontinued by the owners.

Shasta *Courier*: Stolberg & Maurer are pushing work on their claim on Shurtleff Hill. They will put in 300 feet of tramway to the wagon road to ship ore to the Keswick smelter.

Sierra.

Grass Valley *Union*: W. Ring, F. S. Foltz and W. Geary of San Francisco have gone to the Gold Ridge and Hilda mines, near Sierra City, where they have a permit to hydraulic. These mines will be worked by the drift method in the future.

Nevada City *Transcript*: The Alaska mine, at Pike City, is to be reopened, also the Grizzly mine, by the London & California M. & M. Co., Ltd., an English corporation, W. B. Dunlap of San Francisco Supt. A new shoot of high-grade ore has been discovered on the Alaska 1000 feet west of the old shaft. A new shaft will be sunk on this ore shoot, using electricity for power. A new mill will be built on the site of the old one that was destroyed by fire a few years ago.

Siskiyou.

Yreka *Journal*: Austin & Co., after drifting 150 feet south in their claim on Yreka Flats, and finding little gold, drifted north. On Monday they took out $4, on Tuesday $14 and on Wednesday $60.——In the Salmon river section the quartz, hydraulic and placer miners are busy, having plenty of water.——At Oro Fino the hydraulic claims are in operation.——Spengler Bros., who have been ground sluicing at mouth of Humbug, are moving their derrick up the creek and will hoist gravel into the sluices with steam machinery. The claim was idle all last year, owing to lack of water.——The steam prospecting machinery for boring to bedrock has been at work for a week in Cottonwood creek, between Klamath river, Henley and Hornbrook, prospects being satisfactory.——Placer locations have been made this week two miles west of the Yreka and Scott Valley wagon road south of Yreka. Quartz locations in same locality are also being opened by prospectors. The miners call that section the New Klondike mining district.

Trinity.

(Special Correspondence).—The Trinity Center Co. proposes putting in a dredger in Trinity river, two miles from Trinity Center. The Katie Folley mine has a shoot of ore and a 2-foot vein in the 1st level. Geo. Carr has shipped some ore to Selby's from the Forget-Me-Not mine. Strode Bros. have started up their mill. They will put in five more stamps. The Bloss & McClury gravel mine of Trinity Center, owned by Thomas McDonald & Co., has now four 4½-inch nozzles playing on the gravel bank and expects to wash about nine acres of ground. They have twenty men employed on each shift. Vollmers & Stoddard have run through a ledge 60 feet wide, averaging about $6.21 in free gold. F. Hurst, formerly of Harrison gulch, has bought the Dewey mine on Coffee creek. The Duffenbacher M. Co. on Coffee creek is putting up a 10-stamp mill, two compressed air drills and an air compressor. They have a 2-foot ledge and have fifteen men on each shift. On the dump are about 400 tons of ore, mostly telluride. The Red Flag, owned by Wagner & Carr, has tapped a 2-foot ledge of good ore 120 feet below the surface, in hard granite. The Nash mine is doing extensive work. They have about sixty men employed. W. B. Frue Jr. has opened his mine and will put up a plant to treat forty tons a day.

Carrville, April 20th, '99.

Redding *Free Press*: The black sand in the placer mines of Trinity river has been assayed and reported to contain $13 in silver.

Tulare.

The bonding of the Deer Creek mine, near Porterville, by J. McDonald of San Francisco a few weeks ago has given an impetus to prospecting.

The district near the Lime Kiln, near the Indian reservation, is being invaded by prospectors and some good ore found. J. C. McCabe found a good lead in that vicinity a couple of years ago.

Tuolumne.

Walton Smith was killed at the Norwegian mine near Jackass Hill on April 11 by a plank falling down the shaft which had become unfastened from the skip. Geo. Gibbons was killed the same day near the power house of the Tuolumne Water Co. by the bursting of a 24-inch steel pipe which he was testing.

Sonora *Independent*: T. T. Lane and R. C. Davis are about to open the Sonnet mine, near Riverside, this county.

COLORADO.

BOULDER COUNTY.

The Dolly Varden at Sunset has passed from the St. Anthony M. & M. Co. to Eastern parties. Consideration $110,000, $25,000 down, balance in quarterly payments.

Other Eastern parties have the Victoria, one of the biggest gold and silver mines in Boulder county. G. A. Blaisdell of Boston is one of the purchasers. The consideration was $125,000.

The Smuggler, it is said, has been leased and will be worked. It has yielded over $1,000,000. The Invincible at Jimtown, is in good ore and has begun shipping.

Ward *Miner*: J. T. Hilliard of St. Louis, Mo., president of the Hematite G. M. & R. Co., has spent the past ten days in Ward. He and associates have secured from J. W. Piazzac and P. Miller the Calambia group of three claims and the mill in Spring gulch, near the Morning Star mine. The company has experimented in treating the low-grade iron sulphide ores of this camp and found that by their process it was an easy matter to save nearly their full value at a small cost.——The Dolly Varden deal was closed Wednesday. The property was sold for $150,000 to N. Gregg and New York parties.——The Ward smelter will be blown in as soon as the weather permits necessary improvements, and a bricketing machine will be installed to handle the fine concentrates. The company is pushing ahead the St. Louis to cut the King lead, and on the Success adit; also prospecting in the Miser's Dream.

CHAFFEE COUNTY.

The Twin Lakes Placer Co. (Ltd.), an English corporation, has been working several years in the Arkansas valley, between Granite and Twin Lakes. They own 5000 acres, patented. The water supply is carried by four miles of ditch and flume, and another ditch is in contemplation which will secure water from above Twin Lakes. the improvements to cost $50,000. The profits of last year were $60,000. The manager is F. Harvey, who is now in England.

The Twin Lakes Con. Placer Co., of Milwaukee and Kansas, is ready to commence work as soon as the weather permits. They own 3800 acres of patented land, and it is claimed the quartz will average 35 cents per yard.

CLEAR CREEK COUNTY.

Although the tunnel has been completed three years, the Lamartine has been hoisting high-grade ore to the top of the shaft, where it is loaded for shipment. Arrangements have been made to bring the ore down Trail run from the mouth of the tunnel, making a saving of three miles. The snow is still deep around the shaft house.

The Lone Tree mine, below the mouth of the tunnel, is filled up with ore, which it begins moving this week. In the adit level a body of ore was opened. Some is smelting, but the greater part is milling ore.

Leasers at the Freeland mine are finding bodies of mineral in the virgin ground. The Minnie is shipping forty tons per day. The Toledo, on the opposite of the gulch, is also being worked, producing gold-bearing copper ore, some of which is shipped to the Argo smelter.

In drifting on the recent strike in the Alpinde mine at Georgetown a distance of 60 feet has been gained in the ore body. Mgr. J. Turck has shipped thirty tons of ore that runs $300 to the ton. Stoping on the ore will begin. The old level, which has reached 1000 feet, is being driven to cut the same ore. Work has commenced on the 600 and 750 levels.

Idaho Springs *Mining Gazette*: Lundy & Co., who have been operating the Clyde and other lodes up Virginia canyon, have a large streak of $100 ore in a crosscut. A shaft was sunk at the breast of the tunnel, in which a streak of ore was discovered. Also a crosscut was run north back of the shaft in the tunnel. In 60 feet this crosscut tapped a vein carrying 2 feet of solid ore, tests from which showed a value in gold and silver of over $100 per ton. This enterprise is backed by Utah capital.

Silver Plume *Standard*: The Seven-Thirty has been shipping a large amount of ore, which was packed down from the mine on jacks and then hauled to the mill in wagons.——G. Wheeler is hauling ore from the Stevens to Graymont and says there are 300 sacks in the mine yet. Some of it is inside the tunnel, which is blocked with ice.

DOLORES COUNTY.

Rico *News-Sun*: The Enterprise mine at Rico is reported employing more men than at any time in three years.

GILPIN COUNTY.

The Gregory-Bobtail properties, at Black Hawk, have passed into new hands. The amount of money paid for the property is not public. The new owners are H. R. Wolcott of Denver, L. T. Bush of New York, who is president of the Gold Coin Mines Co. in this county; J. S. Bache of New York; B. B. Lawrence of Clear Creek county, and A. L. Collins of Central City. The purchase includes the Bobtail mill of 75 stamps. The future policy of the new owners has not as yet been given out. A. L. Collins will look after their interests at Central City. The record of the Gregory-Bobtail to date is over $14,000,000, chiefly gold.

The Rialto mine, between Central City and Black Hawk, which was sold recently, has again changed hands, C. K. Colver transferring to W. H. Davis, trustee of Denver, the property, machinery and buildings, for $40,000. A pool has been organized to work the property and a new shafthouse is to be erected over the site of the old one, and a hoisting plant will be installed. The main shaft is down 550 feet. It has been idle for five years.

The Kelley M. Co., operating the Rialto Extension property, near Central City, are advertising for bids to sink the cage shaft 100 feet deeper.

Denver *Republican*: S. W. Miller of Chicago, who is working the East Whiting on Gunnell Hill, Central City, has a lease and bond on the Straub, Straub Extension and Press claims, also 200 feet of the Ashtabula lode near the East Whiting property. He has also an option on the Huddleston group of five claims in the Eureka district. In the East Whiting mine the vein has been opened in a south crosscut on the 300 level.——Local parties working the Washington Day in Pleasant Valley district, have returns from several loads of ore which gave 35% lead.——Frey & Horner have made a shipment of lead ore from the Hayseed property in Quartz Valley. They have about seventy-five tons of mill rock on the dump. They also have a lot of zinc ore which they will ship to the works at Canyon City.——The County mine in Chase gulch made a shipment of 100 tons of ore to the concentrator for a test. The ore carries lead, not enough to make it a smelting proposition and too much for milling.——E. C. Lindemann is getting the old Stewart mine in Hawkeye district in shape. The water has been lowered and miners are retimbering the shaft. It has been idle twenty-five years.

GUNNISON COUNTY.

(Special Correspondence).—The Cortland M. Co. is now working several claims by a tunnel in McIntyre gulch, about three miles northeast of Ohio City. In the upper working there has been 400 feet of work, and a good deal of high-grade silver-lead ore has been shipped. H. S. Roe, the Mgr. has started a tunnel about 500 feet farther down the hill and is running on the vein. At a depth of 200 feet he has encountered good pay ore in several places. There are two cars ready to ship. The ore is worth about $200 per ton; $20 is gold, the balance silver and lead. Mr. Roe will start a winze in the tunnel and increase his force.

The Raymond mine, which is near the Cortland property, will be started up at once. The mine is said to be in good ore. The Mgr., who has a bond on the property, shipped a car of ore to the smelter, getting returns of $100 per ton. He has means to put a force of men at work and unless all signs fail the Raymond will be a shipper of high-grade lead-silver ore.

The Chloride mine is now working six men and has sent out two cars of ore that will run about $100 per ton in gold. The property is near Ohio City, has a good deal of work done on it (mostly tunnels) and shows up good bodies of ore.

Gunnison, Colo., April 10th, '99.

HINSDALE COUNTY.

Denver *Mining Review*: The streak of gold ore in the Golden Wonder mine near Lake City is looking better.——L. A. Vinton, with three men, has gone up to Red mountain to work on the Bryan lode, where a shaft is being sunk on a porphyry dyke.——T. N. Dall and H. Reppy in the Golden Rule on Hotchkiss mountain have good looking quartz.

LAKE COUNTY.

Leadville Carbonate *Chronicle*: The Humboldt mine, on the northwest corner of Iron hill, is being worked under lease to Hinckley & Co. They are mining in the upper levels, 170 feet from the surface.——The Mahala mine continues to produce 100 tons of sulphide ore from the ore body, near the bottom of the winze. This ore chute is 60 feet in height, and the diamond drill shows mineralization below.——The road is open to the Continental Chief, and ore will be moving from that property. It cost the company $1500 to move the snow.

MINERAL COUNTY.

Creede *Candle*: A few days since workmen grading for a building in the town of Creede uncovered a gold-bearing vein.——A contract has been let by D. L. Motz for another 100 feet of work on the Ballarat at Creede. Recent assays from this tunnel show increased values.——Work has been progressing during the past month on the Mollie S. and considerable ore has been broken. A shipment was made this week.

MONTROSE COUNTY.

Telluride *Examiner*: Thirty teams are freighting ore from the La Sal Copper Co.'s properties in Paradox valley, near Bedrock, and as many more would be employed could they be obtained.

PARK COUNTY.

Park county is doing as much development work as any county in the State at present.

In the district north of Lake George, along the Tarryall and to the west of this stream work has been done all winter.

The Tenderfoot will be a steady shipper within sixty days. The ore is gold, silver and lead, the percentage of the latter being exceptionally large. The vein is in granite. Bids are being received for 500 feet of sinking.

The Tarryall-Midland has made its third shipment, the carbonates netting $35 at Pueblo. The ore is silver and lead, the latter 60%, returns on galena being from $45 to $80 net.

The Redskin has a rich chimney of ore at the 85-foot level. The average run of ore is $40. Iowa people are back of the company.

The Hard-to-Beat mine has a 3-foot vein of galena reached by a tunnel. Hauling will soon begin.

The Copper King, a new discovery in the northern part of the district has malachite and azurite. An assay at 10 feet gave 10% copper.

The Plymouth Rock, down 90 feet, has a body of copper ore which is being sacked for shipment.

RIO BLANCO COUNTY.

G. S. Wedgewood of Omaha has closed a deal for eleven gilsonite claims close to the Colorado line and sixty miles from Vernal,

Utah. The claims have several veins of gilsonite, the crude material running high in carbon. The price paid was about $20,000. He represents a company who are preparing to develop the property and ship the product East.

SAN JUAN COUNTY.

Silverton *Standard*: The Red & Bonita Mountain G. & S. M. Co. have awarded contracts for building the mills at its mines near Silverton.——The shipment of concentrates for March from the Gold King mine at Silverton was thirty-two cars of fourteen tons each.

SAN MIGUEL COUNTY.

The Japan Mines Co. is taking rich gold ore from the Flora, in Savage basin, which, with the Climax and two adjoining claims, was last fall purchased from the Flora G. M. Co. for $50,000. The Flora properties lie next to the Japan group, with which they constitute one of the largest properties owned by one company in the district. Since their purchase the Flora and Climax have been developed and large ore bodies found. In the Japan 3 feet of solid ore is visible, some of which is high-grade, and, shipped to smelters, netted from $750 to $1000 per car. The concentrating plant will be started up as soon as there is sufficient water for milling purposes. The plant has a capacity of sixty tons per day. As soon as the mill is started the force will be increased to 75 or 100 men.

The United States & British Columbia M. Co.'s new mill, one-half mile east of town, is treating from sixty to seventy tons of ore daily. A two-mile bucket tramway connects the mill with the mines in Cornet Creek basin. The vein is from 2 to 8 feet wide. A subsidiary company, known as the Liberty Bell G. M. Co., has been organized to operate this group of mines and mill, while the United States & British Columbia Co. is developing other claims in the district.

The Gold King mine and 40-stamp mill, which was closed down a few weeks ago on account of litigation with the Suffolk-Globe Co., will, it is reported, be started up in a few days.

The trail from the Alta mine, at the head of Gold King basin, to Ophir station is opened, and in a few days the Alta will resume shipping. Stoping ground has been opened, the main tunnel having a depth of 1000 feet, but no stoping has been done. The vein is from 4 to 6 feet wide and carries from 2 to 3 feet of milling ore and from 12 to 20 inches of shipping ore. The vein carries a larger percentage of lead than any other in the county.

A rich body of ore has been found in the lease held by Hall, Randol, Matthews & Rogers on the Silver King, on the same vein and adjoining the Alta. The mineral is said to carry gray copper rich in silver and a high percentage in lead. The streak is from 10 to 12 inches wide.

Ten stamps of the Terrible & Butterfly mill at Ophir Loop are dropping, and as soon as the water supply increases five or ten more will be added. The plant comprises thirty stamps, with concentrating machinery.

Telluride *Examiner*: Rich copper veins are reported discovered at Placerville.

TELLER COUNTY.

London reports the sale there to English parties by W. S. Stratton of the Independence mine at Cripple Creek, and about 100 acres adjoining, for $10,000,000.

A former London cablegram announced that W. S. Stratton had sold his Cripple Creek mine, the Independence, to the Venture Co. of London. The price was not stated, but it is said to be $2,000,000. Local officials of the company refuse to discuss the matter. In '93 the net profits of the mine amounted to $60,000. In the next three years the mine put into circulation $4,000,000 in gold, of which one-half was profit.

Drifts are being driven in two directions on the lead recently cut at 250 feet depth on block 5 of the Mountain Beauty G. M. Co.'s group on the southeast slope of Bull Hill, Cripple Creek. All the ore taken out is saved for shipment. The vein is 4 feet wide.

On the Minnie Belle claim of the Wilson Creek Con. Co., adjoining the Mountain Beauty, the shaft is being sunk to a depth of 350 feet and is now in 325 feet. In the fifth level the ore is the richest.

Up to this time the Magner and Sindlinger lease on the Minnie Belle has operated on the smallest of the fractions that constitute the claim. From four-tenths of an acre nearly $60,000 worth of ore has been taken. The present production is $20,000 a month.

Last month the Wilson Creek Co. purchased the Queen Isabella claim at Cripple Creek which overlapped nearly all of the Minnie Belle and threatened the title to more than three-fourths of the claim. The lessees will extend their operations to the remaining territory covered by the Minnie location.

Victor *Record*: Another strike has been made on the Chance vein and on the E. Porter Gold King in the Philips' lease west of the main workings. —— Work has again been started at the Golconda mine under the management of E. R. Argersinger. The main shaft has been equipped with a hoisting plant of the gasoline type, 22 H. P. The engine is the first of the kind in the district. The shaft is 320 feet deep and it will be sunk to a depth of 900 feet.

Denver *Republican*: The first shipment from the Pride of Cripple Creek since it has been under lease and bond by the Creston, Ia., syndicate, will go out this week. The leasing company has opened a lead at a depth of 165 feet, 18 inches of which carries good pay values.——Work has been resumed on the Ollie on Signal Hill sold to the Creston investors last fall for the sum of $50,000. A contract has been let for 100 feet of shaft.

Denver *Post*: The case of the Roxana Co. vs. the Isabella Co., at Cripple Creek, in connection with the wedge-shaped strip of land between the Cheyenne and Lee claims, which has been the subject of litigation, has been disposed of by the Land Office at Washington in favor of the Isabella Co.

IDAHO.

In the Sixteen to One, at Wallace, the drift is 50 feet from where the ore was first found, and the vein is 9 feet wide—about one-half clean ore and the remainder high-grade concentrating ore.

The reported discovery of molybdenite in the Leslie mine, near Mullan, has created a boom in that mineral, and prospectors are locating molybdenum claims.

MICHIGAN.

At Calumet last Wednesday the Tamarack, Osceola, Tamarack, Jr., and Kearsarge copper mines closed on account of a strike at their stamping mills at South Lake Linden. About 2500 men are out of employment through the strike of 300 men at the mills. The men are not grumbling, being in sympathy with the mill men. The mill men are likely to demand a straight 10% raise before beginning work again.

MISSOURI.

During the week zinc ore sold at Oronoga and Pleasant Valley mines, Webb City, for $52 a ton. Two years ago the price averaged about $20 a ton.

MONTANA.

The latest developments in the Boston & Montana receivership is the refusal of the Great Northern Railway to carry matte for the receiver. Five cars loaded with matte were tendered at Great Falls, which were refused. Suit will be started to compel the Great Northern to carry the matte.

Neihart *Herald*: Over 400 men have left Neihart since the strike began.——On account of the B. & M. closing down at Great Falls, the Lewis and Millard mines at Neihart have suspended shipments of coal to the smelter. This will throw fifty men out of work.

Butte *Inter-Mountain*: The principal news of the week is the resumption of work at the Boston & Montana. During the litigation the ore bins had been emptied and the workmen are now refilling them before shipments are made to Great Falls. The smelter will be ready to treat ore next week. The payroll of the company in Butte amounts to about $85,000 and at Great Falls $25,000 per month. It is probable that the full force will be at work next week.

Virginia *Madisonian*: G. D. B. Turner is operating the Red Bluff mine, at Red Bluff. The shaft has been retimbered to water and the pumps will be started. The work is in charge of G. Hadzor.——Mr. Ramstadter, it is reported, will begin work on the Grubstake, a mine which has produced about $125,000.——A. W. & C. E. Tanner are working the Tilden mine. They have fair ore in sight.

NEVADA.

Unwatering of the Comstock goes on. Drainage is to be facilitated, and when the new elevator gets to work about May 1st the water will be lowered more rapidly. The following is Mgr. Ross's latest telegram: Elevator working steadily. Water in the 1750-foot level winze is 26 feet 10 inches below the station.

Eureka *Sentinel*: Laird & Northey are working the Marguerite mine on Adams Hill north of the Macon City and are getting out high-grade ore. —— F. Quinn is working the Auro-Cyanide claims on Adams Hill, adjoining the Macon City, under lease. The Auro-Cyanide mines have produced $75,000.

Winnemucca *Silver State*: At Dayton the Bull Dog plant, consisting of an engine, hoist and pump, was burned recently.——At Gold Hill Pierson & Davis have men at work screening a test run of rock from the Overman tunnel dump, which will be crushed at the Rock Point mill in Dayton, and, if the returns are satisfactory, the entire dump will be reduced. The dump is composed of quartz.——John Biggs, owner of the Overland mine, near Johntown, leased the property to Washburn & Mills of Gold Hill, and later assigned it to the Bank of California. The bank put a force of men on the mine, whereupon Washburn & Mills hired watchmen to oversee the property. Litigation is threatened.

NEW MEXICO.

Santa Fe *New Mexican*: M. M. Freed has sold his Cabello mountain copper claims to the Fidelity M. Co. of Salt Lake City. There are twelve claims in the group.

Santa Fe *New Mexican*: The Old Abe mill is running day and night on ore from development work. In connection with this a cyanide plant is in operation. The new hoist is now on the way from Alamogordo, the nearest railroad station. The foundation for it is nearly laid. The cyanide plant, owned and operated by the Gumms, is still working.——The company preparing to operate in the Jicarilla placer district has had a survey made, which shows the water sources several hundred feet higher and the line three miles shorter than expected.

Santa Fe *New Mexican*: The Philadelphia M. & M. Co. at Hillsboro has abandoned the cyanide process and adopted the amalgamating process, which has increased the output. ——The Snake group and the Richmond group near Hillsboro are being worked profitably on the lease system.——The Porter mill is running steadily.

Sacramento *Chief*: In Dry canyon, eight miles east of Alamogordo and seven southeast of La Luz, a number of prospects are being developed. The formation is granite and limestone with porphyry dykes and veins of quartz and spar.——Tucker, Varner & Smith have a copper claim near Dry canyon which at 35 feet assays $120 to $180 per ton.

OREGON.

Baker City *Republican*: The bromine-chlorine plant on the Golconda property will be started up the coming week. Its capacity is fifty tons a day, which will be increased to 100 tons within thirty days. There are about 1500 tons of ore on the dump, which will first be treated.

Baker City *Epigram*: The Chicken Creek mines are to start up with three giants under the superintendency of W. A. Weatherly.—— It is reported another strike has been made at the Collateral of the Virtue Co.——Work will be commenced on the 25th inst. on the 125-mile mining ditch which runs from South Burnt river near Unity to near Malheur City.

SOUTH DAKOTA.

Deadwood *Mining Review*: Quartzite has been struck in the Mark Hanna ground in Two Bit at a depth of 55 feet. The quartzite carries value. The ground adjoins the Monarch, from which shipments of ore are being made.——The Gilt Edge Co. is sinking a shaft on the Dolcothe claim, east of Hill City, which is 175 feet deep. The vein contains gold the same as the Holy Terror ore and the company is preparing to sink to the 300 level.——The St. Elmo mine and mill near Hill City have started up again. There is a vein of free milling ore in the mine which gives good assays.——The Spokane mine near Hill City is being worked by the Crown Hill M. Co. and the ore, which contains lead and silver, is being hauled to the concentrating plant of the Harney Peak Tin Co., east of Hill City.

Hill City *News*: The Blue Lead copper mine, near Sheridan, is to be reopened under the Harding bond. A tunnel will be driven in from the foot of the hill, 1000 feet from which crosscuts will be run. The surface deposit is over 100 feet in width, consisting of black slate and quartz, in which occurs green carbonate. Black oxide of copper also occurs in the slaty portions.——Rossiter Bros. will start the cyanide plant at Deadwood, to treat ore from their mines in Blacktail gulch.

UTAH.

The antimony mines of Garfield county are being worked, regular consignments of ore being made to the Eastern and Western market. The last consignment was thirty tons.

Eleven teams left Ferron recently loaded with gold-bearing rock from the mines, thirty-five miles southeast of Ferron. This is the first shipment and it is now on the way to Price, the nearest railroad point.

Hon. J. H. Conrad has purchased the Massachusetts mining property at Park City, Utah. While prospecting from the original workings he will begin a new shaft.

Mercur *Mercury*: The Mercur made the first shipment of gold bullion from its new refinery Wednesday, amounting to $24,000.

Salt Lake *Tribune*: Recent sampling of the Petro at Bingham shows large bodies of copper ore. This was recently worked as a lead-silver mine.——If negotiations now in progress result favorably, work will be resumed on the Atlas group, eight miles south of Milford, which has been abandoned for fourteen years, but at one time a large producer of silver and lead ores.——A strike of copper ore has been made on Granite mountain, Deep Creek district.——It is reported that the Ganyard placers at Bingham, comprising seven claims, is to be incorporated by Salt Lake men.—— The reopening of the United States M. Co.'s property at Bingham has been commenced and when in full blast it is not unlikely that 1000 names will appear upon the payroll. There will be enlargement of the main tunnels of the Old Telegraph and Old Jordan which are to have a double track, the cars to be drawn by mules until an electrical plant is installed. Air compressors are also to be put in.

Salt Lake *Tribune*: The engineers at the Daly-West quit without notice a few days ago. They had been working twelve-hour shifts and under the new law demanded eight-hour shifts, which was agreed to, but the miners refused to allow a strange engineer to lower them into the mine.

Eureka *Republican*: Mgr. W. Lawrence of the Star Con., south of Mammoth, reports the shaft down 480 feet. The objective depth is 700 feet. They are also sinking a winze on the 400 to tap the ledge.——At the South Sunbeam, of Silver City, the shaft is now down 175 feet, with a crosscut of 20 feet, and showing ledge about 300 feet.——Supt. W. Morris reports that assays from the 100-foot level of the Orient, in West Tintic, show 13% copper, 22⅔ ounces silver and 67 cents gold.——Supt. W. Hoffman reports the opening of an ore body in the White Cloud mine, near Diamond. Specimens of galena have been brought in, some samples of ore carrying considerable gold and silver.

WASHINGTON.

A contract is to be let to sink 50 feet on the Altura at Republic.

Work on the drift in the Trade Dollar, at Republic, has been shut down and a winze started on the pay shoot near the entrance to the drift. It is now about 12 feet in depth and is showing up fine ore.

Rossland *Miner*: No. 4 tunnel of the Republic mine, has been started. It will be 2200 feet long and will tap the ledge at 600 feet deep. The Republic is running a full force.

FOREIGN.

AUSTRALIA.

Bendigo last year produced one-fourth of the total output of gold of Victoria. Since 1851 this field has produced 15,765,041 ounces, of a monetary value of £67,060,164.

BRITISH COLUMBIA.

Supt. H. A. Ross of the Bismarck, Standard No. 1, Blue Bird, Nevada, Tip Top and MacKenzie, eight miles from Grand Forks on the west bank of the north fork of the Kettle river, says they are down 30 feet in the Tip Top and No. 1, which adjoin, and have 4 feet of ore.

The Lucky Jim mine near Kaslo has been purchased by an English syndicate and development work is to begin at once. The purchase was made by A. R. Browne, representing English capitalists who control a chemical process for extracting zinc from ore. The Lucky Jim is rich in zinc and the new owners will ship the ore to England for treatment. The mine has been developed to some extent and has a tramway. E. C. Ward, formerly of the Whitewater, is in charge.

The Stemwinder tunnel in the Kootenay is now in 80 feet, in ore its entire length. A south drift run from this tunnel 30 feet is also entirely within the ledge. Both were run to find the walls, but have failed so far.

During March the St. Eugene and Lake Shore mines at Moyie shipped twenty carloads of ore to the Trail smelter. The total value was $32,960, net profit $16,000. The St. Eugene is credited with 370 tons and the Lake Shore with 42 tons.

A rich strike of copper ore is reported on the Highland King on Diorite creek, twenty-eight miles from Fort Steele, owned by Kleinsmith, Schagel & Grez. The owners have a force of men developing. There is a good showing of ore of a high grade.

The crosscut tunnel being driven on the Miller Creek is now in 232 feet and quartz stringers are beginning to come into the face of the tunnel. For some time mineralized rock appeared in the workings, carrying lead, zinc and iron, which is taken as an indication that the ledge is only a few feet away.

At the Mascot mine, in twenty-six days, 174 feet were driven in No. 3 tunnel, making the record for work in this camp.

The Stemwinder is working ten men. A crosscut is being run from the shaft both ways at the 200-foot level. Better values are now showing.

It is said that work will soon begin on the Smuggler, which has been idle some time.

The Evening Star at Rossland will soon be a regular shipper; at present the ore is allowed to accumulate until the roads get in condition when it will all be shipped to the Trail smelter.

The Porto Rico mine is one of the productive mines of Ymir camp. A 10-stamp mill installed last winter has been in operation two and a half months and $30,000 in gold has been extracted. The development of the mine consists of three tunnels. The upper is in 675 feet. At the breast the vein is 3 feet wide. No. 2 tunnel is in 280 feet and has 290 feet of backs. The tunnel is on the vein. No. 3 tunnel is in 540 feet. The vein varies from 14 inches to 5 feet in width. An upraise has been made connecting No. 3 tunnel with No. 2, a distance of 155 feet. It is proposed to run a fourth tunnel below No. 3 for a distance of 1000 feet. The vein lies between walls of porphyry and consists of white quartz heavily mineralized with pyrite.

Ashcroft *Mining Journal*: A party of Americans and Englishmen have started north for the head of Peace river by way of Fort McLeod, where they say they have a large quartz ledge being developed by miners. The headquarters of the company is in Chicago. They also have mines on Great Slave lake.

Nelson *Tribune*: The Slocan Star is putting the mill in shape to resume operations about the 20th. A number of cars of ore taken out during the winter will be shipped.—— Throughout the Slocan the trails and wagon roads are breaking up. For this reason the Whitewater has discontinued shipments.—— Arthur Bacon, who has been in the Slocan purchasing zinc ores for an English smelter has about 1400 tons of ore running 15% to 35% zinc.——The Last Chance in the Slocan is keeping up its record of one car per day which nets from $1200 to $1500 per car.——G. Alexander, owner of the Antoine near Sandon is preparing to start a long tunnel on the Best Basin side to tap the lead at great depth.—— The Tennessee, Iowa and Iron Chief claims owned by the Hamilton & Rossland G. M. Co. near Ymir are to be developed.——It is understood there is a deal on for the Wilcox on Wild Horse creek; it has two ledges, principally galena.——Work on the Elise in Ymir will be continued in the drift along the hanging wall, now in 65 feet. The shaft and the tunnel have been connected at the 125-foot level.—— It is reported that work on the Jubilee mine will be resumed; it is on Jubilee mountain near Ymir and is operated by the Mountain Goat Co. The tunnel is in 200 feet and it will be extended to the ore body.——A representative of French capitalists has been looking up the Ymir district.

Rossland *Miner*: The War Eagle has just shipped fifteen cars of ore or a little over 262 tons. The shipments of the company since Sunday have amounted to 472.5 tons.

Rossland *Miner*: The Rambler-Cariboo M. Co. near Rossland will put in a 5-drill compressor. The present plant consists of a boiler, engine, hoist and three steam drills. W. H. Adams is Mgr.——The ore shipments for the year up to April 15 from Rossland aggregate 24,855 tons, principally from the War Eagle, Le Roi and Iron Mask.

MEXICO.

A mining disaster in which twelve men lost their lives is reported from Sierra Mojada, in the State of Coahuila, fifty miles south of Presidio, Texas. An explosion of foul gas occurred in the Veta Rica silver mine, and before all the miners got to the surface the timbers took fire, barring exit.

NEW ZEALAND.

The New Zealand Government is assisting the prospecting of the country by the erection in suitable localities of prospecting plant and all necessary appliances to enable pioneers to test the ground.

SOUTH AFRICA.

South African *Mining Journal*: The Robertson shaft of the Knight's Deep makes 300,000 gallons of water daily, raised by electric pumps. This is from the shaft only and a large increase is looked for from the levels. The Connor shaft is making 600,000 gallons daily and an increase is looked for. This vast volume of water is considered a valuable asset. To utilize this supply of water to advantage, it is intended to lay a pipe line from the Knight's Deep shafts to a new reservoir now being constructed. This reservoir will be connected with the different boiler plants and batteries which need water.

Personal.

M. P. DALTON lately returned to Denver from Boston.

T. A. RICKARD, State Geologist, is visiting the Comstock, Nevada.

EX-GOVERNOR ADAMS of Colorado is in Arizona looking after mining interests.

F. A. WOODS, Mgr. Last Chance mine near Sandon, B. C., is visiting in California.

G. W. PARSONS has returned to the Alta mine, Alleghany, Cal., from San Francisco.

JOHN SHAW has taken charge of the 20-stamp mill at the Hathway mine, near Ophir.

JNO. HAYS HAMMOND has returned to South Africa from London. He will remain three years.

P. C. WAITE has gone from Bozeman to Silver Star, Montana, to superintend operations there.

R. D. HUNTER, Denver Mgr. Sullivan Machinery Co., recently returned to Denver from Chicago.

H. B. MEECH is at Revelstoke, B. C., for the B. & B. C. C. M & S. Co., which is building a smelter there.

ARTHUR PEARSE of London was in San Francisco last week arranging for a Siberian mining expedition.

A. M. MCDONALD of Tuolumne county, Cal., has been appointed Supt. Lily gold mines, in Madera county, Cal.

E. L. BALLOU, of Igo, Cal., goes to Pony, Montana, to take charge of mining operations for a company there.

F. MCMILLAN of San Francisco has returned from an extended tour among the mines of central California and Mexico.

E. BENT has returned from Johannesburg, S. A. R., to Prescott, Ariz., and is investigating the Amazon group near Prescott.

L. VON ROSENBERG, a New York mining engineer, is is San Francisco, returning from inspection of Arizona mining properties.

C. A. SPRECKELS of San Francisco was a recent visitor in Deadwood, S. D., near which city he has large coal interests in the Wyoming field.

W. J. CLARKE, Gen. Mgr. General Electric Co.'s foreign department, has gone to Europe for four months to complete organization of his department.

BERT HOLDEN of Salt Lake, Utah, has accepted the position of managing director for the United States M. Co., with headquarters at Cleveland, Ohio.

EDWARD RAY, formerly Supt. Ibex mine at Leadville, Colo., is now in a similar position on the Independence Town & Mining Co.'s properties in Cripple Creek district, Colo.

M. H. TWOMEY of Phœnix, Ariz., is in Cochise county, Ariz., where he has mining interests. He leaves soon for Boston to arrange for marketing turquoise found near Pearce.

MR. H. T. HESSELMEYER, of Cobb & Hesselmeyer of San Francisco, has returned from Marysville, Cal., where he had been inspecting an Archimedean dredge in the Yuba river.

H. P. GORDON, who has been developing some Del Norte, Cal., properties, goes to Pandi gold basin, Alaska, this week to resume superintendency of the New York M. Co.'s property there.

PROF. W. L. WATTS of the State Mining Bureau, who has for the past three years been examining southern California oil deposits, etc., has returned to San Francisco and is making up his report.

ROBT. H. POSTLETHWAITE has returned to San Francisco from visiting the four Risdon dredges he recently placed on the Feather and Sacramento rivers. They are successful, having paid from the start.

Mr. J. P. CORBUS is at present superintending the operations of the Alaska-Treadwell M. Co. at Douglas Island, Alaska. Mr. Robt. P. Duncan, the late Supt. there, died at Phœnix, Arizona, on the 14th inst.

GILBERT MCM. ROSS, Mgr. Comstock Pumping Association and Supt. Ophir and Mexican mines, is in San Francisco, and speaks encouragingly regarding the favorable progress of the deep level pumping which is making progress commensurate with the magnitude of the work and the difficulties necessarily encountered.

FRANKLIN FARRELL now states that while he had accepted the position of president of the United Verde Extension C. Co., Jerome, Arizona, as previously published, he has reconsidered his determination and will not accept. He also says he has sold all his Parrot, Montana, interests and resigned as president and director.

LIEUT.-GOV. J. H. NEFF, Pres. California Miners' Association, has appointed the following committees to take charge of the arrangements for the convention of the American Institute of Mining Engineers in San Francisco next October: Executive Committee—W. C. Ralston, chairman; S. B. Christy, C. H. Lindley, C. G. Yale, W. S. Keyes, T. Mein, E. H. Benjamin, J. F. Halloran, E. A. Belcher, A. A. Watkins. J. J. Crawford, F. A. Leach, H. T. Power, Placer; W. H. Bourne and A. D. Foote, Grass Valley; F. Zeitler and B. S. Rector, Nevada City; W. B. Hammon, Butte; W. F. Detert, Amador; F. F. Thomas and M. B. Kerr, Calaveras; D. R. Oliver, T. Hender and F. M. Wilmans, Tuolumne county; H. E. Picket, El Dorado; M. E. Dittmar, Shasta; C. C. Derby, Santa Clara, and P. A. Buell, Stockton. Reception Committee—H. T. Gage, J. D. Phelan, I. M. Scott, D. M. Burns, A. J. Ralston, W. W. Montague, R. S. Moore, J. Spiers, Jr., B. T. Lacy, T. Heushaw, S. J. Hendy, H. T. Lally, S. Mooney, G. H. Wallis, J. Sloss, E. Coleman, A. Carrigan, J. M. Wright, J. F. Davis, J. S. Bownell, G. Johnson, J. Bermingham, J. Sonntag, W. A. Doble.

Industrial Notes.

The Utah Pacific Railroad is completed to within forty miles of Pioche, Nevada. It is expected that the line will be extended there by July 1st, '99.

—Ass't Gen. Mgr. McKercher of the Mexican Central says the Guadalajara branch will be built south and west of Manzan, Pacific coast, a distance of about 300 miles.

—Last week the Colorado Midland Railroad blockade west of Leadville, Colo., was broken and through traffic, which had been interrupted for seventy-seven days, was resumed.

—The Blue Lakes, Cal., Co. has completed its power line to Stockton and has bought $10,000 worth of machinery for use at its reservoir site. The plant at Blue lakes is ready for operation.

—Speyer & Co. say that over 91% of the bonds and 99% of the stock of the Central Pacific Railroad Co. have been deposited under the plan and agreement of readjustment, dated February 8th, '99.

—At Denver, Colo., the Denver & Northwestern Railway is to be constructed by German and Gould capital, and run in connection with the Missouri Pacific, to be built from Denver to Boulder, Ward and Steamboat Springs.

—Denver reports an unauthenticated deal whereby the Midland Terminal Railway Co., the Florence & Cripple Creek Railway and the Florence Reduction Works at Florence have been sold to a London syndicate for $8,000,000.

—Canada announces official intention to lay a cable across the Pacific ocean from Vancouver, B. C., to Australia, the cost to be borne by the Governments of Great Britain, Canada and the Australian colonies. A U. S. line to Hawaii and the Philippines, Japan and China is an existing necessity.

—The Union Pacific gravel mine at Sherman, Wyoming, is in charge of E. P. Edwards of Illinois. Two steam shovels and a large force of men will be employed this summer. The shipments will aggregate 5000 tons per day during the entire season. A rotary plow is clearing the gravel pits of snow and ice.

—The Northwest Railway expects by June 15th to have twenty miles completed from Huntington, Or., to Tramway Junction, the shipping point for the Peacock mine, and by August 15th to have seventy-five miles completed. The line runs up the Oregon side of the Snake river and is projected to tap the Seven Devils copper district.

—The O. R. & N. Co.'s steamship Lennox cleared this week for Oriental ports with the largest cargo of flour ever put afloat on the Pacific coast—47,358 barrels. The Lennox is the third steamer to leave Portland within a month, and the combined Oriental flour shipments on the three steamers were 105,244 barrels, over three-fourths of which was for Hongkong and the remainder for Japan ports.

—The Russian Minister of Railroads announces in a special dispatch from St. Petersburg that when the Transsiberian railway is completed it will be possible to go around the world in 33 days, as follows: Bremen to St. Petersburg, 11½ days; St. Petersburg to Vladivostock, 10 days; Vladivostock to San Francisco by steamer, 10 days; San Francisco to New York, 4½ days; New York to Bremen, 7 days.

Books Received.

"*Practical Notes on the Cyanide Process;*" octavo. 202 pp., illustrated; Francis L. Bosqui, New York and London; price, $2.50. This volume treats the cyanide process in a thoroughly practical and comprehensive manner, giving many illustrations and details of construction, which must be of value to all engaged or interested in cyaniding of ores. Considerable space is devoted to South Africa and New Zealand, but the greatest amount is given to the operations in the United States.

"*Stevens' Mechanical Catechism;*" octavo, 336 pp., gilt, illustrated, interesting and thorough, plain and easily understood. The steam engine is thoroughly explained with all its modern attachments and improvements, slide valves, safety valves, injectors, pumps, steam gauges, lubricators, eccentrics, link motion, indicator, etc. Traction engines, etc., are treated in a special chapter. The manufacturing of ice, refrigeration machines, brine and direct expansion systems are treated exclusively; also, the machine shop, electric plant, house wiring and electric heating. Silk cloth, price $1; Laird & Lee, Chicago.

Trade Publications.

The largest and in some ways the finest trade publication received this month is the illustrated book issued by W. T. Garratt & Co., 138-142 Fremont St., San Francisco. It is 7¼x10 inches, bound in gold and brown, printed on 120-lb. paper and profusely illustrated. The first 100 pages illustrate and describe the hydraulic and pumping machinery manufactured by W. T. Garratt & Co., in each case details being furnished as to dimensions, cost price, with such description as would naturally be asked for by probable purchasers. The next 265 pages of the book are devoted to similar illustrated description of all manner of steam goods, tools and requirements of steam fitters and engineers. The remainder of the 402 pages treats of bells, gongs and gong fittings, and is an encyclopedia on those subjects. It was from the W. T. Garratt foundry that the first bell cast on the Pacific coast was turned out in 1851, and ever since the firm has been causing considerable noise in the world, its bells going everywhere, whether in church steeples, ranch and mine use, on locomotives or in engine rooms. The volume is the result of considerable labor and expense and is just issued. It will be sent to any address on request.

Catalogues.

In our weekly talks on catalogues comes up this issue notice of a booklet—No. 169—issued by the Ingersoll-Sergeant Drill Co., 26 Cortlandt St., N. Y. City, treating of air compressors. It is 3x5 in., 24 pp., an unpretentious publication, but worthy of notice as refuting the idea that a big pamphlet is necessary in this connection. The booklet gives considerable information on air compressors, with full page illustrations, and enumerates 162 separate and distinct uses of compressed air.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING APRIL 11, 1899.

623,068.—STUMP PULLER—E. M. Bliss, Tacoma, Wash.
622,793.—SIDEHILL HARROW—G. A. Brockhurst, Orinda Park, Cal.
622,887.—CLOCKS—S. G. Button, Hollister, Cal.
622,883.—BOTTLE WASHER—Cobb & Dyer, Phœnix, Ariz.
622,890.—ROLLING GATE—E. E. Gustin, The Dalles, Or.
623,084.—BICYCLE LOCK—S. C. Houghton, S. F.
623,021.—SHADE TRIMMER—D. H. James, Albany, Or.
622,954.—SHINGLE SAW—S. T. Johnson, Trinidad, Cal.
622,807.—CARD HOLDER—Robt. Joy, S. F.
623,088.—ORE CRUSHER—C. C. Lane, Los Angeles, Cal.
623,025.—MINER'S PICK—J. B. Lucas, Valley Springs, Cal.
622,818.—PLOW DRAFT—W. S. McClarren, Redlands, Cal.
623,030.—DOOR HANGER—A. Newell, Pasadena, Cal.
622,707.—WRENCH—E. Olson, Seattle, Wash.
622,823.—SLIDING DOOR—D. Schuyler, San Diego, Cal.
622,827.—MECHANICAL MOVEMENT—T. S. Smith, Los Angeles, Cal.
622,748.—RHEOSTAT—W. H. Woodman, S. F.
622,937.—FUIT CLEANER—B. B. & J. H. Wright, Riverside, Cal.
30,526.—DESIGN, EGG HOLDER—W. P. Murphy, Willowglen, Cal.

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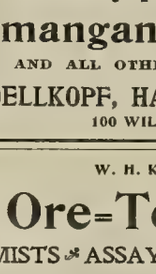

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Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SIDE HILL HARROW DRAFT ATTACHMENT.—Geo. A. Brockhurst, Orinda Park, Cal. No. 622,793. Dated April 11, 1899. This invention relates to a draft attachment for harrows, and is especially designed for harrows which are used in cultivating lands upon side hills or in other sloping positions where the harrow is drawn over the land in the line of the slope. It consists essentially of a bar interposed between the harrow and the team, the traveler movable upon the bar with clamps or stops adjustable with relation thereto to determine the movement of the traveler upon the connecting bar. When harrows are hauled transversely along inclined land or side hills, the tendency of the harrow is to continually slide down below the line of draft and travel, and this is counteracted by the use of the present device.

CARD HOLDER AND EJECTOR.—Robert Joy, San Francisco, Cal. No. 622,807. Dated April 11, 1899. The object of this invention is to provide a holder for visiting, business and other cards which it is desirable to carry in considerable numbers, so that they will be kept clean, and in conjunction with this of a means for delivering and ejecting cards from the holder one at a time. It consists essentially of a card-containing chamber with springs fixed to the top, and pressing upon the surface of the cards so as to maintain the lowermost one constantly in contact with the bottom of the case. A fulcrumed lever having a push plate fixed to its long arm is adapted to engage the rear edge of the lowermost card, and a second lever lying along the interior of one side of the case is fulcrumed near one end and has the opposite end engaging the short arm of the first named lever. A press button or projection extending through the side of the case serves for the application of power to the levers and through these the ejector plate is actuated to force out the single card. As soon as the button is released, a spring returns the parts to their normal position.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.

For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

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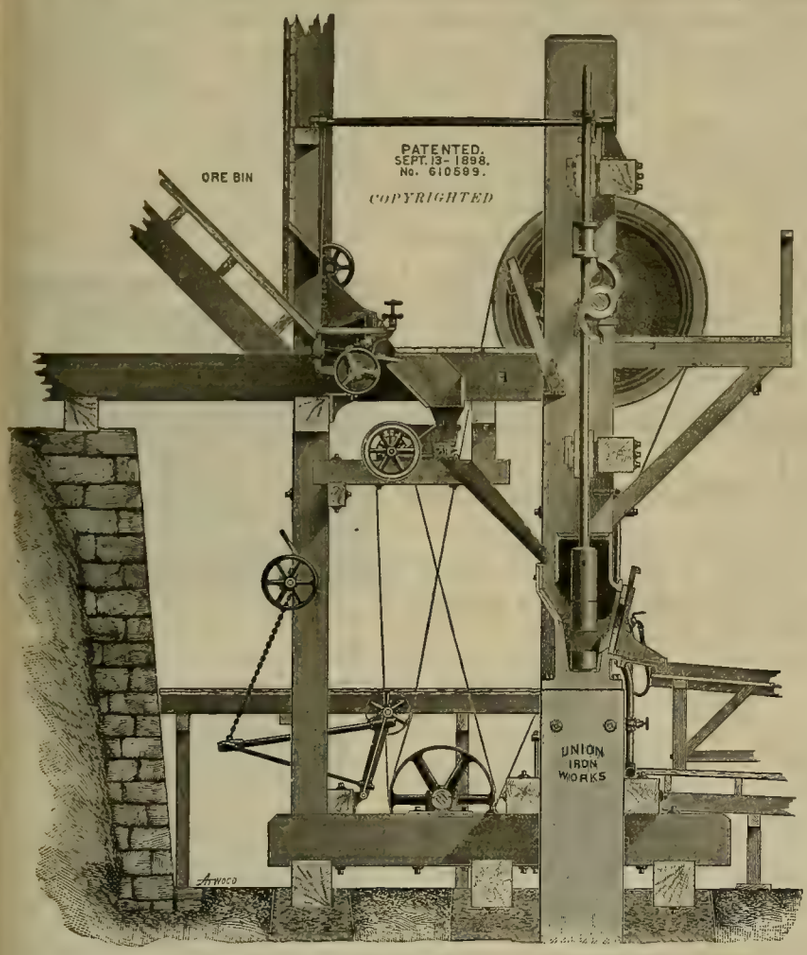

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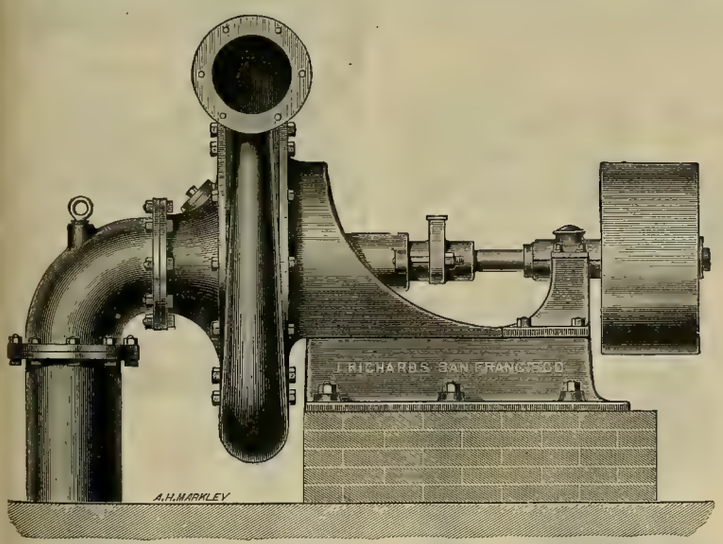

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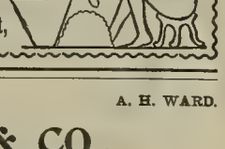

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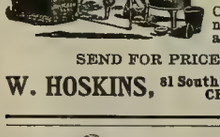
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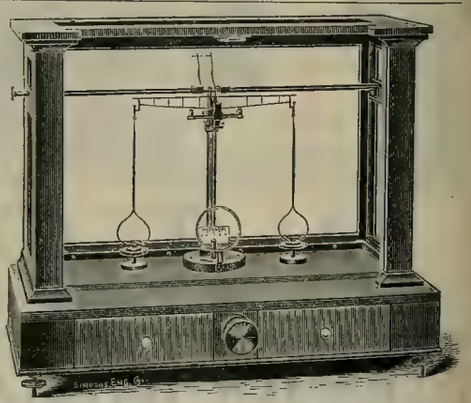
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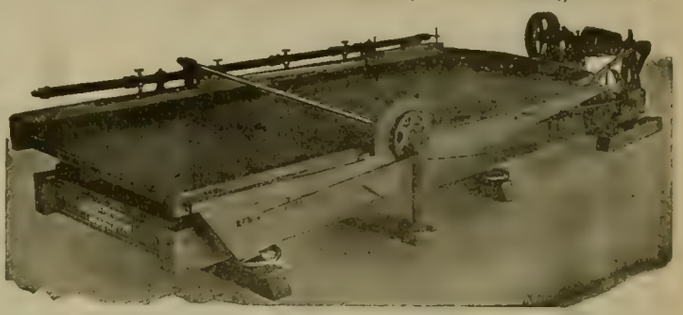

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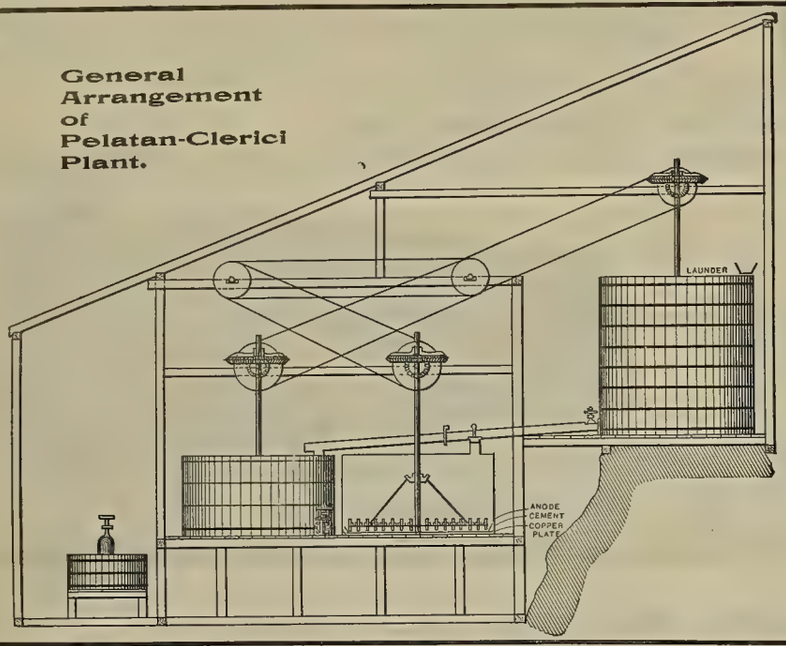

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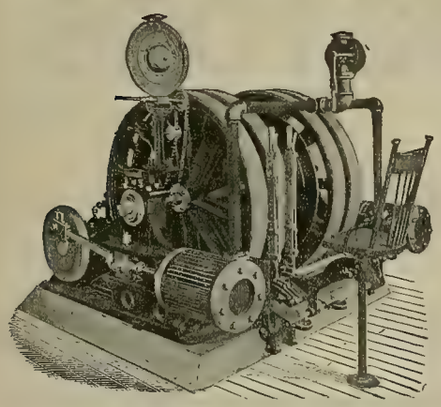

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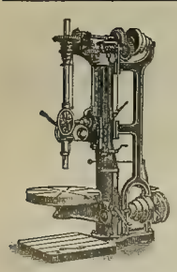

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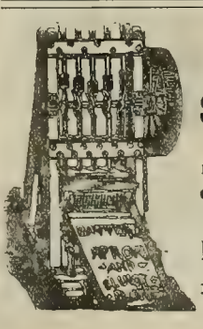

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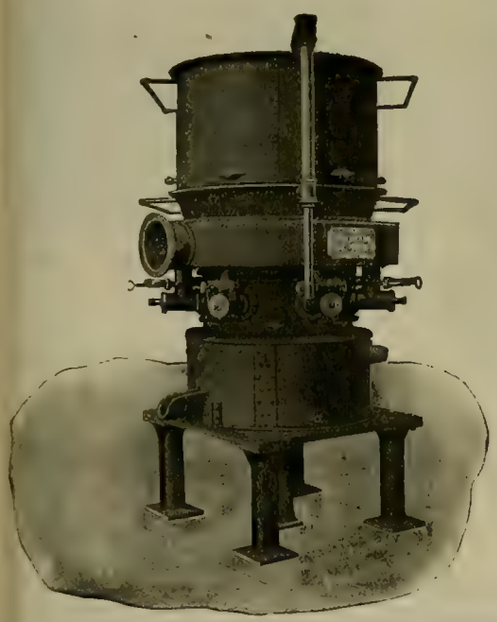

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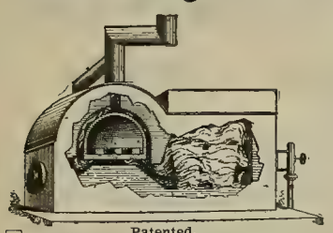

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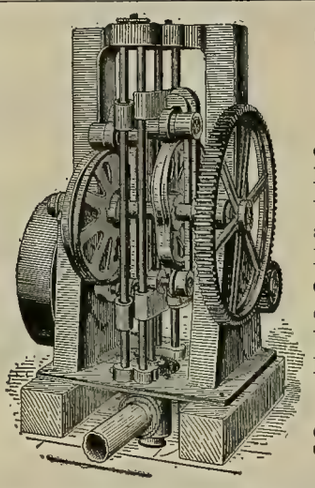

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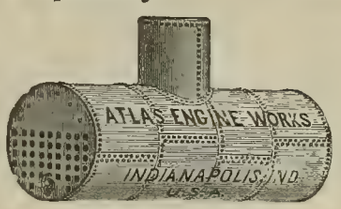

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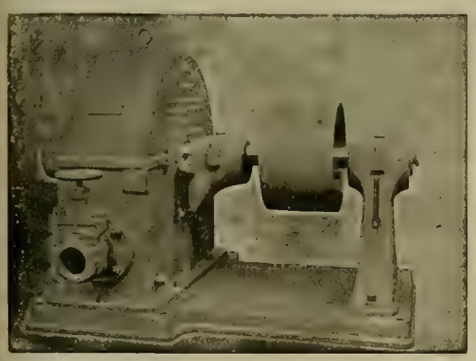

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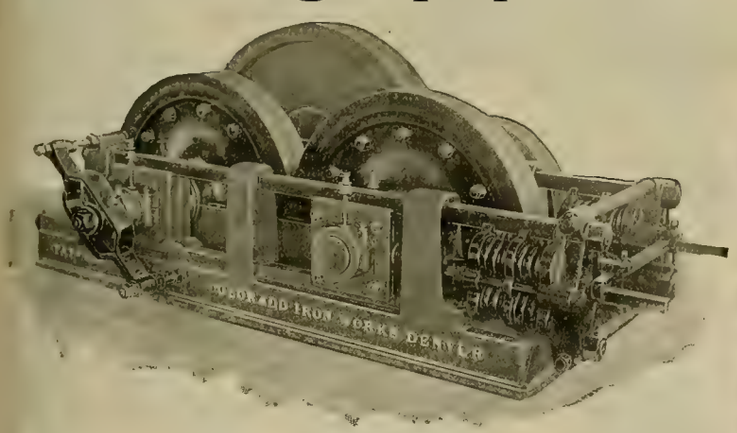

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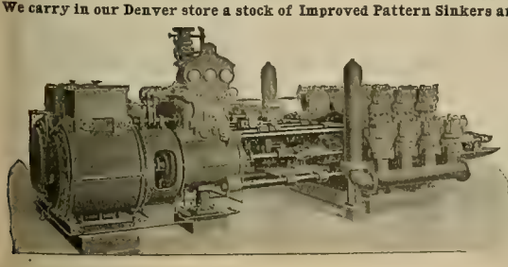

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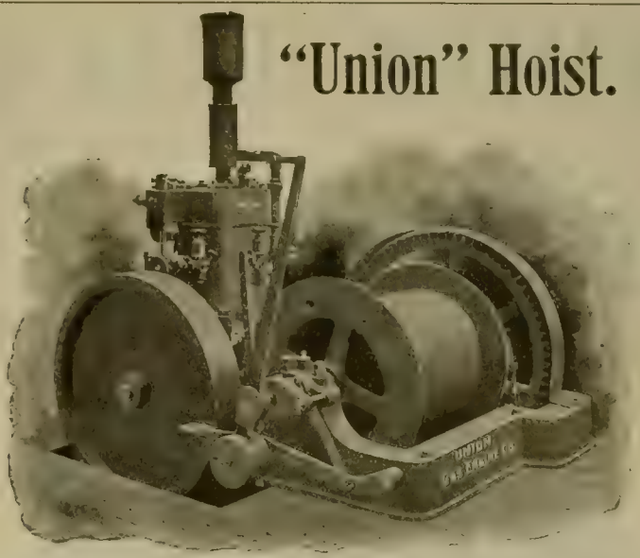

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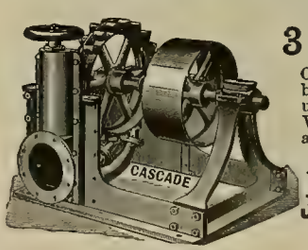

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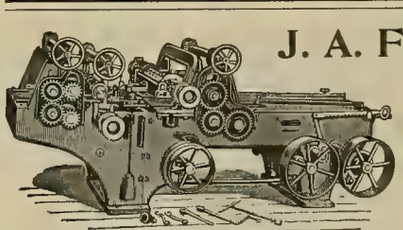

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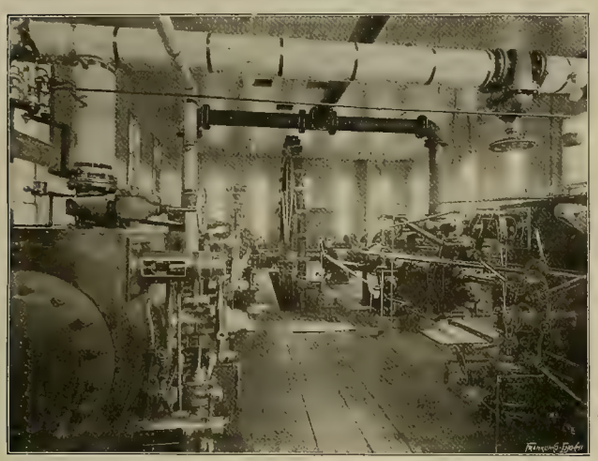

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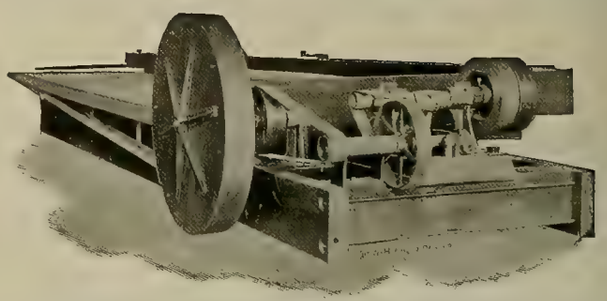

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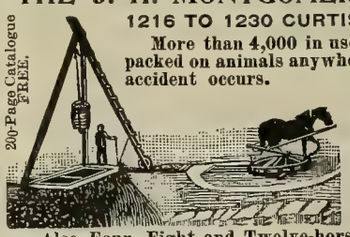

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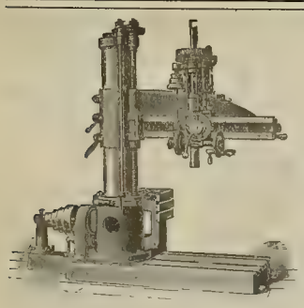

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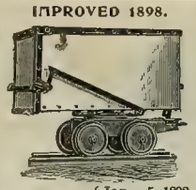

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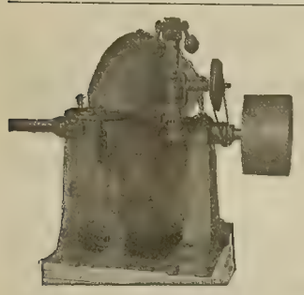

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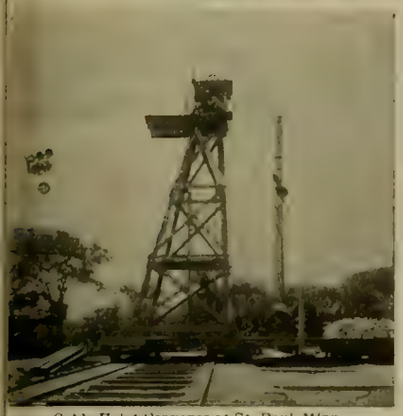

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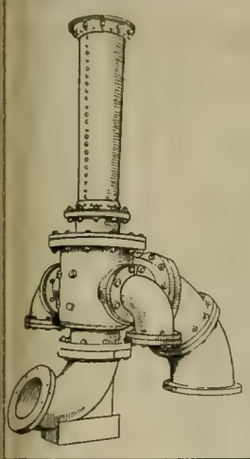

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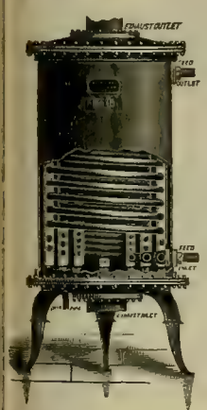

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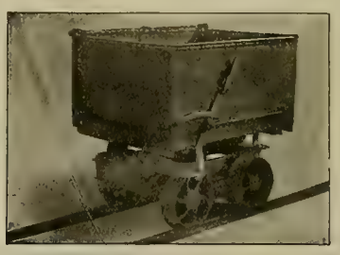

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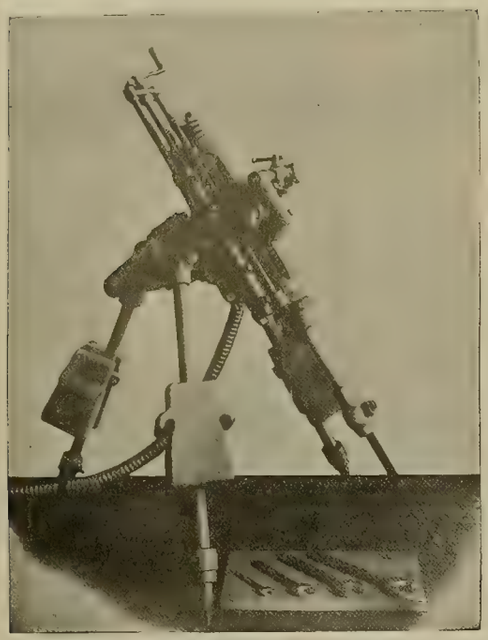
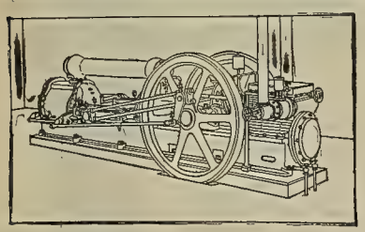


Are you looking for a rock drill of simple construction, one that will do lots of work with less repairs than any other drill? If so, investigate the Giant Improved Drill made in S. F. by

THE COMPRESSED AIR MACHINERY CO.,
WM. A. HEWITT P. H. REARDON.
11-13 FIRST STREET, SAN FRANCISCO, CAL.



THE NORWALK Air and Gas Compressor.

In use in every State in the Union, Central and South America, Great Britain, etc. Also by the U. S. Army and Navy.

ESPECIALLY DESIGNED FOR DRIVING

Rock Drills, Pneumatic Locomotives, Engines, Pumps, Coal Cutters,

And Other Mining Machinery. The Best Machine for Compressing Air for All Dynamic Purposes. Send for Illustrated Descriptive Catalogue.

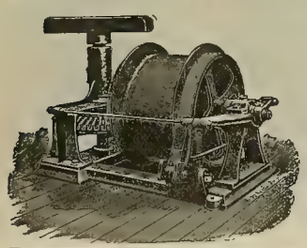
HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.

JOSHUA HENDY MACHINE WORKS,

No. 42 FREMONT STREET, SAN FRANCISCO, CAL.

—BUILDERS OF—

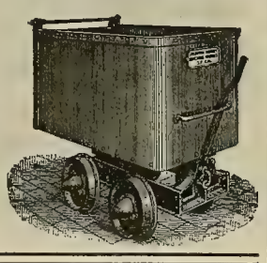
"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of PROSPECTING, MINING and MILLING PLANTS.

ORE and WATER BUCKETS.

"T" RAIL OF USUAL WEIGHTS, EITHER NEW OR SECOND-HAND, FOR SALE CHEAP.



Tanks

OF EVERY DESCRIPTION FOR Mines and Cyanide Plants.

Patent NON-SHRINKING TANKS FOR Water or Oil.

The only Tank that will stand the Desert and Hot Climate.

Write for Catalogue and Estimate on any kind of Tank Work.

PACIFIC TANK CO.
33 BEALE ST., SAN FRANCISCO.
348 East 2nd St.....Los Angeles.

W. H. BIRCH & CO.

OFFICE AND WORKS:
127-129-131-133-135 First St., San Francisco, Cal.
WRITE FOR A CIRCULAR ON THE

"BICRH" Improved Two-Stamp Mill.

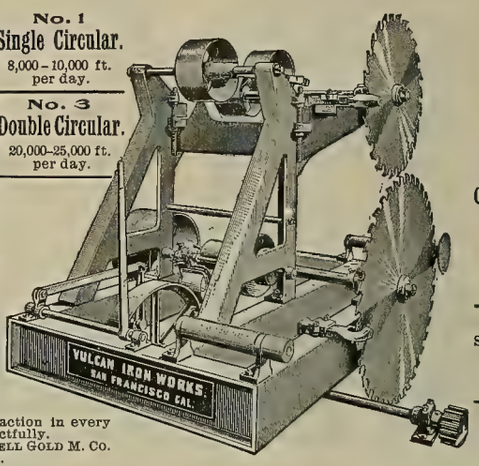
IRON FRAME. TRIPLE DISCHARGE. 850-LB. STAMPS. FORGED STEEL SHOES AND DIES.

Price, $450 f. o. b.

Manufacturers of the LIGHTNER QUARTZ MILL.

Portable Saw Mills.

No. 0 Single Circular.	No. 1 Single Circular.
4000–6000 feet per day.	8,000–10,000 ft. per day.
No. 2 Double Circular.	**No. 3 Double Circular.**
15,000–20,000 ft. per day.	20,000–25,000 ft. per day.



Alaska Treadwell Gold Mining Co.
SAN FRANCISCO,
Feb. 20, 1896.

Vulcan Iron Works,

GENTLEMEN: Our Double Circular Saw Mill of about 20,000 feet daily capacity, for which you made plans and built the machinery complete, including a set of three 6-inch beam Vulcan Head Blocks, 60-inch opening, has given us complete satisfaction in every respect. Respectfully,
ALASKA TREADWELL GOLD M. CO.
A. T. CORBUS, Sec'y.

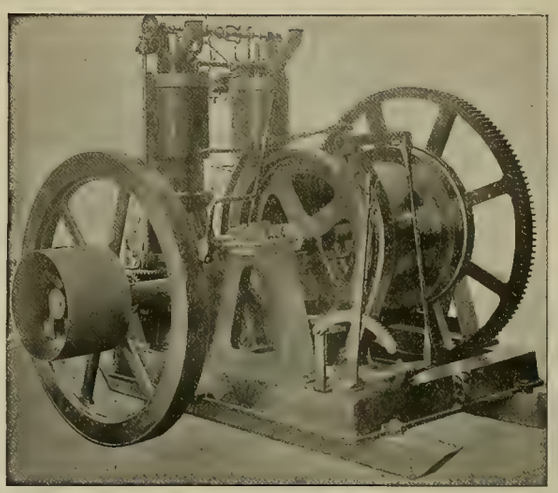
For Mining Companies —OR— Other Consumers of Lumber at Remote Points.

SEND FOR CATALOGUE

Manufactured by

VULCAN IRON WORKS, Office, 505 Mission Street, SAN FRANCISCO, CAL.

Improved Mining Hoist.



THE Golden Gate Gas Engine

THE MOTIVE POWER.

Will Raise More Ore at Less Cost Than Any Other.

MANY IN USE

Giving Satisfaction.

Built for any Capacity and for any Purpose.

Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS, 211 & 213 MAIN STREET, SAN FRANCISCO, CAL.

RAND DRILL CO.

Rock Drilling, Air Compressing, Mining and Quarrying Machinery,

100 Broadway, - - New York, U. S. A.

BRANCH OFFICES IN UNITED STATES AND CANADA:

Butte, Montana. Wallace, Idaho. Birmingham, Ala. Rossland, B. C. Toronto, Canada. Spokane, Wash. Montreal, Canada. Halifax, N. S.

MORRIS & TREGLOAN, Agents, 141 First St., San Francisco, Cal.

ADAMANTINE SHOES AND DIES.

CHROME CAST STEEL.

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

MORRIS & TREGLOAN,
141 and 143 First Street, San Francisco, Cal.,
Pacific Coast Sales Agents.

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SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE MINE AND SMELTER SUPPLY CO.,

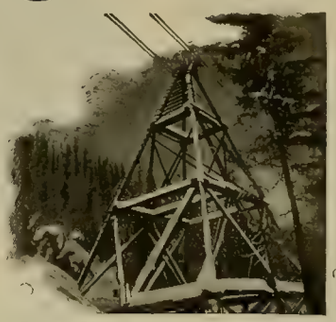
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

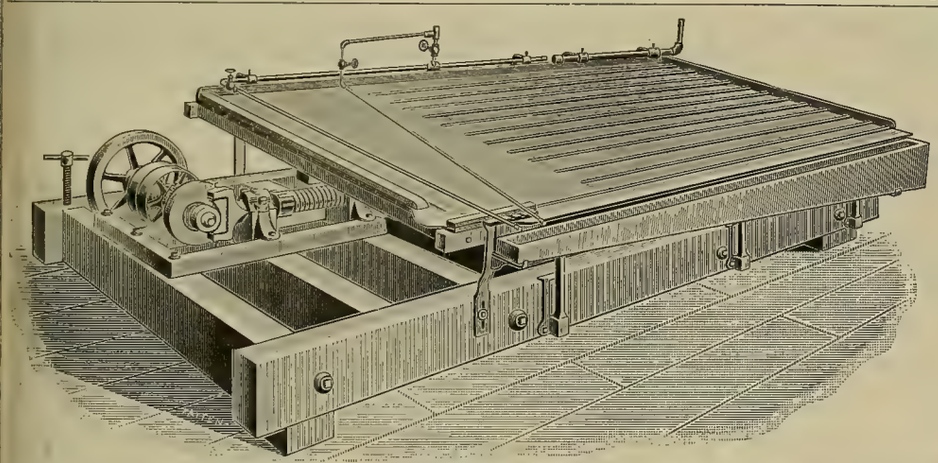


We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Etc.

THE MINE AND SMELTER SUPPLY CO.,.....Denver, Colorado.
THE MINE AND SMELTER SUPPLY CO.,.....Salt Lake City, Utah.
THE MEXICO MINE AND SMELTER SUPPLY CO., No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.



WOODBURY'S IMPERIAL CONCENTRATING TABLE.

THE Imperial Concentrating and Amalgamating Table is the latest invention of Mr. Geo. E. Woodbury, whose fame as one of the pioneer concentrator builders is world wide, machines of his manufacture being in general use in every country on the globe where the milling of ores is carried on. This Table is, however, built on entirely new lines, differing materially from either the well-known belt or bumping table types of concentrators.

SIMPLE IN ITS CONSTRUCTION. | SAVES FINE SULPHURETS.

WITHOUT LOSS IN TAILINGS.

MAKES HIGH PRODUCT. | CAPACITY FROM 5 TO 10 STAMPS.

GEORGE E. WOODBURY,
Send for Catalogue. No. 141 First St., San Francisco, Cal.

CENTRAL VALVE ENGINES.

—:—
Compound or Triple Expansion.
—:—
Condensing or Non-Condensing.
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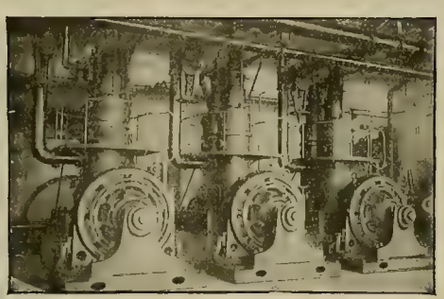

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Maximum Economy.
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Highest Efficiency.
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Lowest Cost per K.W. Hour.
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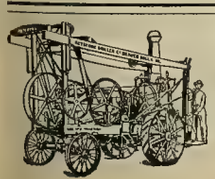
DIRECT COUPLED UNITS FOR LIGHTING AND POWER PLANTS.
Engines Especially Designed for This Service.
Dynamos Especially Designed for These Engines.
Over 215,000 I. H. P. in Use.
M. C. BULLOCK M'F'G CO., 1172 W. Lake St., Chicago, Ill.



For Testing Placer Ground.

Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes.
Write for Catalogue and full information.
KEYSTONE DRILLER CO., Beaver Falls, Pa.

An Improvement in Modern Stamp Mill Practice.

GLOBE BATTERY STEM GUIDE.

PATENTED AUGUST 24, 1897.
RIGID. SIMPLE. DURABLE. EFFICIENT. ECONOMICAL.
Effect a Saving in Friction Losses. No Trouble to Install. No Alterations of Mill Necessary.
No Keys or Wedges to Adjust.

Manufactured only by GLOBE IRON WORKS, STOCKTON, CAL., U. S. A.
Manufacturers of All Classes of Mining Machinery. Estimates Furnished.

OFFICE OF WILDMAN GOLD MINING COMPANY, SUTTER CREEK, CAL., June 28, 1898.
Globe Iron Works, corner Main and Commerce Streets, Stockton, Cal.—GENTLEMEN: Replying to your inquiry about the Globe Patent Battery Stem Guides furnished us by you last fall, will say that you supplied us with Guides enough for ten stamps of the Wildman Mill. These Guides have been in constant use for the past eight months, and so far **do not show any wear either on the Guides or the Stems.** They are more convenient than any Guide I ever handled, and much time is saved with them in changing stems, etc. The Guide can be set so close you always get a fair blow on your dies, and the use of these Guides materially increases the crushing capacity of your batteries. **It is our intention to replace all of our Guides with those of your make,** and I cheerfully recommend them to any one desiring a good, serviceable and economical Guide. Very truly yours, JOHN ROSS, JR., Superintendent.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

Market Reports.

SAN FRANCISCO, April 20, 1899.

SILVER. — London, 27¾d; New York, 59½; San Francisco, 59½; Mexican Dollars, 48@48¼. New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports quiet, $4.32½ bid, $4.37½ asked; brokers' price, $4.10. Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 7c; bar, 7¼c.

COPPER.—New York reports Lake nominal and unchanged at $18.50; brokers' price, $18. Paine, Webber & Co. of Boston say: "We know of carload lots of copper being sold in New York recently at 19c for spot and that 18½c is bid as far ahead as August for round lots." Local, bar, 24c per lb.

IRON.—American, soft, $22@24 per ton; Scotch, $27. Local bar, 2½c per lb.

STEEL.—12½c per pound.

TIN.—Pig, 30c per lb.; Bar, 35c. New York reports firmer, $25.12 bid, $25.25 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8½c.

QUICKSILVER.—Local, $42.50; export, $38; carload lots, special rates.

PLATINUM.—London, 63½s per ounce; York, $16.25; San Francisco, $16.75.

RED LEAD AND LITHARGE.—One ton and over, at one purchase, 6¼c; 500 lbs. and less than one ton, 6½c; less than 500 lbs., 7c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¾c; less than one ton, 11¾c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 738 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CHEMICALS. — Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 1¼c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1⅞@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅝ dia	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

Recent Mining Incorporations.

President Monroe M. Co., San Francisco; capital stock, $150,000; subscribed, $3000; A. L. Fuller, G. M. Seaton, J. Keep, M. S. Martin, W. Incell.

Shenandoah M. & M. Co., to operate at Plymouth, Cal.; capital stock $100,000, subscribed $50; S. K. Thornton, T. J. Parsons, W. E. Palmer, W. B. Meckfesel, W. F. Laumeister.

Butte Creek G. M. Co., Butte Creek, Cal.; capital stock $500,000, subscribed $250; O. W. Meysenberg, W. W. Snow, S. C. Denson, H. B. Denson, T. J. Ryan.

COPPER DEPOSIT.—Favorable surface indications. Will undertake development under working option. State water available for plant in dry season; cost of freight, coke, timber, and full particulars to Box 26, 320 Sansome St., San Francisco.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.
EDW. N. BREITUNG, Marquette, Mich.
Cable address Edbee Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

San Francisco Stock Board Sales.

SAN FRANCISCO, April 20, 1899.

9:30 A. M. SESSION.

1000 Alta	09c	350 H. & N.	24c
500 Andes	10c	100 Mexican	51c
300 Belcher	33c	600 Ophir	$1 10
600 Best & Belcher	53c	300 Potosi	23c
100 Challenge	29c	200 Savage	23c
200 Chollar	29c	300 Sierra Nevada	97c
800 C. Cal. & Va.	$1 65	400 Union Con.	45c
600 Gould & Curry	34c	100 Yellow Jacket	37c

2:30 P. M. SESSION.

300 Ophir	$1 10	100 Yellow Jacket	37c
500 Mexican	52c	100 Belcher	33c
200 Gould & Curry	33c	600 Sierra Nevada	94c
800 Best & Belcher	52c	500 Utah	11c
900 Con. Cal. & Va.	$1 60	400 Overman	12c
400 Savage	25c	200 Union Con.	44c
600 Chollar	29c	300 Alta	09c
300 Potosi	23c	100 Caledonia	28c
100 Crown Point	18c	300 Challenge Con.	28c

Commercial Paragraphs.

THE Jeanesville Iron Works Co. Denver branch store, A. Middlebrook manager, reports the sale of a large electric power pump to go in reduction works at Florence, Colo.

THE Parke & Lacy Co., 21-23 Fremont St., San Francisco, have established a European agency at 27 Clements Lane, E. C., London, England, with L. C. Trent as their representative.

THE Vulcan Iron Works Co. of Seattle, Wash., is figuring on erecting an auxiliary plant to be utilized for a complete boiler plant, with galvanizing, bronzing and nickel plating departments.

THE Denver, Colo., firm of Roller, Cummins & Draper, assayers, chemists and mining engineers, has been dissolved. To them succeed Marshall D. Draper, E. M., and J. N. McLeod, E. M., under the firm name of Draper & McLeod, 1821 Arapahoe St.

THE Weber Gas & Gasoline Engine Co., Kansas City, Mo., report the following recent shipments: One carload, eight engines, to southern California for irrigation; one 10 H. P. hoist for Sonora, Mexico; one 25 H. P. hoist for Silverton, Colo.; one 10 H. P. engine for Havana, Cuba; one crude oil engine for Porterville, Cal. We have also just finished the installation of a plant, entirely furnished by us, for pumping the sewerage for the city of El Paso, Texas, during flood time of the Rio Grande river. This consists of two direct connected, 10 H. P. Weber gasoline engines and two 8-inch Morris centrifugal pumps.

Recently Declared Mining Dividends.

Yellow Aster M. Co., Kern Co., Cal., $10,000; April 11.

Gold Coin, Cripple Creek, Colo., No. 18, 1, cent, $10,000; April 18. Total $180,000.

Ætna Quicksilver Co., Napa Co., Cal., $10,000; April 18.

Napa Con. Quicksilver Co., Napa Co., Cal., regular $10,000; extra $10,000; total $1,000,000; April 18.

Quicksilver M. Co., Santa Clara Co., Cal., 1½ cents on preferred stock; payable May 5.

Grass Valley Exploration Co. (W. Y. O. D. mine), Grass Valley, Cal., 25 cents, $7500; April 20.

Republic Con. M. Co., Washington, 1 cent, $35,000; April 12. Total $155,000.

North Star M. Co., Grass Valley, Cal., No. 11, 25 cents, $50,000; April 15.

Alaska-Treadwell M. Co., Douglas Island, Alaska, quarterly, 37½ cents, $75,000; payable April 28.

Alaska-Mexican M. Co., Douglas Island, Alaska, quarterly, 10 cents, $18,000; payable April 28.

Montana Ore Purchasing Co., quarterly, $1, $80,000; total, $1,040,000; April 20.

South Swansea, Utah, $7500; payable April 24.

Vindicator Con. G. M. Co., Colorado, dividend No. 5, $25,375; April 20.

Gwin M. Co., Cal., $5000; April 20.

Quicksilver
FOR SALE IN LOTS TO SUIT.
Agents for Redington Quicksilver Mine.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

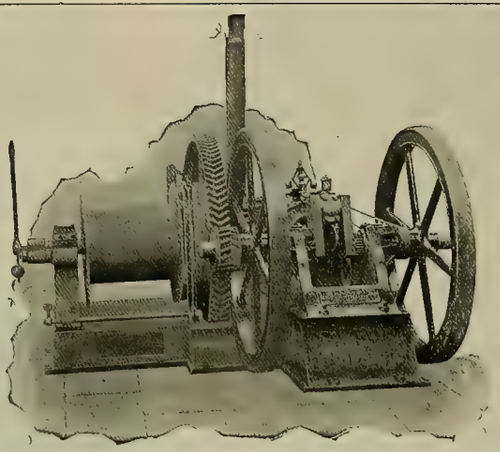
S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.
GRAHAM, GARRETT & CO.,
211-212 Peyton Block, SPOKANE, WASH.
MINE PROMOTERS, AND BROKERS.
Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

UTAH
Mines—Dividend Paying and Investment Stock.
W. E. HUBBARD & CO., 15 W. 2d So. Street, SALT LAKE CITY.

PACIFIC EXPLORATION COMPANY
Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited
W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.
29-30 Chronicle Building, S. F.

DOBLE ROCK DRILLS AIR —AND— COMPRESSORS.
SIMPLEST.

BEST.
Write for Catalogue.
Miners, Investigate!
ABNER DOBLE COMPANY, S. W. COR. FREMONT & HOWARD STS. SAN FRANCISCO, CAL.


FRESNO, June 25, 1898

Hercules Gas Engine Works, San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,
305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,
MANUFACTURERS OF DIRECT CURRENT MACHINERY
For Power and Lighting Purposes.
SPECIALTY
Direct Connected Electric Elevators.
Estimates Given on All Kinds of Mining Apparatus,
ALSO REPAIR AND JOB WORK OF ANY KIND.
Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.
509-511 Howard St., - San Francisco.

WEST COAST OF MEXICO.
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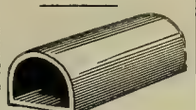

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Notice is hereby given, that at a meeting of the Board of Directors, held on the nineteenth day of April, 1899, an assessment (No. 130) of twenty-five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the twenty-fourth day of May, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the fourteenth day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1899, an assessment (No. 9) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 773 Mission street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 1st day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

G. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California. Office hours from 1 to 3 P. M.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3rd day of April, 1899, an assessment (No. 24) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of May, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 29th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

HEAD CENTRE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1899, an assessment (No. 7) of twenty (20) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of May, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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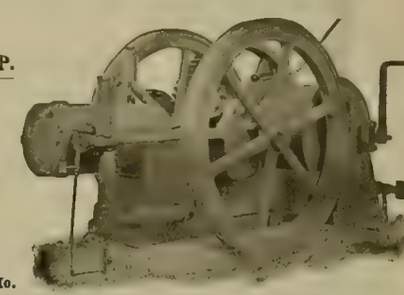

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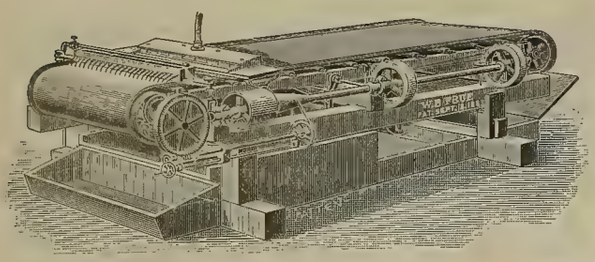

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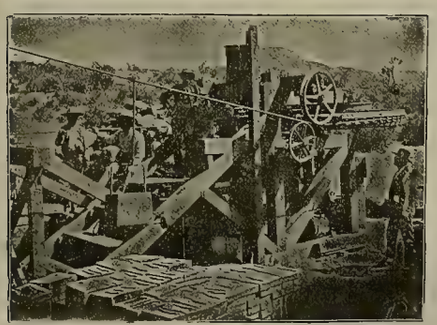

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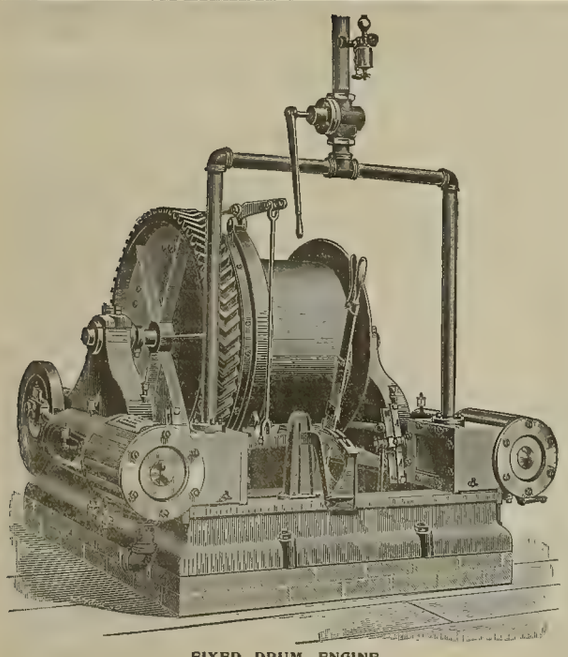

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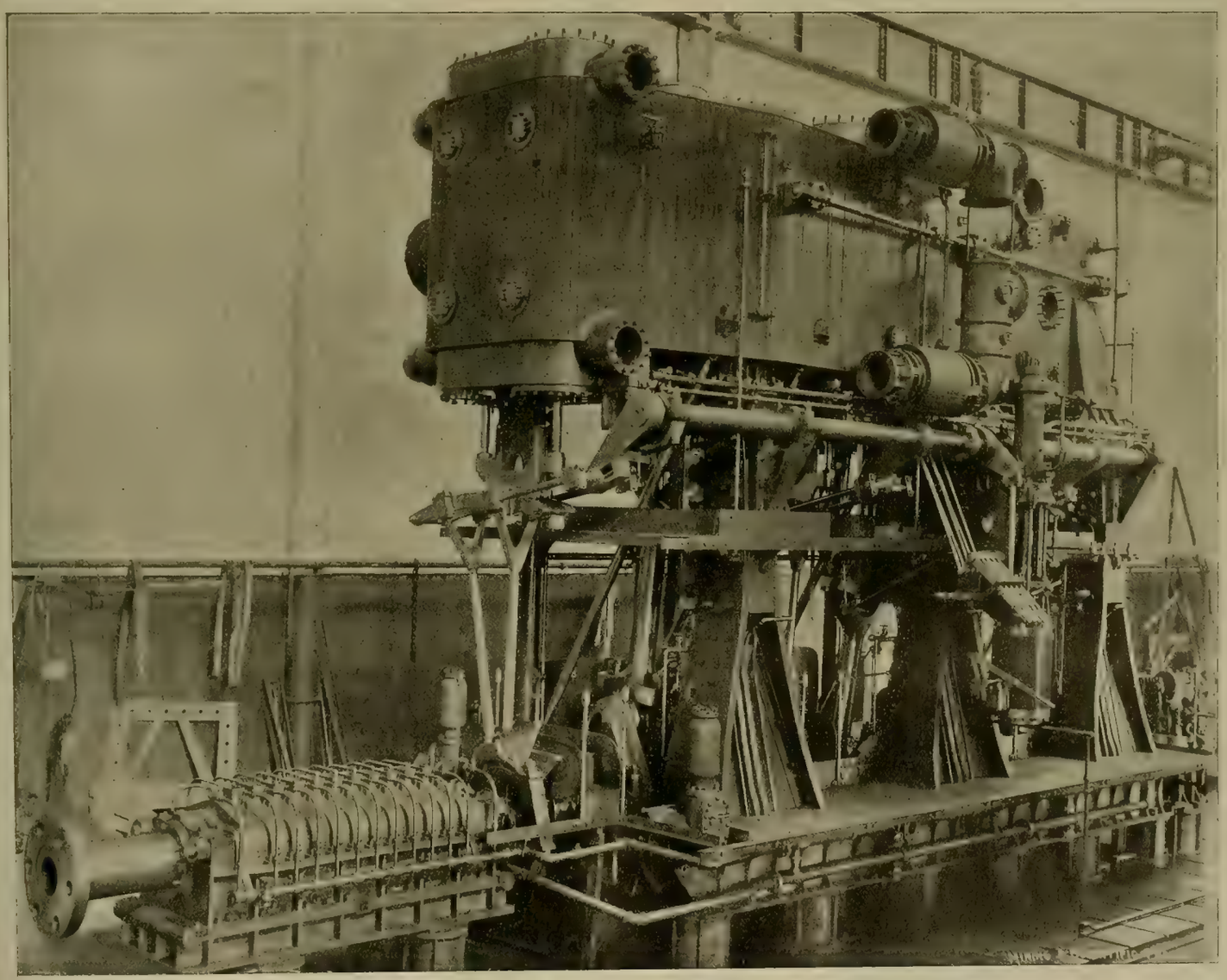
No. 2025.—VOLUME LXXVIII. Number 17. SAN FRANCISCO, SATURDAY, APRIL 29, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

One of a Battleship's Engines.

To the fleet of great American battleships built by the Union Iron Works, at the Potrero, San Francisco, are being added two more—the Wisconsin and the Ohio. The former was recently launched, and, under the supervision of Mr. Geo. W. Dickie, is now receiving the additional requirements that will enable her to go out, if necessary, on a career similar to her distinguished sister ship, the Oregon. The total length of the vessel on load water line is 368 feet, with a normal displacement of 11,525 tons and a maximum displacement, with all ammunition and stores on board, of 12,325 tons. The maximum indicated horse power has been estimated at about 10,000 and the probable speed at 16½ knots. Her armament will be modern in every particular, the main battery consisting of four 13-inch breech-loading rifles and fourteen 6-inch rapid-fire guns. The armor belt will be 16½ inches thick at its thickest part. The vessel is extremely well protected in the event of rupture of the outer skin or injury in battle, being divided into between 200 and 300 water-tight compartments, both for the accomodation of the motive power and for storage purposes. These compartments are all provided with pipes connecting with powerful steam pumps, for the purpose of removing any water that may reach them. Ample provision has been made for flooding all the ammunition rooms in case of fire on board the vessel. The very necessary feature of supplying fresh air and regulating the temperature of all compartments of the vessel, has received careful consideration. Special pipes or ducts connected with powerful blowers afford ample circulation of fresh air by means of ventilators extending some 20 feet above the ship's deck.

The propelling equipment of the vessel consists of two sets of triple-expansion, twin-screw engines, each in its own separate water-tight compartment. Herewith is presented an illustration of one of her engines, as set up in the shop, engraved from a photograph expressly prepared for this article. The collective i. h. p. will be about 10,000, the engines operating at 120 r. p. m., with a stroke of 4 feet. The single-ended cylindrical boilers are eight in number, each 15½ feet in diameter by 9 feet 11½ inches long. The total grate surface is 685 square feet, with 21,200 square feet of heating surface and a pressure of 180 pounds. These boilers are placed in four separate water-tight compartments.



ONE OF THE TRIPLE-EXPANSION ENGINES OF THE U. S. BATTLESHIP WISCONSIN.

The auxiliary equipment consists of some eighty odd engines, for the various services on board the battleship. The cranes for handling the boats, the deck winches, pumps, windlass and steering gear are all operated by steam. The introduction of these auxiliary engines will reduce manual labor to a minimum, greatly conducing to the development of the crew in their special duties and rendering the vessel first-class in every particular.

The ship is also provided with a secondary battery consisting of sixteen 6-pound rapid-fire guns, four 1-pound rapid-fire guns, two Colt guns and two field

(Continued on page 460.)

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....Publisher

San Francisco, April 29, 1899.

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THE practice among prospectors of naming new locations after well-known mines is a bad one and should cease, as it leads to much confusion in the identification of property and really subserves no useful purpose. The idea probably is to borrow a little of the glory which attaches to a successful mine, but an original name would be far more appropriate.

AN Arizona paper in announcing the second failure in an Arizona mining scheme of a company of St. Louis, Mo., Germans says: "Neither pains nor money were spared to make the second venture a success, about $40,000 being expended. The mill contains ten 1000-pound stamps and two vanners, engines, boilers and buildings, all complete, but the ore is barren, hence the shut-down." It seems a little strange, to say the least, that the fact of the quartz being barren was not discovered sooner. This is probably a practical illustration of the manner in which history repeats itself.

Mining Location Blanks.

Much of the uncertainty as to the proper method of procedure which appears to be experienced by many prospectors desiring to locate mining claims might be overcome, and all essential requirements made plain, by providing a location blank, which, in plain language, stripped of all unnecessary verbiage and confusing legal terms, sets forth every essential requirement of both Federal and local laws; and which, having been properly filled out, posted and recorded, and the claim marked by stakes or monuments as required by law, shall constitute a perfectly valid and legal location, every requirement of the law having been observed. The Montana Society of Engineers has taken up this matter and advocates the adoption by the several counties of that State of a uniform blank of the character above referred to. It is really a matter for legislative enactment; but as the California Legislature recently adjourned and will not, in all probability, meet again for nearly two years, the subject should receive the attention of the California Miners' Association. The adoption of a suitable location blank by this organization would give it immediate standing, and such a blank would without doubt be adopted by mining districts throughout California. They should be printed upon substantial paper and sold at as low a price as possible, and no certificate of location should be accepted by the local or county recorders other than this official blank properly filled out, or which is not an exact copy of the original notice posted on the mining claim. If the blank is not properly filled out, another should be substituted in its stead by the recorder, whose duty it should be to see that this first step in the location of what may become valuable property be properly and legally taken—all this in the interest of the miner himself, and to obviate the possibility of vexatious and expensive litigation.

Mineral Product of California for 1898.

State Mineralogist A. S. Cooper reports the yield and value of the mineral substances of the State for for 1898 as follows, as per returns at the State Mining Bureau in answer to inquiries:

Mineral Substances.	*Yield.*	*Value.*
Asbestos	10 tons	$ 200
Antimony	40 tons	1,200
Asphalt	25,690 tons	482,175
Bituminous rock	46,836 tons	137,575
Borax	8,800 tons	1,153,000
Cement	50,000 bbls	150,000
Clay, brick	100,102 M	571,362
pottery	28,947 tons	33,747
Coal	143,045 tons	337,475
Copper	21,543,229 lbs	2,475,168
Gold		15,906,478
Granite	98,369 cu. ft	147,732
Gypsum	3,100 tons	23,600
Lead	655,000 lbs	23,907
Lime	297,860 bbls	254,010
Limestone	27,686 tons	24,548
Macadam	452,691 tons	369,082
Magnesite	1,263 tons	19,075
Manganese	440 tons	2,102
Marble	8,050 cu. ft	23,594
Mineral paint	653 tons	9,698
Mineral waters	1,429,809 gals	213,817
Natural gas		74,424
Paving blocks	1,144 M	21,725
Platinum	300 ozs	1,800
Petroleum	2,249,088 bbls	2,376,420
Pyrites	6,000 tons	30,000
Quicksilver	31,092 flasks	1,188,626
Rubble	724,674 tons	445,395
Salt	93,421 tons	170,855
Sandstone	37,264 cu. ft	46,384
Serpentine	750 cu. ft	3,000
Silver		414,055
Slate	400 squares	2,800
Soda	7,000 tons	154,000
Sulphur	2 tons	50
Total		$27,289,079

The relative rank of the counties of the State, in point of mineral production, is given in the following table. In each case the value given includes that of all mineral substances combined produced in the respective counties for the year. Some counties produce in addition to gold and silver, five, six, or seven other substances, other counties which yield little or no gold or silver, produce in quantities quicksilver, mineral oils, copper, lead, asphalt, structural materials, etc. The figures after the names of the counties indicate aggregate value of all mineral products for the year, including the precious metals. The term "undistributed" includes total values of such substances as are grouped to avoid disclosing private business, as in the case of single operations in a county. In the large and complete tables published by the State Mining Bureau, from which these figures are taken, the amount and value of each substance in said county is set forth. It is therefore necessary in some cases to place the figures in the "undistributed" column.

Rank and County.	*Value.*
1..Shasta	$ 3,510,728
2..Nevada	2,072,604
3..Amador	1,849,846
4..Tuolumne	1,757,735
5..Los Angeles	1,732,357
6..San Bernardino	1,644,152
7..Placer	1,535,525
8..Kern	1,129,573
9..Calaveras	1,024,507
10..Trinity	1,010,769
11..Siskiyou	769,125
12..San Diego	694,418
13..Ventura	654,063
14..Napa	555,966
15..Butte	529,225
16..Mono	519,421
17..El Dorado	512,300
18..Santa Barbara	472,784
19..Alameda	443,759
20..Inyo	434,766
21..Sierra	399,582
22..Plumas	369,609
23..Humboldt	357,288
24..Mariposa	337,411
25..Santa Clara	334,848
26..Santa Cruz	270,636
27..Riverside	247,022
28..San Benito	212,585
29..Fresno	201,057
30..Yuba	166,865
31..Madera	147,907
32..Contra Costa	141,440
33..Sonoma	132,709
34..Sacramento	131,438
35..San Francisco	129,595
36..Lake	102,096
37..San Joaquin	91,289
38..San Luis Obispo	84,267
39..San Mateo	77,000
40..Marin	67,800
41..Orange	65,600
42..Lassen	37,760
43..Stanislaus	22,298
44..Solano	20,635
45..Monterey	19,115
46..Tulare	15,900
47..Tehama	9,400
48..Del Norte	9,057
49..Kings	8,450
50..Mendocino	3,330
51..Colusa	1,093
52..Yolo	384
Undistributed	219,990
Total	$27,289,079

All the asbestos produced in California in 1898 was from Riverside county, and the antimony all came from Kern. Asphalt was produced in Kern, Santa Barbara and Ventura counties. Bituminous rock came from Mendocino, San Benito, San Luis Obispo and Santa Cruz counties.

The borax yield was from San Bernardino and Inyo. Brick clay was utilized in Alameda, Butte, Contra Costa, Fresno, Humbolt, Kern, Kings, Los Angeles, Madera, Marin, Mendocino, Monterey, Orange, Riverside, Sacramento, San Bernardino, San Diego, San Joaquin, San Louis Obispo, San Mateo, Santa Barbara, Santa Clara, Sonoma, Tehama, Tulare, Tuolumne, Shasta and Ventura counties. Pottery clay came from Amador, Los Angeles, Placer, Riverside and Santa Clara. All the hydraulic cement came from San Bernardino county. Coal was produced in Alameda, Amador, Contra Costa, Orange, Riverside and San Benito counties. The copper was mined in Amador, Calaveras, Inyo, Nevada and Shasta counties. The pyrites were from Nevada county. Granite was quarried in the counties of Madera, Nevada, Placer, Riverside, Sacramento, San Bernardino, San Diego, Solano, Sonoma and Tulare. Gypsum came from Fresno, Los Angeles and San Benito, and lead from Inyo and Mono counties. Lime and limestone were quarried in El Dorado, Kern, Mono, Riverside, San Bernardino, Santa Cruz, Solano and Shasta counties.

The principal macadam quarries are in Alameda, Los Angeles, Marin, Sacramento, San Benito, San Francisco, Santa Clara, Solano and Sonoma counties. The magnesite was all from Napa county, and manganese all from Alameda. Marble was quarried in Amador, Inyo and San Bernardino counties. Mineral paint was mined in Butte, Nevada and Stanislaus counties.

The mineral springs which utilized the waters commercially are in Butte, Colusa, Contra Costa, Fresno, Lake, Monterey, Napa, San Benito, San Diego, San Luis Obispo, Santa Barbara, Santa Clara, Shasta, Siskiyou, Sonoma and Tehama counties. Natural gas was utilized in Sacramento, San Joaquin and Santa Barbara counties. Paving blocks or basalt were quarried in San Bernardino, Solano and Sonoma counties. The platinum came mainly from Trinity and Siskiyou counties. Petroleum was produced in Fresno, Kern, Los Angeles, Orange, Santa Barbara, Santa Clara and Ventura counties. Quicksilver came from Lake, Napa, San Benito, San Luis Obispo, Santa Clara, Sonoma and Trinity counties. Rubble was quarried in the counties of Alameda, Humboldt, Madera, Marin, Monterey, Sacramento, San Diego, San Luis Obispo and San Mateo. The salt came from Alameda, Colusa, Riverside and San Diego counties. Sandstone was from Alameda, Los Angeles and Yolo counties. The serpentine was from Los Angeles, slate from El Dorado, soda from Inyo and sulphur from Los Angeles counties.

As far as the "banner" counties are concerned, in the different mineral products, the following is the record for '98, with the value of the material from the county named. Alameda county leads in the production of salt ($155,812), manganese ($2102) and coal ($176,250); Butte leads in mineral paints ($3000); El Dorado in slate ($2800); Humboldt in rubble ($297,276); Inyo in soda ($154,000), lead ($21,170) and marble ($12,000); Kern in antimony ($1200); Los Angeles in petroleum ($1,462,871), brick clays ($188,386), gypsum ($18,500), serpentine ($3000) and sulphur ($50); Madera leads in granite ($49,673); Napa in mineral waters ($63.000), quicksilver ($472,972) and magnesite ($19,975); Nevada county leads in gold ($2,017,628) and pyrites ($30,000); Placer county has the most pottery clay ($12,000); Riverside leads in asbestos ($200); San Bernardino has the most borax ($1,120,000), cement ($150,000) and limestone ($6.600); San Francisco quarries the most macadam ($129,595); San Joaquin utilizes the most natural gas ($57,289); Santa Barbara the most extensive asphaltum output ($351,400); Santa Cruz produces the most lime ($151,000) and bituminous rock ($113,898). The bulk of the copper comes from Shasta county ($2,465,830) and this county also leads in silver product ($171,768).

The most paving blocks are from Sonoma county ($13,310). It is to be noted that only one county has the lead on five things—Los Angeles. Four lead on three substances—Alameda, Inyo, Napa and San Bernardino—and the counties of Nevada, Shasta and Santa Cruz lead in two products. The three counties named only have the lead in one substance each.

In the year 1897 the total value of the mineral products of the State was $25,142,441 and in 1898 the total value was $27,289,079, so that the increase for the year is $2,146,638. The figures given show that in the past year the total value of metallic substances, including precious metals, was $20,023,034; of non-metallic substances, $2,102,072; of hydrocarbons and gases, $3,070,596; of structural materials, $2,093,379; total, $27,289,079.

Concentrates.

A "CUBIC FATHOM" of copper ore will weigh about 14¼ tons.

THE chloride of gold is not known to exist in nature as an ore.

IN crushing hard Cripple Creek ores, three ounces of steel are worn away per ton.

KALGOORLIE, Western Australia, is credited with a total production of about $16,000,000 in gold.

IDAHO State assessors have been officially notified that all mining claims therein are exempt from taxation.

THE duty per stamp at the New Primrose mine, Johannesburg, S. A. R., is five tons daily, on conglomerate.

NATIVE GOLD is found in calcite in the Alvord mine and at the Carbonate mine in San Bernardino county, Cal.

THE output of tin from the mines of the island of Pulo Brani, in the bay of Singapore, is reported at 1200 tons monthly.

ELATERITE is used in the manufacture of a substitute for rubber, paint and varnish. It is mined in Utah near Price.

CINNABAR with hematite is found in a vein in rhyolite, near Copper basin, thirteen miles from Prescott, Arizona.

URANIUM MICA occurs in the Ross-Hannibal mines in Ruby basin, Black Hills, South Dakota, and uranium oxide in claims near Terry's peak.

ABOUT 100 hydraulic miners have been engaged to leave Placer Co., Cal., for the works of the Twin Springs Placer Co. near Boise, Idaho.

THERE is no local demand for or production of nickel. Latest quotations are $1 per pound for black oxide; 50 cents per pound for green No. 2.

THE production of copper the first quarter of '99 is reported at 60,441 tons; exports during same period were 38,295 tons, or about 47% of the production.

THE Transmississippi Congress meets at Wichita, Kansas, May 31st, June 1st, 2nd, 3rd, '99. Governors of Pacific coast States and Territories are now appointing delegates.

A PROMINENT mining engineer reporting on a well-known copper property states that there are $11,000,000 in sight in the mine, but in his opinion it would cost $13,000,000 to get it out.

THE Calumet & Hecla Copper Co. of Michigan, has paid $60,850,000 dividends. Its capital stock is $2,500,000. The Tamarack mine is capitalized for $1,500,000 and has paid $5,-770,000 in dividends.

THE presence of tellurium in an ore may usually be detected by pulverizing the mineral and treating it with sulphuric acid in a porcelain dish. A purple color is noticed if tellurium be present.

ANOTHER copper strike is reported sixty miles east of Tacoma, Wash., the ore being said to resemble in character that of Montana. The usually exaggerated statements of values accompany the report.

THE property of the Boston Quicksilver M. Co. comprises 6000 acres in Napa Co., Cal., and is to be opened in an enlarged way, with new machinery. W. B. Buckminster of Boston, Mass., is Gen. Mgr.

THE highest mountain in Colorado is believed to be Uncompahgre, in the southwestern part of the State—14,665 feet. Ouray mountain is 14,447 feet; Mt. Whitney in California is 15,150 feet above sea level.

THE Atlantic mine in the Lake Superior copper region has the smallest percentage of metal in its ore of any of the working mines, yet has paid its stockholders $820,000 on rock yielding ¾ of 1% copper per ton.

THE paving blocks used in San Francisco, Cal., commonly referred to as basalt blocks, are chiefly hornblende and augite andesite; none are of basalt. Granite is also used to a limited extent for the same purpose.

OWING to the curvature of the earth and refraction, an allowance of .572 feet must be made for each mile. A standing at the sea level, only the extreme top of a mountain 4717 feet high would be visible at a distance of 100 miles.

FIFTY carbon steel means that one-half of one per cent is carbon and 99½% is iron, excluding from the computation some small quantities of other elements; twenty-five carbon means that only one-quarter of one per cent is carbon.

SHEET LEAD may be joined for the purpose of lining tanks for holding acids by using common solder. The joints may be lapped if desired. The Chinese have a method of their own not generally known or practised in this country.

GLAUCOPHANE SCHIST is not uncommon in California. It occurs abundantly in Marin county, also near Sulphur Bank in Lake county. Glaucophane is very similar to hornblende, to which mineral species it belongs, and is usually of a blue color.

A NEW ZEALAND dredging company states its expense to be $268 for six days, as follows: Fuel $48, labor $120, superintendence $100. The dredge handles ninety tons per hour and pays a dividend on gravel containing 1¼ grains of gold per cubic yard.

AMONG other veracious statements, an English mining publication remarks that an Australian miner, in working an old abandoned gravel mine, has found a nugget of gold weighing 216 ounces, in a pillar 3 feet square that had been left standing to support the roof.

CYANITE or disthene is found in Los Angeles county, near Acton, and in abundance in the Cargo Muchacho mountains, near the American Girl mine, where it occurs in a broad zone of schist. It has a pale blue color and occurs in bladed crystals. Cyanite is an aluminous silicate.

THE only people handling antimony on this coast are the Chapman Smelting Works, San Francisco. There is another concern on Staten Island, New York, and a third in New Jersey. Antimony reduction works would not pay unless one had a very large deposit. Miller & Ferris, Havilah; Sumner & Brown, Kernville, Cal., W. A. Van Reed, Bernice; J. Sutherland, Lovelocks; Pea Vine M. Co., Pea Vine, Nev., are reported owning antimony mines. A Blanc of Oakland, Cal., was last week reported to have bought an antimony mine near Mojave, Kern county, Cal., for $12,000.

MOUNT GLEASON in Los Angeles Co., Cal., consists largely of a feldspathic rock very much like the anorthite rock of the Lake Superior region. The rock is crystallized and of bluish-gray color, contains little or no quartz and no mica or hornblende. In this formation gold-bearing veins occur.

A U. P. HANDBOOK states that Utah mines have yielded an aggregate of $197,389,205.53, that the dividends paid exceed $2,000,000 annually and that "Utah mines have paid 100% more dividends than Colorado mines have and $5,-474,231 more dividends than the mines of Montana have."

WHERE a shaft is sunk through a large ore body a pillar of sufficient size must be left to insure the security of the shaft. If stopes are carried too close, the ground in which the shaft is sunk is likely to shift, throwing the shaft out of line and resulting in great and unnecessary expense, and danger as well.

THE Cripple Creek, Colo., Engineers' Union has adopted the following schedule of wages and hours, to take effect May 8th: Hoisting and stationary engineers, not less than $4 per day of eight hours; pumpmen, not less than $4 per day of eight hours; firemen, not less than $3.50 per day of eight hours.

IN the absence of any law to the contrary, some California miners are going back to the old miners' district plan, in vogue for so many years. For instance, to-day is held at Sonora, Cal., a meeting of quartz miners to "adopt the old quartz mining laws made by a similar convention in Sonora Oct. 5th, '72."

THE stoping of a vein up to the surface, leaving a line of open excavations along the lode in the early history of the mine, is bad practice, but one nearly always followed. It leaves the lower workings exposed to surface drainage, and caves usually result, increasing the size of the open cuts, which still further increases the disadvantages of the system.

THE new metal "copper steel" is attracting some attention, as it possesses high resistance and can be forged like iron. In the process of its manufacture zinc or a zinc alloy is employed for retaining a certain proportion of iron, nickel, or chromium in the form of oxide, and reducing and incorporating it in a state of fine division in the presence of furnace gases.

"RECALESCENCE" is "a phenomenon peculiar to heated iron or steel of glowing more brightly when certain temperatures are reached in the process of gradual cooling from a state of high incandescence." This is supposed to be due to a change of molecular structure. At such temperatures the magnetic and other properties of the iron also suddenly change.

PUMICE STONE is produced cheaply and in large quantities in Utah and thence shipped to the Chicago Pumice Co. It is plentiful in Sonoma county and other parts of California. The specimen sent is of good quality, but the substance is imported as ballast to the Atlantic coast consumer from Europe so cheaply as to ordinarily make its mining on this coast unprofitable.

WHERE two persons locate two adjoining claims on the same vein and agree to sink a shaft jointly on the vein at the joining end lines, $200 worth of work must be done regardless of the size of the shaft, and each locator should post a notice stating the fact that the assessment work was done jointly, and also the cost of the work, which must be determined by the local rate of miners' wages.

DEFINITE and repeated experiments and practice show that at from 205° C. to 360° C. there is a regular run of colors in a steel bar heating. Above the latter temperature are three different points where the rise of temperature is checked—that is, the metal momentarily contracts and then re-expands. The "recalescence" does not take place during the heating of the bar, but during its cooling.

THE article on gold in granite in California in last Saturday's issue was, as indicated, a recital of facts on such gold occurrence in that State. That gold is a constituent of granite in other localities is an equally well known fact. Gold is so found in several places in Sonora, Mexico, in central and northern Arizona; in the Homestake mine, South Dakota; at Butte and Walkerville, Montana, and elsewhere.

CINNABAR occurs very commonly in the Coast Range of California, usually at or near the contact of sandstone and serpentine. Many of these occurrences are of small importance, yet are geographically similar to those of many of the large producing mines. Cinnabar is also found in small quantity in the gold belt, one notable occurrence being in Mariposa county near Horseshoe bend of the Merced river, where the cinnabar is associated with gold.

IN the issues of the 15th and 22nd inst. appeared formulæ for the making of powder by which to take flash-light pictures underground. Attention is directed to the necessity for great care in the use of such powder when it contains potassium chlorate or perchlorate, as it is peculiarly sensitive to friction and liable to explode. It is also susceptible of decomposition, in which state it is explosive, and in general it is a substance that had best be let alone.

THE ohmic resistance in a motor is nearly the same whether running or at rest. Counter electro-motive force is developed when running, which operates exactly like an ohmic resistance, and which rapidly increases with the speed. This prevents a motor from running too fast, and enables it to absorb more energy when going slow. The armature of a motor is more liable to burn out when going slow than when going at high speed.

THE meeting of the American Institute of Mining Engineers in San Francisco next October will be the most important mining event of the year to California. The interchange of ideas, personal observation, acquisition of accurate knowledge, and the practical, business-like methods of the members must result in mutual benefit to visitors and visited alike. The Institute has met three times in Colorado, '82, '89 and '96. The October, '99, meeting will be the first in California.

IN the Independence mine, near Victor, Colo., said to have been sold last week by W. S. Stratton to English investors for $10,000,000, the ore impregnates a phonolite or nepheline basalt dyke coming up through coarse red porphyritic granite which at contact with the dyke has been much affected by the hot steam and ore solutions ascending along the volcanic dyke, resulting in a honeycombing of the granite, a leaching out of its constituent mica, and replacing it with gold-bearing ores, such as sylvanite, pyrite, and free gold.

OREGON'S new mining law makes it mandatory on all persons, companies or corporations employing miners to file with the county recorder and post in the mine office, the name or names of the owners, whether the work is being done as owner, lessee or agent, where the principal office is located, the name of the responsible representative, the day of the week or month when payments for wages or supplies are made, a statement of all mortgages or liens against the property and when due. The law is a good one, locally, but will not be generally enforced.

ZINC LEAD sulphide ores are not extraordinarily difficult of treatment in Colorado or elsewhere. A Leadville ore of that class goes 27% zinc, 18% lead, 21 ozs. silver and 5% of 1 oz. of gold to the ton. The Broken Hill, Australia, ores of that character average 20 ozs. to 25 ozs. silver, 15% to 25% lead, 25% to 35% zinc. There is an ore mined at Temaxcaltepec that carries from 30% to 40% zinc, 5% to 10% lead and from 15 to 60 oz. silver per ton. F. L. Bartlett, Canyon City, Colo., would be a good man for our three inquirers to write to. He buys zinc-lead ores.

CARBONIC ACID is a distinctly poisonous gas. It does not act by merely diluting the oxygen of the air. Three per cent of carbonic acid in air is noticeable; 10% occasions respiratory distress. A higher percentage acts as an anæsthetic. A candle will not burn in an ordinary atmosphere containing 15% carbonic acid, though if the percentage of oxygen in the air be considerably increased a candle will remain lighted in an atmosphere containing 50% carbon dioxide, this further illustrating what has hitherto been stated, viz., that the burning or extinguishing of a candle flame is not an infallible test as to danger to human lungs.

HUNGARIAN and longitudinal riffles are synonymous. For sluices 12 to 14 inches wide they are made of narrow slats, being secured by pieces nailed at right angles at each end. In long lengths it is customary to give rigidity and strength by placing a small block 2 inches in length between each slat midway between the ends. If the riffle is not over 6 feet in length these center blocks will not be necessary. The riffles thus made are laid in the bottom of the sluice box and secured by wedges driven in at the sides. They may be pulled out at any time with a pick point. In flumes 3 to 4 feet wide similar riffles are sometimes used made of 2 or 3-inch scantling 4 inches deep.

IN reply to the Los Angeles, Cal., concern that wants to buy from some one in California 1000 tons of graphite equal to Ceylon quality, it is believed that the order can not be filled. Practically, graphite does not exist in California in commercial quantities. There were several San Francisco dealers, but none have produced any of consequence for a long time. The California Graphite Co. have a deposit near Cazadero, Sonoma Co., but it has not produced any. The Elkhardt mine is near Watson's, Mendocino Co., twenty-eight miles from Ukiah, but is a non-producer, being of too low grade to be used. There are several small known deposits in southern California, none of which have been utilized.

THOUGH the whole matter was fully and clearly stated and explained on the editorial page of the issue of the 8th inst., and universally copied all over the State, numerous questions are still being received asking what the present status of the California mining law is. There seems to be an impression among some miners that some important new laws were enacted by the recent Legislature. All that was done regarding mining at the last session of the California Legislature was the repeal of a law passed by its predecessor regarding location of mining claims; so that "the mining laws of California" are just where they were and what they were before that law was passed in '97, that particular law passed in March, '97, having been repealed in March, '99.

TO BRAZE a band saw scarf the saw ends to match with a ¾-inch lap for small saws, up to ¾-inch for large size. If the scarf is brought to too sharp an edge it is liable to burn. Bind together with fine iron binding wire, with the laps wet with a paste of borax and water ground on a piece of slate or rough glass. Pin the blade, laid straight, on a large piece of charcoal, ground flat, with a recess excavated under the scarf so as to allow a blowpipe flame to pass under the saw blade. Put a piece of brass, or better still, silver solder or coin, on the upper edge of the lap, with sufficient ground borax to flow the brazing easily. Heat with a blowpipe under and above the blade until the solder flows, when it will draw entirely through the lap. When cold, file to an even thickness.

THE amount of water evaporated in a boiler can be determined as follows: Take the mean between the widths of the two levels at the beginning and at the end of a space of fifteen minutes as indicated by the glass gauge. Multiply the constant length of water surface with this mean width, and the product by 4, giving the amount evaporated in cubic inches; dividing by 1728 gives result in cubic feet. One-half cubic foot, 3¾ gallons, evaporated in one hour, equals 1 H. P. To find the H. P. of a tubular boiler by the heating surface, ascertain the number of square inches of hea ing surface around boiler shell from fire line to fire line, and in the flues; divide by 144 to get square feet; divide quotient by 15 if horizontal tubular, or by 12 if locomotive or vertical boiler, to get H. P.

MECHANICAL stokers, contrivances to feed coal automatically by machinery to a steam boiler, rightly handled, work well and are economical. They may be divided into four general classes. In one the coal is carried on either horizontal or inclined grate bars which are given a rocking or reciprocal motion which gradually advances the fuel along the grates; in another kind the grate has a steep incline, and the coal being pushed onto its upper end slides slowly down as it is consumed; in a third the entire grate forms an endless chain of short bars, on which the coal travels horizontally into the furnace; the chain passes over a sprocket wheel at the end and returns through the ash pit. In still another class of these devices fresh coal is fed in underneath the burning coal and the gases distilled from it pass through the bed of hot coke above. In this kind the action is just the reverse of that in the down-draft furnace where the fresh coal is fed on top of the bed, the gases passing down through the bed of hot coke beneath.

Mexican Methods of Mine Management and Operation.

Written for the MINING AND SCIENTIFIC PRESS by GEO. F. BINCKLEY.

In the conduct of a mining business in Mexico there are two master-words—simplicity and co-operation. In these two words are crystallized the experience of three centuries of mining under disadvantages that are little known in this country, the most striking being inefficient and unreliable labor and the almost total lack of machinery. The necessities of the case have developed the system, and the system makes possible the profitable operation of mines in Mexico that would wreck an American company in a year.

This fact is not due so much to the "cheap labor" that is supposed to be so plentiful in Mexico, as to the manner of extracting work from a class of labor that is notoriously shiftless and reluctant. The payment of labor by the day is rarely practiced by the mining concern itself, for it is almost impossible to get foremen or shift bosses that will make the men really work; but when these shift bosses become petty contractors, as under the Mexican system, and look personally after the men under them, and have to pay them so much a day for their labor, then it is surprising what efficiency the labor may be made to show, for these contractors, having their own interests at stake, are as exacting taskmasters as can be found anywhere. In almost all cases it is found more economical to do all the exploration work by contract, and in many camps the actual work of ore extraction is done under a tribute system that is one of the best illustrations of the Mexican method that can be shown, insuring, as it does, the fullest co-operation between the miner and the owner, and the maximum efficiency of the labor employed, which is secured by the only true means—making it a matter of self-interest. The Mexican mine manager does not purchase labor from the lowest bidder, at so much per day, but arranges it so that the miner always gets his rated proportion of the gross results of his labor. This, as will be seen, does not lay the burden of the possible mismanagement of the business on the shoulders of the miner, but, whether the mine pays dividends or not, if there is rich ore being mined, the miner is making money, and if the management is poor, or if heavy expenditures are being made, it is no concern of his.

Taking up first the exploration contracts, which are always verbal, and may be terminated at the pleasure of the manager, they may be said to represent about the only successful form of communistic labor, although the contract is always let to one man, and he is held responsible for the proper performance of the work. This contractor, however, quite generally works with his men, and his share of the profits on the contract are very slightly in excess of the share of the ordinary "barretero," or working miner, who is paid every week by the contractor in proportion to the number of men in the gang, and the amount of work performed and paid for by the mine. The fact that all the members of the gang are interested in the performance of the greatest possible amount of work tends to make them work with a will; but, if any skulking is done, the offender is promptly "fired" by the contractor and his comrades, who are very strict in this matter.

Now, regarding the cheapness of the labor in the mines of Mexico, it may be stated from the writer's own experience that the average pay or profits of the working members of a contractor's gang in representative mines is about $2 per day, and it must be remembered that these men, although they are required to be within the mine gates at 6 o'clock in the morning, rarely get started before 8:30 or 9, as they generally go down the ladderways, and their preparations for work are very leisurely. When they get to work, they work hard, but quit early in the afternoon and are out of the mine by 4:30 or 5 o'clock. Taking these hours into consideration, it will be seen that the Mexican is not so badly paid after all, and, as a matter of fact, he could, if he were not so shiftless, live very comfortably on what he makes, for in Mexico the miner is the aristocrat among laborers and looks down on those of the field and farm.

In connection with this matter of exploration contracts, it will not be amiss to quote some costs of work. All drilling is done by hand, and in this case the powder and candles are furnished by the mine, as well as tools and sharpening of same.

Drifting in solid limestone, size of drift being two meters square, strata about horizontal, costs from $26 to $35 per meter (39.37 inches), according to the progress made per week, a sliding scale of prices being paid, less than three meters being paid for at the lower rate, three to five at an intermediate rate, and five to eight at the highest figure. The sliding scale insures that the work will be performed in the minimum time, the resulting cost being an average of about $28 per meter for labor alone. Same size drift in hard, tough quartz costs $40 per meter, and in solid porphyry about $22. In decomposed porphyry this size drift costs $16. In none of the above was there any timbering whatever, and whenever there is timbering to be done it is paid for by the mine and done by the contractors, on a separate account, or by timbermen under a boss paid by the mine, or, oftener still, by contract. The work is generally measured up on Sunday morning, and the account settled for the week. This system is universal, and is entirely satisfactory.

The extraction of the ore from the stopes is carried on under an entirely different system—one in which the miner acquires a right to a certain percentage of the ore that he extracts, or that is extracted by the gang of miners of which he is a member. This percentage varies with the grade of the ore, being one-third of the whole amount in the case of ore of the lowest grade, and one-twelfth to one-fifteenth in ore of the highest grade, according to the practice of the mine. This ore belongs to the miner and he may sell it to outside parties, or it may be bought by the mine and paid for at its assay value, minus a fixed treatment charge. This system is employed at the mine of Santa Ana, Catorce, S. L. P., managed by Francisco M. Coghlan, one of the ablest mining engineers and managers in Mexico. At this mine the share of the miner is never less than one-twelfth of the amount that he extracts, even in the case of the richest ores, and is one-third in the case of the lowest grades. Almost all the "rescate" or miners' shares of the ore is bought by the mine, as the reputation of the management for honesty in its dealings with the miners is very high, and the price paid is as good as that paid by the ore buyers. The practical working of the system is excellent, and serves to keep the men at work when the mine is not in good ore, in hopes that a good strike will be made. Just here paternalism plays a rather important part, for if a miner leaves the mine when it is poor and wishes to return when it is again in good ore, the best workings are not open to him, but are reserved for the men that have stayed with the mine through its hard times, and spent their time, when not at work in a stope or on contract work, as "buscones," looking for ore on their own account wherever the prospects seem good and they can obtain the consent of the manager to work. Many of the most valuable ore bodies have been found in this manner and the finder is rewarded with the richest portion of the stope to work, with a limit as to the number of men he can employ in his gang. This work in the stopes is always under the direction of the mine foreman and the engineer and they attend to all the timbering, pumping and handling of the ore. Those men who have been the most faithful and steady are always given the best stopes, but when the ore is very rich, miners from the poor stopes are allowed a certain time in the stope every day—sometimes but one hour—and in this time they work like demons, for their share is worth a good deal even for a short shift, and when they get their ore sacks in the ore yard it is a sight to see them go into the mine and down the tunnel at their best pace, on a "dead run," for the time begins when they get the ore sacks, and they want to make the best of it.

Paternalism plays a very important part in the management of the best Mexican mines, and when the character of the labor that is employed is taken into consideration it will be seen that it is not only natural but necessary for the best interests of all concerned. And again, if only as a matter of policy, fair dealing is the natural result of this system, for the spirit of co-operation is general and extends from the lowest to the highest employe, making the best interests of the mine a personal matter to all. In the case of very low-grade ore the pay of the miner, as represented by his share, is very low—just about enough for him to live on, but when the mine gets into good ore his earnings sometimes run up to a figure that would be very pleasing even in this country, several times in a few months at the mine of Santa Ana the share of a single miner for a week's work having realized sums from $500 to $2200, the former figure not having been unusual—the latter exceptional. However, when the mine is doing even fairly well, the amount that the miner realizes per week is quite generally considerably above that which would be received as pay by a the best business men in these mining towns are exminer in this country, dollar for dollar, and many of miners that have had the forethought to save from the large earnings that they have made from time to time.

It will easily be seen that under this system of working, where every miner has a personal interest in the success of the mine, and every incentive for using his brains as well as his hands, and is allowed to test his theories as to the probability of finding ore bodies in promising spots by his own exertions, unpaid for by the mine, a large force of men may be kept employed, and by their own unaided efforts, or by certain limited assistance when it is in the judgment of the management expedient to do so in order to facilitate the exploration of a piece of ground at a minimum cost, valuable ore bodies may be discovered and the mine put on a paying basis, while if the whole expense of exploration were to be borne by the mine, it would often be impossible for operations to be continued at all, owing to the immense cost of the work. The incentive of personal interest leads the men to work along while their beans last, and when they are at the last notch the mine will often give a small weekly allowance to the men in order to enable them to continue the work. If a discovery is made, then the good times have come again for the mine and the miner alike. It is the fairest system conceivable, for the miner shares the fortunes of the mine—when the mine is prosperous the miner is also, and when the mine is on expense and in a bad way financially the miner shares the hard times, but with hopes for the future and every incentive to help on the enterprise.

Important as the effect of the working of this system is on the working miner, or "barretero," it is far more significant when the "empleado" or permanent employe is considered. In a somewhat different way, he also has the benefit of the miners' prosperity, or shares its hard times. All the permanent or salaried employes receive a share of the mine's output, sometimes in the shape of a certain percentage of the net profits, sometimes a certain percentage of the gross output, and sometimes, in fact, generally, the employes form a kind of subordiate organization, under the direction of the manager of the company, which has the privelege of putting gangs of men to work in the richest stopes a certain number of shifts each week, these gangs working under the direction of a foreman and shift bosses who are interested in the "campos," as this subordinate organization is designated generally. The miners who work for the "campos" are paid by the shift, a fixed sum, and receive no share of the profits that accrue to the employes from the working of this system. In the distribution of the ore according so the assay value, the same rules hold good that are applied to the distribution to the individual miner, and the "miner's share" of all the ore mined on account of the "campos" is sold, and the proceeds of the sales kept account of until the end of the year, when a settlement is made and the money distributed to the employes according to the importance of the positions held by them, the manager of the company, of course, having the largest share, then the engineer, or assistant manager, then in the order of their importance, the foremen, the bookkeepers, the shift bosses, and so on down to the men who weight the ore in the yards, even the office boy coming in for his share. It is easy to see that under such circumstances the employes, from the manager down, have the keenest personal interest in the success of the mine from a business standpoint, and anything that they can do or suggest toward the improvement of the method of working, or that will in any way contribute to the economy of the management, is sure to be done, and dereliction of duty is promptly discouraged by all the employes and is not permitted by the management.

Now, one of the most important features in the application of this system is the fact that none of the employes have any vested interest in the mine, or even in the "campos," but the distribution is made entirely at the discretion of the manager, and neglect of duty, insubordination, or any cause for the discharge of the employe forfeits his right to the share that would have come to him, and he has no recourse in law, as the distribution is entirely gratuitous on the part of the mine.

Now, although the effect on the morale of the employe is invaluable, this distribution to the employe on the salary list costs the mine nothing, yet it often has the effect of making the annual pay of the salaried men in the mine seem insignificant when it is compared with the amount that is distributed through the "campos" system, in one instance that the writer has in mind, the weekly pay of the assistant manager being but $20 per week, his share of the "campos" was nearly $15,000 for the year! The share of the manager was a great deal more than this, and for that year every employe received a dividend that was far greater than his whole year's salary. The salaries paid under this system are, with the exception of that of the manager, always nominal in amount, so that if the mine is too poor to pay the "camperos" to work in to advantage, they receive only about enough to keep them going, with nothing to spare, and, in fact, the salary of the manager is frequently very small when compared to those paid in this country.

While the system that has been explained in the preceding part of this paper could not be applied in its entirety to the conditions that exist in this country, there is no reason that the principle could not be used with the greatest advantage as far as the higher employes of American mines are concerned, and instead of high salaries being paid to the manager, his assistants, and the other permanent employes, whether the mine is prosperous or not, the salary could, as in the Mexican system, be nominal, and the mine could well afford to distribute among them a certain percentage of the net profits of the mine for each month or year. This distribution would, however, have to be made in the the most perfect good faith, for on this rests the success of the system, and any evasions would be disastrous to all good feeling. Net profits would have to be taken to mean in this case the value of the gross output of the mine, minus the expense of operation, and this expense account could not be made to cover construction, purchase of new properties, or additions to a sinking fund, for the employes, not being stock holders, could not be expected to help carry the

burden of permanent improvement or the sinking fund, as their interest would cease when they left the employ of the company. In this connection the writer ventures the opinion that the very worst thing that could be done would be to make the employes stockholders, even to a very limited extent, for in order that the incentive should be greatest, the employe should have no vested interest whatever, but his share of the profits of the mine should rest solely on his own efforts and a failure to work earnestly in the interests of the mine should entail the loss of all his privileges and interests with the loss of his position. In this way alone could the highest efficiency be maintained.

In the business management of the mine co-operation, as has been shown, plays by far the most important part, and in the mechanical methods employed simplicity is an equally prominent feature. The Mexican has been forced to this by circumstances, but in the long years that he has had to deal with the problem of ore treatment without machinery he has learned many facts of great importance from a business standpoint as regards the commercial efficiency of his crude mechanism. In this country the efforts of our engineers have been directed towards the perfection, mechanically, of the machinery used in the mining and reduction of ores. It is beyond doubt that this perfection is of a high degree and unsurpassed in the world, and it is equally beyond question that the treatment of ores in great quantities under the present complete and complicated system of mechanical methods is not only the most efficient in a mechanical sense, but also in a commercial sense; but when the small mine, working under difficulties and with no great amount of ore in sight is considered, the Mexican system becomes instructive. Many mines would be at least on a modestly paying basis to-day if, when the operations were started, the manager had been engaged under an agreement which would give him the full control of the property, and, in addition to a small salary, a certain percentage of the net profits of the mine. Under these circumstances a man of high ability and great experience would be within the reach of a modest corporation, for men of this type are by no means averse to taking chances where they have reason to believe that the property is a good one; but they would not take a small salary with no prospect of sharing in the benefits that might result from their own good management. Now, in addition to this arrangement being almost universal as regards the employment of a manager, the Mexican spends only the amount on surface improvement that is absolutely necessary, and the bulk of his available capital he puts underground, knowing well that if he has ore it is not a serious matter to get the metal out of it. The different mental aptitude of the Mexican as compared to the American miner is well illustrated by the different characters of the mining failures in that country and this. In Mexico when a mine has failed there are frequently very extensive underground workings, representing a large amount of expenditure, but on the surface there is hardly anything to show that mining operations have ever been carried on, for probably all the machinery that was employed at the mine proper was a horse, whim and a steelyard, and all the machinery for the reduction of the ore consists, in the case of a gold mine, of a few arrastras, and perhaps a crude Chilian mill—a disc of stone, with a hole for an axle, and a few stones set in a circle for dies. If the mining has been done for silver, then there will have been a "patio" for the amalgamation of the pulverized ores, and a few crude agitators for the washing of the gangue from the amalgam. All the power will have been supplied by mules and horses, and the only labor employed the cheapest and most unskilled, for but one or two skilled men are needed in the working of these processes. The consequence of all this is that when the operations have at length been discontinued, because unprofitable, the owners have the satisfaction of knowing that what money had been spent was spent in development and not on superfluous surface improvements. The average history of mining failures in this country is a promising prospect, a promoter, formation of a corporation, a mill big enough for ten times the amount of ore reasonably to be expected, expensive hoisting works, pumps, etc. Then when all this is installed mining operations are begun, the mill started, and the fact soon discovered that there is not enough ore in the mine to run the mill on quarter time, at quarter capacity. Then the stockholders are asked by the high-priced manager to put up more money for the development of the mine, but the gentlemen, having expected by now to be drawing dividends, refuse his modest request, and the property is practically abandoned. It is beyond question that many a good mine has been abandoned because the stockholders have spent all their money on surface improvements, trusting to luck that they will find ore, while if they had developed the property before putting up surface works a fine property might have been developed.

If the capitalist would only develop his mine, and the prospector would only be a little less ambitious as regards his machinery equipment and the amount of ore he is going to handle, many mines would be put on a paying basis that are nothing but prospect holes now; and if the small mine owner would only avail himself of the simplest, crudest, and at the same time the most efficient gold saver ever devised —the arrastra—he could oftentimes make the little mine pay its way and a good deal more. But this would be slow, and the average mine owner, prospector or capitalist insists on quick returns, and in this respect differs most strikingly from the Mexican mine owner, who runs a mine as he does a grocery store—on strictly business principles. The Mexican, when he wants to explore a certain piece of ground, runs a level or crosscut as small as possible, and turns it from side to side as the indications may point; or, if he is sinking, he will turn and twist along what seems to be a vein or stringer, and will make a hole just about big enough to crawl into, but he gets to the same place that a roomy, square-timbered drift, crosscut or winze would have taken him, has explored the ground, taken out what ore he has come across, and all at a very low cost. When he does get into the ore body, then he arranges for getting it out, but not until then.

A more thorough development of the mine proper, in all cases before large expenditures for machinery are made, would tend to put the mining business in this country on a footing that it has never enjoyed so far, and the remarks made regarding the amount of machinery placed on mining property are intended to apply only to those properties that have not been developed to the extent that will justify, in a commercial sense, the expenditure of money on surface works. This would result not in cutting down the amount of machinery used in mining operations, but the contrary would be the case, for a developed mine requires a machinery equipment, and the thorough development of the mine beforehand would only make the need a business matter instead of a gambling scheme.

The peculiarities of the Mexican system render the working and development of a very poor mine a possibility by keeping down the expenses in times of financial difficulty through the co-operation of the employes, the almost total absence of skilled labor, and the contract and tribute systems of working underground. This could not be applied with any benefit in the large mines of this country, but in small properties, prospects and new ventures it would seem that the system might be applied with great advantage, for personal interest, after all, is the most powerful incentive to persistent and effective work.

As to the discovery of acetylene gas, *Electricity* relates that some years ago Thos. L. Wilson of St. Catherines, Ont., was smelting for metallurgical purposes. From time to time he used a great deal of rock salt in his furnace stock, and also limestone as a flux. Whenever these two materials were fused together, the slag produced by the intense electrical heat included a dirty grayish substance wholly unlike anything else he had ever seen. For weeks he noticed this substance without giving more than passing attention to it, dumping it into the stream upon the bank of which he had built his furnace. One day a curious thing occurred and at a time when the pile of slag had become so large that its top rose above the surface of the water. A minute or two after dropping the slag as usual into the stream, some of it going under and a part of it remaining above the water in a red hot state, the sizzling and steaming was followed by a bright burst of flame. The next time Mr. Wilson used rock salt and limestone the blaze again appeared over the slag after it had been cast into the river, and, it being at night, he was much struck with the brilliant white light produced. The next time he had a batch of the queer grayish residue to dispose of he did not waste it, but saved it and poured over it some water for experiment. To his surprise, there was no flame, but, after puzzling awhile over this feature, he held a lighted match over the pile, when instantly there was a white, glowing flame.

A GREAT DRAWBACK to the identification of original corners of old mining claims in California is found in a lack of official permanent monuments. When the surveyor turns to the section corners and subdivisions of sections he finds he cannot make his survey close within many feet, if the initial point be taken from opposite sides of the section each time. Nearly all the original corners have been moved, by whom it would often be impossible to state. The most common object chosen in fixing the corner of a mining claim is a tree. Certificates of claims located thirty to forty years ago describe certain bearing trees, giving the name of the kind of tree and its diameter. In many cases the tree has disappeared entirely and in others it has grown to such an extent as to be no longer recognizable. A tree is not a suitable monument to identify a mine survey or other corner. But there is an absolute lack of permanent monuments such as are established by the government elsewhere.

The Pneumatic Cyanide Process.

The pneumatic cyanide process is based upon the necessity of oxygen in connection with cyaniding, and the fact that its chemical activity depends largely on the amount of oxygen mixed or combined with the solution. Many plans have been devised to admit the oxygen of the air to the solution and ore during the leaching process. In some mills the tanks are placed one above the other and the ore transferred during leaching in order that it might absorb oxygen in its passage through the air; others have used mechanical stirrers, etc. The pneumatic process introduces a constant supply of the oxygen of the air into the solution and saturated mass from beneath, and utilizes the power of compressed air.

The method of using it is as follows: The leaching vats are filled with the crushed ore and flooded with the cyanide solution in the usual manner; the valve regulating the amount of pressure is then opened, the current of compressed air—one-fifth pure oxygen —is turned into the space beneath the false bottom, evenly distributed by a coil of perforated pipes over the entire space between the false and true bottoms of the leaching tank, from whence it forces its way through the perforated false bottom and rises through the mass of saturated ore. The inventor says: "If the ores are of a talcose or clayey nature and show a tendency to disintegrate and settle as mud or slimes on the false bottom, the compressed air may be turned on so strongly that the whole mass can be kept seething and boiling until settling is impossible."

Fig. 1 shows a series of leaching vats or tanks

FIG. 1.

fitted with pipes and valves for the introduction and control of the compressed air.

Fig. 2 is a cross section cut down through the

FIG. 2.

middle of Fig. 1 and shows the air pipes between the true and the perforated false bottoms of the vats and the trap door in the bottom for discharging the leached refuse.

Fig. 3 is a view of the bottom of a leaching vat, with a portion of the perforated false bottom cut away to show the coil of perforated air pipe, by which the compressed air is evenly distributed over the entire bottom of the vat.

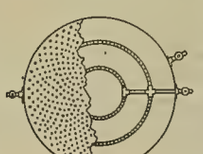


FIG. 3.

There is also, in connection with the patents of the Pneumatic Cyanide Process Co., a special form of vat for treating slimes or talcose ores, which is built with a solid air-tight cover containing trap-doors through which the vat is filled, and a trap-door in the bottom through which it is unloaded. During the leaching and agitation treatment, the trap-doors in the solid top are left open, but when the values are all extracted by the solution the trap-doors are fastened down on air-tight gaskets and the air pressure is turned through an upper pipe into the space between the solid top and the leached ore and solution, to act as a filter press and drive the solution downwards and out of the vat through the drain cocks.

To wash the leached ores and thus recover the last trace of values, the trap-doors in the solid top are again opened, the mass flooded with pure water or a weak solution, the compressed air reversed to the bottom pipes and turned on in such strength that the mass is violently agitated, with the intent that the remaining values shall be absorbed and blended in the wash water; then the trap doors are again closed down, the air pressure reversed to the top, the watered solution driven down and out through a separate drain pipe and led to a reservoir where it is strengthened for use on a new charge of ore; the refuse is thrown out of the vat through the bottom trap-door, and it is then ready for refilling.

If the air is passed through a small furnace between the compressor and the leaching tanks and heated, it will heat the solution, giving it greater power of extraction and enabling it to do more rapid work.

The expense of equipping or arranging cyanide plants already built, so that the pneumatic process may be used is stated to be small, as all that need be added to the present tanks are the pipe connections with ordinary globe valves. If there is a compressor in use at the mine for driving air drills, a connecting

pipe can be laid to the mill any distance required and the air brought in for leaching purposes. For most ores it is not necessary to use a large amount of air, all required being to keep the solution thoroughly filled with oxygen. In building new cyanide plants, it is claimed that a smaller number of vats will be required for a given capacity, and that this saving will more than cover the cost of fitting up to use the pneumatic process.

The Pneumatic Process Co. proposes to sell outright to any mill or mine owner the full right to use this process for the lifetime of the patent—that is, to sell mill rights with full authority to enlarge the present capacity of the mill to any extent desired without further payment. A pamphlet containing full details is issued by the Pneumatic Cyanide Process Co., 306 Boston Building, Denver, Colo.

Latest Mining and Metallurgical Patents.

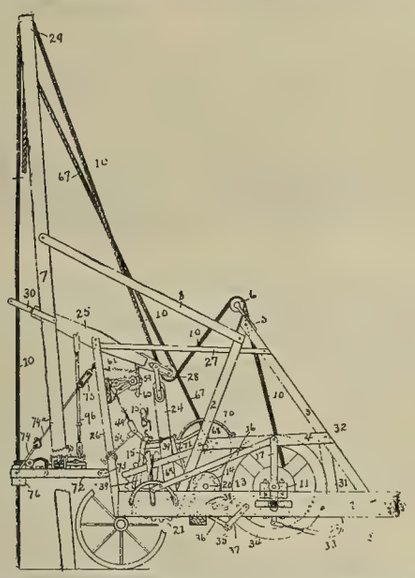
Patents Issued April 18, 1899.

Specially Prepared for the MINING AND SCIENTIFIC PRESS.

EXTRACTION OF ZINC AND COPPER FROM ORES.—No. 623,154; H. Howard, Brookline, Mass.

A process of extracting zinc and copper from ore or residue, consisting in dissolving zinc and copper and their soluble salts from the ore or residue by treatment with a solvent, including aqua-ammonia and an ammoniacal salt in solution; separating the copper from the solution; driving off the ammonia from the remaining liquor in the presence of a base stronger than ammonia or zinc oxide, the base combining with practically all of the acid radicals present to form one or more salts, and finally eliminating such salt or salts in the residue.

WELL DRILLING MACHINE.—No. 623,182; A. Rodefeld, Richmond, Ind.



A well-drilling machine, a combination with a rope-turning clamp, of a screw shaft, a train of gearing between rope-turning clamp and screw shaft, ratchet wheels mounted on screw shaft in reversed positions, a nut movable back and forth on screw shaft, a lever having a close connection with nut, a second lever engaged by first-named lever, the second lever having a spring connected to its pivotless end to facilitate its movements over the center, a third lever pivoted above second lever, a transverse lever engaging with third lever and locking it in its position, a rotary and longitudinally-movable shaft to which third lever has a swivel connection, and prawls on shaft engaging alternately with ratchet wheels and imparting reversed movement to the screw shaft and gearing.

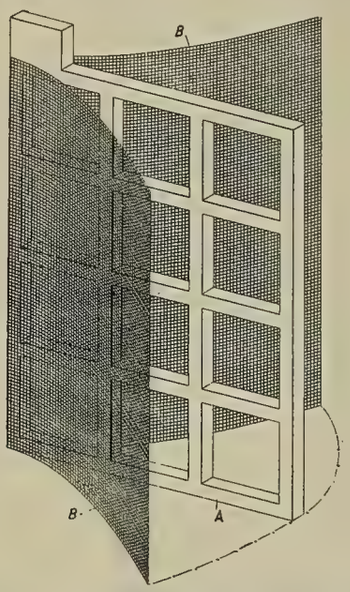
METALLIC ALLOY.—No. 623,209; J. P. Fullerton, London, Eng.

A homogeneous metallic alloy consisting of ninety-one parts of lead, one part of copper, one part of bismuth and seven parts of antimony to every one hundred parts of the alloy, produced by the process, which is for producing a homogenous alloy of lead, copper, bismuth and antimony, and consists in taking a small portion of the lead, heating it to the melting point of copper, then introducing into this molten lead the copper in a finely divided state or dust, stirring the while, then adding this mixture of copper and lead to the antimony which latter has been melted in a separate pot, then adding the remainder of the lead and finally the bismuth; the whole being stirred until thoroughly amalgamated.

COMPOSITION FOR AND METHOD OF HEATING METAL PARTS.—No. 623,239; R. Deissler, Treptow, Germany.

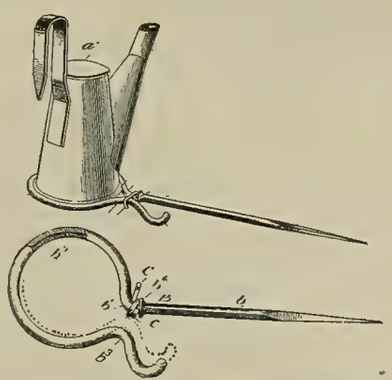
A process of heating parts of metallic objects consisting in embedding them in a reaction mass composed of a finely divided metal having a high temperature of combustion, metal carbide, and an oxygen or sulphur-bearing compound, igniting the mass and after the reaction has propagated itself through the whole mass removing the slag formed thereby.

ELECTRIC ACCUMULATOR.—No. 623,195; A. Werner, London, Eng.



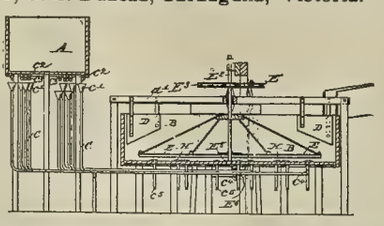
An electric accumulator, being a combination of an electrolyte consisting of a solution of sulphates of magnesium, cadmium and of a zinc with a positive formed of a metallic support on which alloy is electrolytically deposited from such solution and with a negative constituted of a leaden gird having covering fabrics of lead-wire gauze burned to the grid and embedded in the active material on both faces on the grid.

MINER'S LAMP.—No. 623,370; P. Home, Bessemer, Mich.



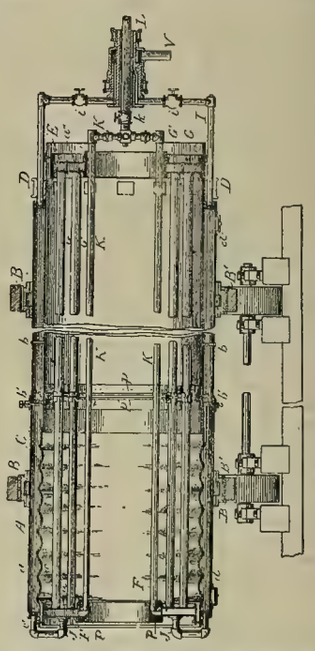
A holder for miners' lamps comprising a shank pointed at one end and provided at the other end with an annular portion grooved on its inner side to engage a bead on the lamp body and a retaining device for securing annular support around the lamp body, and a retaining hook secured to shank and engaging the opposite end of curved portion.

APPARATUS FOR SEPARATING GOLD AND SILVER BEARING SOLUTIONS FROM ORES OR SLIMES.—No. 623,465; G. S. Duncan, Tarnagulla, Victoria.



An apparatus for the separation of solutions of precious metals from residual ores and slimes, the combination with a solutions vat and a leaching and displacement vat placed at a lower level, of a series of pipes having funnel shaped ends arranged beneath the solutions vat, a series of short pipes having valves to discharge from the bottom of the latter vat into these funnel shaped pipe ends; the exit ends of the pipes receiving the solutions having communication with T connections consisting of pipes opening through the bottom of the leaching and displacement vat, their lower ends having removable plugs, a series of stirrers extending radially from a central shaft in vat, and a series of hoods which are slightly arched, the arched portions being placed over the open ends of the pipes entering the bottom of the leaching vat, and arranged at right angles to the movement of currents produced by the stirrers.

ROTARY ORE COOLER.—No. 623,230; Philip Argall, Denver, Colo.



A rotary ore cooler, consisting of a cylinder with shells *A* and *C* inclosing an annular space, hollow heads *E* and *F* within inner cylinder *C*, longitudinal tubes *G* and *G'* connecting said hollow heads, return pipes *K*, *K*, leading from hollow head *F* to a main discharge outlet, means for supporting and rotating cylinder, means for supplying water to annular space and to hollow heads, and means for discharging the water therefrom while cylinder is in rotation. The means for supporting the tubes against displacement consists of annular angle irons secured to inner shell, saddle pieces *p*, double saddles *p'*, intermediate caps *Q*, and suspension bolts *q* anchored to angle irons.

AT Boston, Mass., recently an official test was made on the tug Daniel S. Lamont, of the eophone, an instrument designed to prevent collision at sea. The eophone was some time ago adopted by the United States Government for the revenue cutter service, and is about to be introduced generally. The instrument consists of a vane, shaped like a block of steel rail, on the pilot house of vessel, which is connected with a dial wheel in the cabin by a brass rod. The operator places receivers not unlike those used on a telephone to the ears. When, during a fog, a ship whistle is heard or a reef whistle, the vane catches the sound on the side on which it occurs, transmits it through funnels to the receivers, and the operators, by turning the dial until the maximum sound is reached, can determine to the fraction of a point where the ship or reef is. A whistle can be heard many miles away. The instrument never fails in accuracy. During the tests the exhaust of a tug in the harbor was located when the boat was but a dot on the horizon.

THE report is again in circulation that H. H. Rogers of the Standard Oil Co., acting for a syndicate known as the Copper Combine, is making an effort to consolidate several large copper producers, including the Anaconda in Montana and all the important Lake Superior mines excepting Calumet, and also the Rio Tinto mines of Spain. The syndicate will capitalize for $400,000,000. It is to be an international concern which will control the price of copper in America and Europe. The Rothschilds and Morgans deny the truthfulness of the report that they are underwriting any such project.

A PROBLEM in some manufacturing operations is to get sufficient light at a certain spot, such as upon the die of a drawing press where work must be accurately placed and very quickly handled. A light placed close to the die is often impossible, because it would be in the way or for some other reason. A scientific exchange cites an instance where one machinist got over the difficulty by placing behind and above one of the overhead incandescent lamps a small mirror in such position that the beam of light reflected from it falls directly upon the spot to be illuminated.

THE rise in the price of copper is said to be seriously affecting British industries, particularly the electrical branches, where large amounts of copper are required. The Government has suspended orders for metallic cartridge shells and various industrial concerns are reducing their force.

Some Experiences of a Working Miner.

NUMBER XI.

Written for the MINING AND SCIENTIFIC PRESS.

Did you ever notice that miners are prompt to adopt the latest fads in their line of business? It's so. Let any new thing—a new fashion—present itself in mining, and the miner is quick to seize upon it and works it for all he knows. Just now it is copper. Copper is up and the miner is out for copper—copper of any kind—green, blue, red and black. It is a daily thing now to hear of 90% sulphide ore, and carbonate ore which will go at least 80%; and these statements are made in good faith, too. After a little time it will be something else. A few years ago, when the tin boom was on, tin became so common as to seriously threaten the market, but I notice the tin output is still rather small in the United States. About the time Leadville first arose on its wave of prosperity sand carbonate was all the go. Any bank or deposit of sandy material in the mining regions became sand carbonate in the eye of the optimistic miner. I knew some men who located claims on an outcrop of sandstone several thousand feet in length. A sample weighing sixteen ounces was sent away for assay. In a few days the certificate of assay was received by mail—"sample contains one ounce silver per ton." This was written on a tabulated blank, and in their haste and excitement the "per ton" part was overlooked. The calculation was simple enough. If sixteen ounces sand carbonate contain one ounce silver one ton contains 2000 ounces silver, or over $2500 per ton. The news spread rapidly among the favored ones, and in less than thirty minutes twenty men were in the saddle racing at breakneck speed to reach the wonderful deposit of sand carbonate worth $2500 per ton in silver. Others who knew nothing of what was going on suddenly became aware of the hasty exodus of a certain lot of men and they, too, got animals and wagons and joined in the race. The hot, dusty road was lined for several miles with this small army, many of them on foot, carrying their coats on their arms; and the most amusing part of it all was that the greater number didn't know where they were going and had not the faintest idea what was to be found when they reached the end of their mysterious journey. It just chanced that I was sent to look at this wonderful deposit, and on my return I was obliged to report no sand carbonate, but plenty of sand and very little silver. A closer inspection of the assay certificate revealed the mistake and the stampede was over; but during the brief time it lasted about four square miles of ground was staked out.

One of the late fads is phonolite. Unfortunately, perhaps, but few miners are able to recognize phonolite in its normal condition, and, when altered by crushing and the percolation of mineral solutions to a soft nondescript mass, it becomes very difficult for any one to identify it. Still, the prospector must have phonolite, and the name is liberally and indiscriminately applied to any sort of rock which seems to suit the miner's fancy. Most of these fads, fortunately, do not last long, and the prospector naturally drifts back to first principles and resumes his search for gold. The latest is molybdenite, but this fad is likely to be short-lived.

I took a trip up above P—— to see the dam in the S—— J—— river. The object of this dam was to turn the water through a canal for the purpose of draining the bedrock below, that the stream might be worked for gold. The idea was a good one, but one peculiar circumstance in this connection was that the dam was built just above the mouth of a tributary stream, the flow of water in which was in itself sufficient to defeat the object of the enterprise. You might feel interested in knowing what the final outcome of it was—nothing.

The construction of a large ditch and flume in the mountains involves a considerable outlay of money in the preliminary details. A corps of engineers must go out and make surveys, and sometimes different routes are surveyed. The line having been located, the heavy expense actually begins. Large mining concerns usually fully understand and appreciate these facts; but more than a single instance has come to my notice where errors were made which resulted in the unnecessary expenditure of hundreds of thousands of dollars. When the F. D. M—— mine was in full blast, it was determined to locate a ditch and flume line and construct a canal to furnish a large supply of water for the works. The surveys were made, the line located and construction commenced. Several sawmills were built at various places along the proposed line of the canal to supply lumber and timber for its construction. Several miles of ditch were dug, millions of feet of lumber were put into the flumes. Two tunnels, together about 3000 feet, were driven, and pipe lines located. As far as the work had proceeded, the cost reached nearly half a million dollars, when all work came suddenly to a standstill, though lacking fifteen miles of being completed. In some manner, difficult to explain, it was discovered that water would not disobey the laws of gravitation and absolutely refused to flow up hill in this canal, despite the influence of a wealthy corporation, and the proposition was abandoned.

A great many operations, particularly in the metallurgical field, are based upon insufficient experiment. A few tests are made on a small scale in a laboratory, and, on the result of these, large works for treating ores on a commercial basis are erected. Not long since I visited a plant at S—— constructed with special reference to cyaniding tailings. It was declared that the material contained several dollars per ton in gold, as numerous assays had fully demonstrated, and several experiments had been made with cyanide, some of which were satisfactory and some not so. They built the works, nevertheless, and, after running a week or two, the proposition was abandoned. One thing I noticed particularly in passing through these works, and that was that the water was flowing through the precipitating boxes at a rapid rate, with much evidence of current and many eddies. This may not have occasioned loss, but I fancy it did.

I was taken to see the C—— mine some time ago. It was described as a good prospect, with over 2000 feet of tunnels, drifts, etc., on six veins. I found two tunnels—crosscuts, I suppose, they might be called. Entering the upper one, I soon found it was very crooked, turning first to the right and then to the left, with many branches running out into the country. After proceeding a long distance, I noticed what appeared to be roots in the roof of the tunnel. This seemed strange, as the point I had reached was fully 600 feet from the entrance. I retraced my steps with some hesitation, not knowing whether I was lost or not, but finally reached daylight. I had seen six or seven veins in the tunnel. I went down the mountain about 100 feet to a second tunnel. This I found had been run in the same erratic manner, exposing half-a-dozen veins. It was very confusing, and I concluded to make a hasty survey. This I did, and was astonished to find that both tunnels were run in the shape of a rude crescent, with many irregularities, and, had either been driven a few feet farther, they must have come into daylight at no great distance from the opposite end. It would not be a bad idea to do this, as it would afford much needed ventilation. In place of six or seven veins, I found there were really but two, which the tunnels in their sinuous course had crossed and recrossed several times. The owner of the claims, who did the work, performed it without assistance of any kind, and assured me he "didn't need the mining expert to show him his business." He still believes that each exposure of quartz in his tunnels is on a separate vein.

MINER.

Personal.

W. W. WORTHING, Stockton, Cal., is president Bay State M. Co., Plymouth, Cal.

M. D. ROCHFORD, owner of the Pinkham mine of Chloride, Ariz., is in San Francisco.

CHESTER BRADLEY of Wyoming has been appointed U. S. Collector at the port of Manila.

MGR. SPENCE of the Humming Bird mine at Paris, Idaho, has returned from an Eastern trip.

CAPT. THOS. MEIN leaves San Francisco next week on an Alaskan trip to Douglass Island.

T. A. RICKARD, State Geologist of Colorado, has returned to Denver after a short visit to Virginia City, Nev.

H. W. NELSON, Mgr. Goleta, Montecito and Sterling mines, Jordan, Mono Co., Cal., has returned from New York City.

E. W. MAYBRIGHT of Denver recently made a trip to properties in San Miguel county, Colo., in which he is interested.

S. W. TYLER of Denver, is making examination of mining properties in southern California for Butte, Montana, parties.

W. H. FERGUSON has been appointed Supt. of the Ridenour mines in Mojave county, Arizona, and J. S. McDonald foreman.

E. H. BENJAMIN, Secy. Cal. State Miners' Association, is in Los Angeles attending the Southern Cal. Miners' Convention.

I. S. FOORMAN, Sec. Mokelumne & Campo Seco, Cal., M. & M. Co., has returned from San Andreas, Cal., to San Francisco.

EDWARD S. GREEN has been elected a director of the Boston & Montana M. Co. of Butte, Mont., succeeding the late Charles Van Brunt.

CHAS. G. YALE, U. S. Mint Statistician, has gone to Los Angeles, Cal., to attend today's meeting of the Southern Cal. Mining Convention.

D. R. OLIVER of the Mazeppa mine, Tuolumne Co., Cal., has returned from an extended trip through the mining districts of Sonora, Mexico.

F. ZEITLER, for several years Supt. of the Champion mine at Nevada City, Cal., was re-elected to fill that position at the recent annual meeting of the company.

VICTOR C. HEIKES has been appointed Colorado's special agent of the department of mines and metallurgy for the United States to the Paris exposition of 1900.

ARTHUR P. DAVIS of the United States Geological Survey has been ordered to Panama as an expert to the commission authorized to investigate the Panama canal route.

CURTIS H. LINDLEY is at Kellogg, Idaho, where he is engaged in the preparation of the case of the Bunker Hill & Sullivan Co. vs. the Last Chance, which comes up in May.

W. W. OLDS, formerly of Custer City, South Dakota, will have charge of the 100-stamp mill now building for the Golden Gulch M. & M. Co., near Woodland Park, Colo.

G. F. TIMMS of Price, Utah, is in Washington, D. C., trying to secure from the Secretary of the Interior a lease of the gold and copper ledges on the Uintah Indian reservation.

SAMUEL NEWHOUSE, Pres., and Thos. Weir, Gen. Mgr., Utah Con. Co., Utah, have tendered their resignations. A representative of the copper trust has succeeded to the presidency.

C. E. FINNEY, recently Gen. Mgr. commercial department Con. Kansas City Smelting & Refining Co., on the 1st prox. assumes the position of Gen. Mgr. for M. Guggenheim's Sons, New York.

THOS. N. SMITH, for many years prominently connected with the Utica mine, Angels Camp, Cal., has resigned his position and will practice his profession of mining engineer in San Francisco.

A. SHIERHOLTZ, representing the Risdon Iron Works of San Francisco, is at Virginia City, Nevada, in connection with the installation of the second elevator in the C. & C. shaft, used in unwatering the deep levels of the Comstock.

A. M. ROBESON, late in charge of the Beers, S. A., diamond mines, will on the 1st prox. assume charge of the Alaska Mexican and Alaska United mines. As previously announced, J. P. Corbus will have charge of the Alaska-Treadwell mine.

DR. ROSSITER W. RAYMOND, Clarence King and Waldemar Lingren are at Rossland, B. C., in the interest of the Center Star (War Eagle) M. Co., in the litigation with the Iron Mask Co. Louis Janin, Frank D. Howe and Clayton Miller are also there representing the geological side of the Iron Mask Co.

ALEX STEWART, Gen. Mgr. of the Broken Hill Propritary Co., N. S. W., resigned his position April 1st to accept the management of the Chillagoe Railway & Mines, Ltd., but will remain in touch with the Broken Hill Co. as consulting engineer. Mr Delprat succeeds to the management of the Broken Hill Co.

VICTOR A. CLEMENT, who was formerly associated with John Hays Hammond in the Transvaal, has recently completed an examination of the Yellow Aster mines at Randsburg, Cal., and is locally credited with having concluded a deal by which these mines pass to Capt. DeLamar. The price is said to be $3,000,000.

FREDERICK J. TAGGART, librarian of the Mechanics' Institute of San Francisco, has gone to New York to negotiate with Chas. E. Tripler, who has a process for making liquid air, and also with Nikola Tesla, who has an invention by means of which he produces artificial sunlight, with the purpose of having them exhibit their inventions at the annual fair of the Institute in San Francisco, commencing Sept. 2nd.

Industrial Notes.

—There are 380 saw mills in California.

—San Luis Obispo, Cal., has voted to spend $116,000 on water works.

—The daily wages of Denver, Colo., carpenters has been advanced to $3.

—The Truckee & Tahoe, Cal., narrow-gauge road is to be built this season.

—Humboldt county, Nev., has sold 1,000,000 pounds wool, at 10 cents per pound.

—Humboldt, Cal., lumbermen have increased employes' wages from 10% to 15%.

—Stock is being subscribed for an electric road between Los Gatos and San Jose, Cal.

—California's total lumber output for '98 was 452,641,887 feet. Of this one-half was redwood.

—It cost the Colorado Midland Railroad Co. $75,000 to clear its tracks of snow during the recent blockade.

—The Utah & Pacific Railroad now runs from Salt Lake City, Utah, sixty miles west of Milford to Maderia.

—At Visalia, Cal., the Mount Whitney Power Company calculates power and light will be furnished on the 10th prox.

—A large jubilee celebration at San Pedro, Cal., on the 26th inst., marked the beginning of the work of making a harbor at that point.

—The Booth-Kelly Lumber Co. has bought a large tract of timber land near Coburg, Lane Co., Or., for $120,000, and proposes to build sixteen miles of railroad.

—Globe, Arizona, has granted a non-exclusive franchise to Martin & Brown, for building city water works. The water will be piped from a natural spring in the Pima mountains, eight miles distant.

—The Commonwealth Lumber Co., Buckley, Wash., has for capital stock "1,000,000 hours work, worth $1 each." One share is sold "for such commodities" as the company needs. The incorporators say they expect to make "a comfortable living" out of it.

—A company with $1,000,000 capital has been organized in New Jersey to be known as the Hallidie Wire Rope, Tramway & Cable Co. of Chicago. The incorporators and principal stockholders are A. S. Hallidie and G. T. Gaden of San Francisco and A. J. Warner of Chicago. The company will acquire the several Hallidie patents and manufacture wire and wire rope.

—At Blake's spur, near Huntington, Or., is the point of connection with the Short Line and the new Northwestern Railway, which is being built as quickly as money, men and material can do it. I. E. Blake, president of the railroad, is one of the owners of the Northwest Copper Co., Peacock, Helena and White Monument mines of the Seven Devils country. Twenty miles will be finished by June 15th.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING APRIL 18, 1899.

623,394.—HAY PRESS—F. V. Burner, Elko, Nev.
623,240.—VEHICLE WHEEL—A. E. ELLIOTT, Modesto, Cal.
623,210.—TOY—E. GIER, S. F.
623,366.—DISH DRAINER—Christine M. Halvorsen, Los Angeles, Cal.
623,211.—CAR COUPLING—G. C. Harlin, Stockton, Cal.
623,402.—WINDMILL—L. K. Hong, Parkland, Wash.
623,215.—STATION INDICATOR—Hunter & Gustafson, S. F.
623,484.—IRONING MACHINE—O. W. Lorbeer, Pomona, Cal.
623,179.—CULTIVATOR—R. Peet, Escondido, Cal.
623,428.—WIND WHEEL—O. Rubarts, Newport, Or.
623,436.—LATERN—J. W. Smith, Portland, Or.
623,439.—WATER FILTER—S. M. Suman, Riverside, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

VEHICLE WHEEL.—Arthur E. Elliot, Modesto, Cal. No. 623,240. Dated April 18, 1899. This invention relates to improvements in the construction of wheels which are designed for use upon vehicles, such as wagons, carriages, buggies or farming implements where such wheels are available. The object of the improvement is to provide wheels for vehicles in which will be found all the strength and rigidity of the middle wheel and its insensibility to the effect of expansion and contraction by moisture or heat, while at the same time the objection of inelasticity is overcome and the felloes can be adjusted with relation to the tire to keep it constantly tight. The wheel is provided with tubular metal spokes, a hub having radial sockets cast upon the inner ends of the spokes, an interior wooden bushing and metal axle box. Metallic tenons project from the outer ends of the spokes and the wooden felloes fit upon these with felly plates bored to fit over the tenons, bolts extending through the tire and the felly plates to lock them in place, and the felly plates have a flat inner surface against which the ends of the spokes abut. A screw-threaded sleeve or thimble fits the exterior of the screw-threaded nuts of the spoke and is turnable thereon to expand the felly and keep the tire tight.

The Genesis of Petroleum and Asphaltum in California.

NUMBER XIV.—CONCLUDED.

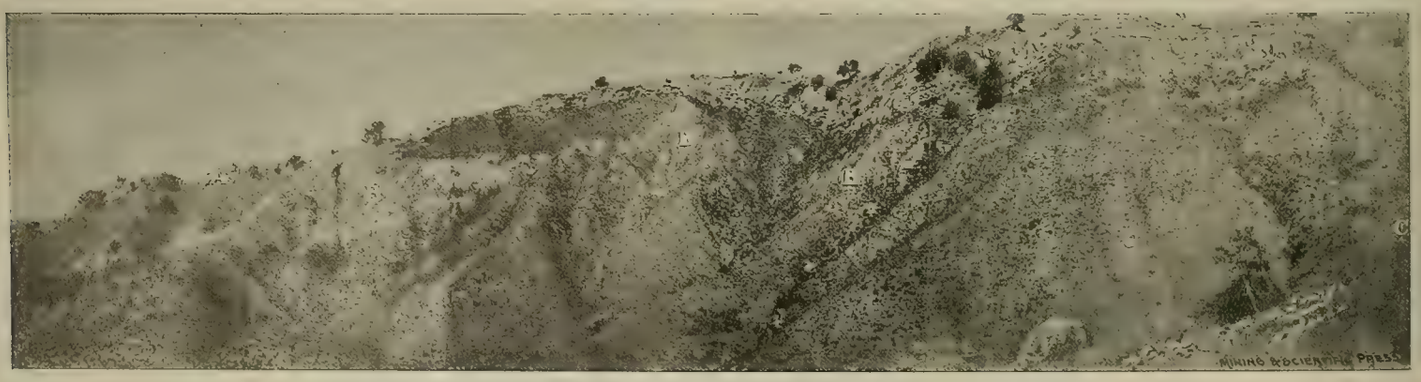
Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

The illustration herewith shows a formation lying east of Zaca creek, in the county of Santa Barbara, California. *A A A* is bituminized sand forming the south dip of an anticline; underlying the bituminous sand are bleached shales *B B B*, and below the shales are metamorphic rocks, quartzite and serpentine. At one point the metamorphic rock has closely approached the bituminized sand. At this point the bitumen has been removed from the sand and the sand is calcified and silicified. From the attending phenomena it would seem that these sands were bituminized before metamorphism reached them.

This sandstone when not reduced by erosion is nearly 300 feet in thickness and, like a mantle, covers a large part of the territory lying between the Santa Maria and Santa Ynez rivers, the Pacific ocean and the Alamo Pintado creek in Santa Barbara county, some 600 square miles. In the summit of the domes and in the dip of the anticlines which are farthest away from the mountains, which are higher than the summits of these anticlines, the sands are sometimes bituminized. Extending toward the northwest from the place shown in the cut are sands containing millions of tons of bitumen. These bituminized sands are very prominent, forming high bluffs. Throughout the area which this upper sand covers there are places where these sands are silicified, in others calcified.

On the south slope of the Santa Maria valley, and in some other places, these sands are uncemented and have been formed into sand hills through the shifting of the sands by water and the winds. Also scattered throughout this area there are a number of sulphur blows, mineral springs, and places where natural gas escapes in large quantities. On the slopes of Mount Salamon asphaltum is injected into the formation surrounding subsidences. Veins of asphaltum also occur on the Jonata rancho. White, leached shales and shales burned to various tints of red occur in large masses. The shales and sand stones in this area are fairly conformable.

On the Sisquoc river there is another exposed sand which is bituminized and which is geologically about 1000 feet lower than this upper sand, and is separated from it by a bed of shale. How thick this lower sand is cannot be positively determined, but judging from its exposures it must be over 300 feet thick. If this sand covers the same area as the upper sand, which it is reasonable to suppose that it does, there is no reason why it should not contain in its domes and the dips of its anticlines millions of tons of bitumen, which, on account of being excluded from the atmosphere, should be in the form of petroleum oil, and which could be obtained by the sinking of wells.



FORMATION LYING EAST OF ZACA CREEK, SANTA BARBARA COUNTY, CAL.

EDMUND DAVY first made acetylene from a compound produced during the manufacture of potassium from potassic tartrate and charcoal, which, under certain circumstances, yielded a black compound decomposable by water with considerable violence and the evolution of acetylene gas. This compound was afterwards investigated by Berzelius, who showed it to be carbide of potassium, and who also made the corresponding sodium compound, and showed that it evolved the same gas.—Australian Mining Journal.

THE London *Statist* compares recent annual reports of the Rio Tinto Copper Mining Co. and miscellaneous statistics for two years:

	1898.	*1897.*
Ores on hand	£671,668	£693,004
Pyrite sold, tons	544,518	575,733
Pyrite treated, tons	820 882	812 293
Copper produced, tons	20,426	20,826
Average price copper	£51-16	£49-2
Development account	167,473	181,113

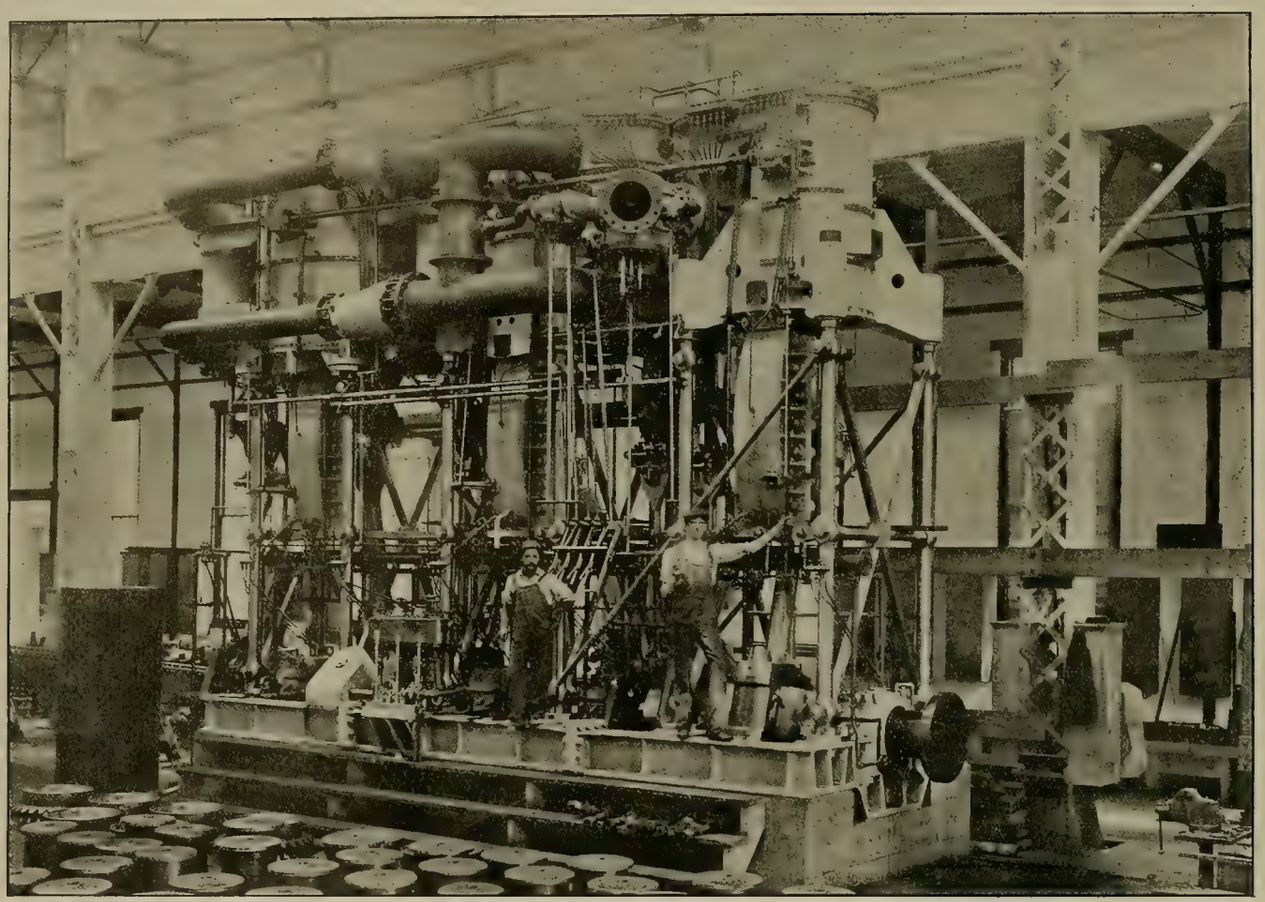
One of a Battleship's Engines.

(*Continued from page 453.*)

guns, and will also carry four torpedo tubes. The arc of fire of the 13-inch guns is about 135° on each side of the center line. Diagonal armor 12 inches thick connects the belt armor and barbettes and extend from the slopes of the protective deck to the top of the side belt on both sides.

The Wisconsin will be ready to turn over to the Government after her trial trip, about Jan. 1st, 1900. She embodies all the electrical features that have been experimentally tried in the older vessels. Her electrical equipment consists of an incandescent lighting system, four large searchlights, apparatus for the operation of two large turrets, electrical ammunition hoists and powerful electrically-propelled fans for the elaborate ventilating system.

For purposes of comparison is also presented herewith an engraving of one of the triple-expansion engines of the battleship Illinois, a shop view taken at Newport News. Both vessels are substantially alike. So far as known this is the first publication of pictures of these two great war machines now building for the U. S. Government, one on the Pacific and the other on the Atlantic shore.



ONE OF THE TRIPLE-EXPANSION ENGINES OF THE U. S. BATTLESHIP ILLINOIS.

Mining Summary.

ARIZONA.

The Tennessee mine at Chloride is reported to have 12 feet of ore at the bottom of a 250-foot shaft.

On the Merrimac at Chloride a crosscut is being run on the 350 level. The company is thinking of putting in a concentrating plant. Mr. Hilty is Supt.

The Great Lead, near the Tennessee at Chloride, has good ore. Parties are figuring to purchase this mine. It is a large vein, carrying 50 ounces of silver and 60% lead.

W. C. Bishop, on a claim on Stockton Hill, at a depth of 30 feet found a small stringer of ore which gradually widened to 4 feet of ore.

It is reported that the Crowned King mine, in the Bradshaw mountains, southeast of Prescott, has a shoot of ore 145 feet long and 10 inches thick, in which the ore is chiefly zinc sulphide and very rich in gold. The mine is extensively developed and has other ore shoots. It has been worked for more than twelve years.

Phœnix *Herald*: Ten of the stamps of the mill on the Bonanza mine at Harqua Hala are to be shipped to Australia by the company that has been operating the property.

Kingman *Miner*: The St. Charles Bros. have bonded the Midnight mine, near Chloride. A shaft will be sunk on the property 200 feet.

Prescott *Journal-Miner*: The Sterling M. & M. Co. has been incorporated to operate the Sterling mine on Big Bug. It is composed of Eastern men.——A mining claim has been located on the outskirts of Prescott by a miner from Nevada. He found some good looking float, followed up the indications discovered and located the ledge; the ore shows free gold.——The Garcia mine near Wickenburg, which has been closed for some time, will be started again. The shaft is down 400 feet and there is a good grade of free ore in the lower drift. Thirty-five men will be employed. New claims are being located in that section.

Prescott *Courier*: Supt. Douglass of the Senator mine is putting in a station 600 feet from the surface, 2400 feet from the mouth of the tunnel, to sink 200 feet deeper.

Tucson *Star*: The deed has passed transferring the Cobrige copper mine from A. Spencer to Huntington & Wellbye; consideration $8000.

Mining Reporter: An important mining district is being opened along the boundary line between Utah and Arizona at Buckskin, Mount Trumbull and Grand Gulch.

Bisbee *Orb*: Bisbee is excited by the discovery of gold-bearing quartz seven miles below town in the main canyon. One group of claims has been located by J. Huber, who has begun work. The quartz is decomposed and iron-stained and shows free gold.

CALIFORNIA.

Amador.

Sutter Creek *Record*: The 900 station in the Lincoln mine, near Sutter Creek, has been completed. The west crosscut from the north drift on the 500 is nearing the ore channel. This is 200 feet farther north and 200 feet deeper than the old workings.——After a long idleness, the Voorheis chlorination works at Sutter Creek will resume operations.

Butte.

Electric power for operating dredges near Oroville is being discussed; it is expected that the Butte County Electric Power & Lighting Co., recently incorporated, will supply this power.

Oroville *Mercury*: The Oroville Water Co. is making additions to the water system, which will supply a great deal more water than is needed at the present time. On the upper end of the main Miocene ditch thirty-five men, under E. H. Bickford, are cleaning the ditch, which has not been cleaned since '90. Seven miles have been cleaned and three miles remain. The lower end was cleaned and repaired last winter. Twenty men are working on the side line known as the Morgan ditch.——Mining in Big bend is increasing and new claims are taken up and being worked in Shield's gulch.——C. Waldeyer, Supt. Buchanan Hill mine, has two shifts driving the tunnel through bedrock and expects to strike the channel in about a month.

Oroville *Register*: A dozen men are employed in the Golden Trout mine, near Mooretown, and the force is to be increased.——At the Cayot mine, on Fall river, twelve men are employed.——B. G. McLain of Magalia, Supt. for a company of San Francisco capitalists, is erecting a hydraulic elevator, at a cost of $20,000, near Cherokee, to work tailings from the old Cherokee mine. Work will begin at the falls and go down stream. They will employ twenty men and 600 inches of water used to run machinery.

Calaveras.

The Kings Co. purchasers of the Bruner mine at Angels have made the first payment of $5000 on their bond.

Jackson *Republican*: V. S. Garbarini, Supt. Sheep Ranch mine, reports 150 feet of the shaft retimbered and as much more remains to be retimbered before the water level is reached. The Pioche tunnel taps the shaft at the 300 level. Within the next six weeks everything will be in readiness to hoist water. Seventy-five thousand brick are to be burned, the brick to be used to set the battery of three boilers. New machinery to sink the shaft 2500 feet deep is at Valley Springs.

San Andreas *Citizen*: It is reported that the Josephine and Black Wonder mines, near Blue mountains, ten miles from West Point, are to be opened. F. Greve is the owner.——There are employed 105 men at the Melones mine, near Robinson's Ferry. It is said that 2,800,000 feet of lumber will be required for the construction of the mill.

San Andreas *Citizen*: W. H. Clary, formerly Supt. of the Sheep Ranch mine, has a bond on the Flamm mine, near San Andreas, and will develop it.——The Satellite mine at Campo Seco, owned by J. K. Harmon of Chicago, employs thirty men. It has been idle seven years. A forty-ton water jacket furnace is being erected under the direction of Mr. Fowler of Denver, Col. Mr. Randall is Supt. of mining operations. O. Borger is working half a dozen men on an extension of this property.

El Dorado.

W. S. Graham is surveying the Ralston Divide drift mine, owned by a French company, located twenty miles above Michigan Bluff. Men are getting out timber for additional buildings.

Inyo.

The Rip Rap mine, near the Jo Walker mine, is being reopened by G. H. Smith and others of Pasadena, Cal.

Los Angeles *Mining Review*: Kitchline & Walker of El Paso district have put up a cyanide plant at Old Coso, near Darwin, where they bought 4000 tons of tailings which had been run through arrastras. The tailings will run $10 per ton.

Randsburg *Miner*: The P. D. Q. Cyanide Co. have about 10,000 tons of tailings, thirty miles east of Independence, and will put up a large plant at that place. There are several other lots of tailings in that neighborhood which they expect to work.

Kern.

It is reported that the Yellow Aster mines at Randsburg will be transferred to a French syndicate represented by Captain DeLamar, the consideration being $3,000,000.

Porterville *Enterprise*: J. L. Hooper is preparing to work the Big Blue tailings.——The tailings from the Harley mill are being treated by the cyanide process.

Los Angeles *Mining Review*: D. Hirschfeld of Bakersfield, who is working claims seven miles west of Randsburg, has ore enough on the dumps and in the mines to keep five stamps running many months.——At the Hard Cash mine, west of Randsburg, a force of men is taking out ore, which is treated in the dry concentrator.——It is reported that the Butte property has been sold to the Little Butte Co. and that the latter are negotiating for the wells and water owned by the Johannesburg Water & Townsite Co. If successful in the above deals they will put up a 15-stamp mill at the mines, in Randsburg, or at the pumping station in Johannesburg.—— The Good Hope people, who bought the Eureka 2-stamp mill, are keeping it running day and night. This mine will make a record this year.——The Johannesburg mill is running five stamps on ore from the Butte dump, and the other five on ore from beyond Garden Station. This latter is base and the tailings will be cyanided. The cyanide plant has made its first big cleanup.

Randsburg *Miner*: Woods & Waite, owners of the gravel diggings near St. Elmo, are having fifty tons crushed at the Barstow mill. A second shaft is being sunk. Other parties are getting good prospects. Some gravels assayed $40 per ton.——C. C. Boles, who has been leasing on the Minnehaha, had five tons of ore crushed at the Red Dog mill which returned $300.

Los Angeles.

It is reported a milling gold vein has been found in the San Gabriel mountains, northeast of Pasadena.

Madera.

(Special Correspondence).—There are some small high-grade veins in granite near Grub gulch which warrant development. Most of them have some development. There are also some good prospects on Potter ridge and near Coarse Gold. The ores are quartz, carrying free gold and auriferous iron sulphides. Galena also is found.

Coarse Gold, April 20th, '99.

Mariposa.

Sonora *Democrat*: The Copper King mine near Mariposa has been bonded to C. K. Thorburn of Sonora. There is a 65-foot shaft and a 60-foot tunnel on the prospect.

Nevada.

The Orleans M. Co. at Grass Valley has decided to resume operations. C. H. Brockington is Supt.

Auburn *Republican*: W. D. Pinkston is preparing to build a 20-stamp mill on the St. Patrick claim at Washington. The mill is from the Taylor mine, near Greenwood, El Dorado Co. Mr. Pinkston has a 90-foot ledge of low-grade ore.

Placer.

Colfax *Sentinel*: Supt. Felix Chappellet, Jr., at the Eureka Con. drift gravel mine, is drifting to drain the channel struck in the upraise. They expect to reach it in a few days. The Eureka, when opened, will employ 300 men. The company owns six miles of channel. ——During the heavy storms in March the pumps at the Herman mine near Deadwood were not able to handle the water and the shaft was filled. The new pumps will have sufficient capacity. Tunnel No. 5 cut the ledge at 1308 feet. A drift has been run south on the ledge 45 feet.——The Blue Canyon M. & D. Co. have their Azalea tunnel in 1430 feet. This tunnel is being run for a gravel channel. Quartz veins have been struck in the tunnel through the bedrock.

Auburn *Republican*: At Whisky Diggings, near Lincoln, the day shift in the copper mine, located near that place, took out $1500 worth of copper ore in one day recently.

Riverside.

San Bernardino *Sun*: The Virginia Dale mines, which were "jumped" on New Year's morning, will be held by the original owners. Judge Oster rendered a decision recently against the new claimants on two counts: First, the evidence shows that the owners of the property in '98 did $100 worth of work; and, second, that the claim jumpers did not make their title good, for the reason that they did not complete the location as required by law, and do the requisite work within sixty days from the date of the first location notice.

San Bernardino.

(Special Correspondence).—The Alvord gold mines, twenty-three miles northeast of Daggett, are being gotten in shape, under the direction of Gardner H. Smith of Pasadena. The property comprises a group of claims on a zone of calcite 200 to 600 feet wide, in which occur large masses of limonite. The iron and calcite are gold bearing. There are several thousand feet of development on the property.

Daggett, April 23d, '99.

Harrison & Godsmark, the owners of the Radcliffe mine in the Panamint range, are arranging to add five stamps to the ten in their mill. They have put up a cyanide plant. The mill is 4000 feet distant and 1700 feet below the shaft of the mine, and the ore is carried by tramway.

Ten miles southeast of Kramer three prospectors—Duncan, Clarke & Goldsberry—report a ledge 180 feet wide traced for half a mile, containing free-milling gold. The miners found it by dry-washing the lateral gulches leading to it and sinking a shaft 52 feet.

San Diego.

It is reported that S. Black of San Diego has found rich gold ore in his claim at Mesa Grande. There are several partially developed locations in the Mesa Grande district, and some rich quartz has been found at various times, but no systematic work has ever been done. The Shenandoah, one of the most important, was equipped with a 5-stamp mill. The district is a northwesterly extension of the Julian-Banner belt. The formation is chiefly mica schist, with numerous veins of coarse granite, in which black, green and red tourmalines occur, and in some localities also violet-colored lepidolite.

Shasta.

At Bragdon Moore & Nordstrom are reported to have made an improvement in catching both fine gold and black sand. "New Brussels carpet is laid in two 12-foot sluice boxes, laid at 7 inches grade to 12 feet, and a strong head of water run. Near the lower end of the lower box is a ½-inch undercurrent cut across the full width of the box and covered with fine wire screen, and the undercurrent box is laid with common grain sacks. The carpet in the two boxes catch all the gold and a little black sand. The undercurrent box catches the black sand by sweeping it off three to four times per day; if allowed to go too long without cleaning, the sand cakes and it does not save it at all."

It is locally suggested to bond the townsite of Shasta for mining the ground on which it stands. It is a remnant of placer ground left undisturbed since early days.

Shasta *Free Press*: H. C. Woodrow has been investigating the Bacchus, Trinity and the Butler mine on Dog creek and has shipped a car of ore from the Bacchus to the Keswick smelter.——It is reported that the Trinity mine is to be opened by the Bank of Shasta county.

Shasta *Courier*: A strike was made recently in the Capitol mine near Shasta, owned by Sheriff Behrens. In sinking, a 2-foot vein of free-gold rock going $60 per ton was found.

Siskiyou.

Yreka *Journal*: Baker & Co., who bonded the Gumboot quartz mine at Scott river, are finding good quartz in prospecting.——The Greenhorn Blue Gravel mine continues to yield handsomely; the ground now worked seems the richest yet found.——At the Rostel & Nehrbass ground, at Greenhorn, new machinery will be put in to get to bedrock.——C. V. Herman has discovered chrome ore in his land on Yreka Flats, west of town, a few feet from the surface. An assay of the chrome ore a few years ago returned $12 in gold and $3 in silver to the ton.——Austin & Co. are finding good pay on Yreka Flats; also more water for pumping into the sluices.

Yreka *News*: The Commodore mine, thirteen miles northeast of Scott's Bar, is running night and day, and good ore is being crushed.

Yreka *Journal*: The ledge in the New Klondike district on the Scott Valley road, three miles south of Yreka, is 40 feet wide, but is opened only by shallow cuts.——The Greenhorn Blue Gravel mine since working north in the claim under John Garvey has produced $12,000.——In Little Humbug there is a good supply of water and B. B. Jackson, Rider & Fabricius, Everson Rider and others are sluicing pay gravel.——Austin & Co. are taking out pay drifting their claim on Yreka Flats.——The new mill at the Cape mine on Greenhorn creek will be ready in three weeks.

Del Norte *Record*: There is unusual activity in mining in Happy Camp.——A body of ore has been found in one of the old crosscuts of the Union copper mine at Low Divide. It is 4 feet in width.

Trinity.

Redding *Democrat*: The Copper Queen mine, situated three miles east of Carrville, and owned by Baker, Vollmers and Dimmick of Trinity Center and E. Ellery of Redding has been sold to Napa capitalists. The new owners will erect a 40-ton smelter.

Redding *Searchlight*: H. Brown of the Bank of Napa and Schuppert & Buckman, also of Napa, owners of the Old Spanish mine, have bought the Copper Queen, five miles from Trinity Center and one mile east of Carrville. They will put in a forty-ton smelter.

Tuolumne.

Sonora *Democrat*: A tunnel has been driven 80 feet on the Black Horse, near Coulterville, cutting a 6½-foot ledge.——A carload of high-grade ore from the Densmore, near Sonora, has been shipped to Selby.——The Pedro Bros. have another pocket from their Bald Mountain claim. This time it was $1000, one specimen weighing twenty-nine ounces. Ore is being hauled daily from the Vine Spring mine, near Columbia, for shipment to Selby. ——At the Buckeye, near Coulterville, a shaft is being sunk on a 2-foot vein that it is reported will mill $80 per ton. The mine has a steam hoist and 4-stamp mill.——Work has begun on the Gerrymander at Sonora with three shifts. The shaft will be sunk 200 feet deeper.——A concentrator has been placed in the mill at the Temescal mine, near Sonora. In the past the sulphurets, which are high grade, have been wasted.——Sinking has been resumed in the Black Oak shaft, near Soulsbyville, now down 750 feet. It will be sunk 100 feet deeper, where a station will be put in and the eleventh level established. Two 10-inch pumps keep the workings free from water with a five-to-the-minute stroke.

Sonora *Independent*: J. Long has sold his mine to the Good Luck M. & M. Co., represented by Willey, Roderick & Greely of Monterey and Santa Cruz. The property is east of the Mammoth mine, near Jacksonville.——Fifteen tons of ore taken from the Vine Spring mine, near Columbia, will be shipped to Selby's Works.——The Densmore mine is reported shipping sulphurets to the same place. ——At the Anaconda mine, near Columbia, the shaft is down 104 feet and a level is being started. A survey for a tunnel has been made.——The Gerrymander mine at Sonora has started up with a force of ten men. The shaft will be sunk. J. Josephs is Supt.——Pumping is in progress at the San Guiseppi mine at Sonora under the superintendency of Dr. Drake. When the water has been removed development will begin.

COLORADO.

BOULDER COUNTY.

In crosscutting at the Mammoth another vein has been uncovered, 40 feet beyond the Black. It is mineralized and broken up.

Redding & Co., working the Freeland Extension, have found a rich free-gold streak near the surface in the first level west of the shaft.

The Amenda M. & M. Co. has taken a new lease and bond on the claims at Empire station, and a contract was let recently for 50 feet of crosscutting.

Representatives of the Princess of India tunnel, at Lawson, have big bodies of milling ore opened through the tunnel of the Monarch vein, and expect to lease the mill at Lawson.

The Cold Spring M. Co., recently incorporated to operate mines at Red Hoss mountain, it is reported, will build a large mill. The incorporators are Illinois men.

Ward *Miner*: The Hanna M. & M. Co. has secured the Gold Crystal mine, on Modoc hill. They will first sink the shaft 200 feet deeper. ——W. Barrett has given an option to the Ward Pyritic Smelter Co. on his Copper Glance group of four claims on Four-Mile creek, half a mile above Sunset.

CLEAR CREEK COUNTY.

Idaho Springs *Gazette*: The Seventy-Six M. & M. Co. has been incorporated for $50,000 to work the mine of that name near Dumont. The incorporators, with the exception of a local representative, are Chicago men. The mine is developed by a tunnel; a contract has been let to continue the tunnel.——Pease, Holladay & Co. have been developing the Nabob mine, on Silver creek near the Jo Reynolds, for years, and have ore in one of their drifts. They have opened it for 60 feet. The streak is from 4 to 6 inches thick.——The machinery at the Seven-Thirty mine, covered by the snowslide in February, has been uncovered and found uninjured. Forty men have gone to work in the mine.

Denver *Republican*: C. E. Stubbs of Denver has resumed in the Perkins tunnel at Idaho Springs. A contract is to be let.——G. Williams has found a mineral east of the shaft which is being sunk on the Teller lode. The pay streak shows sulphurets and is 3 feet wide. It is a surface pocket. Two feet of mineral has also been found on the west side of the shaft.

FREMONT COUNTY.

The owners of the Sentinel mine, at Dawson, near Canyon City, have a body of ore the gangue of which is streaked with pure copper.

A steam hoist is being installed on the Metallic King, Greenhorn district, near Canyon City. The ore shows copper and gold. The property is owned by a Galveston company.

GARFIELD COUNTY.

The Colorado Fuel & Iron Co. are to open the coal mines of Coal Basin and will build a narrow gauge railroad to the mines. Coke ovens will be built at Redstone.

GILPIN COUNTY.

Denver *Republican*: In March the Cook M. Co. shipped 2000 tons of ore, which produced 360 tons of concentrates; also 126 tons of smelting ore. During the same period the Concrete mine produced 1050 tons and in three weeks the Kansas-Burroughs Con. M. Co. shipped 2100 tons.——Sinking 100 feet at the Galena mine on Central hill is in progress, which will make it 650 feet deep. The property is owned by the Alpha G. M. Co. of Detroit, Mich.——The Cook and the Fisk mines on Bobtail hill are handling a good deal of water. In the former sinking is being carried on with three shifts, hoisting 250 buckets of water daily. The Fisk mine is working sixty men and its daily product is fifty tons of mill and smelting ore.——At the Queen of the West mine in Chase gulch three shifts are sinking and a depth of 685 feet has been reached. A cross vein was struck a few days ago in the shaft. The property is being worked by H. J. Stephens of Denver, the owner, who has done only development work this winter.

GUNNISON COUNTY.

Denver *Republican*: The Taylor Park M. Co., which had devoted itself to its placers, entered the lode mining field last fall and let a contract for 500 feet of tunnel on a lode at

the head of Tellurium creek. At the depth of 150 feet from the surface a large body of ore was found and a drift run 80 feet on the vein. The ore averages $65 per ton. The tunnel will cut the vein at greater depth and shipping will commence. Machinery is to be put on the property.——A rich strike is reported in the Napoleon of Pitkin district. A drift from the 300 level opened a 17-foot body of low-grade ore, and another drift at the 240 level has cut an 8-foot vein that will average 50% lead, 100 ounces silver and some gold.

HINSDALE COUNTY.

Lake City *Times*: C. C. Bruner, in charge of the Japanese group on Copper creek, in Burrows Park district, has a 7-inch streak of ore in a drift, an assay of which showed 500 ounces of silver, 1.5 ounces in gold and 7% in copper.

LAKE COUNTY.

The Home M. Co. of Leadville, which is pumping out the down-town mines, has reached the lower levels. Some properties are preparing to take out ore, and in the next month 500 more men will be at work in Leadville.

At the Moyer mine there is trouble over a reduction of wages on their trammers. They employ fifteen men in this capacity and have been paying $3 a day. This was reduced to $2.50. It is the same wages that most of the trammers in this camp are receiving. When notified they must accept $2.50 per day, they quit work. The Moyer resumed operations a year ago, and, after pumping out a large amount of water, began six months ago shipping regularly from 150 to 300 tons per day. Their product is low-grade silver ore. The places of the striking miners have been supplied with new men.

Leadville *Miner*: Mansfield Bros., working a sub-lease on the Crown Point, have opened in the third level a body of high-grade oxide iron 30 feet thick, besides a body of lead carbonates from 1 to 8 feet thick.

Leadville *Chronicle*: It is reported that the company which purchased the Colonel Sellers mine has a smelting scheme that will enable it to treat the zinc in its ores, which are associated with pyrite.

Leadville *Miner*: It is reported that a new ore body has been found in the Little Prince shaft of the Big Six on the north slope of Breece Hill. The shaft is to be enlarged and sunk deeper. This is the fourth important find recently made in that locality. The ore is gold bearing.——The Maid of Erin and Henriette mines at Leadville have been leased by D. H. Moffit et al. to S. D. Nicholson for ten years. The mines have been large producers. All the workings below the 300 level are flooded.

MINERAL COUNTY.

Creede *Candle*: The pumps and mill of the Co-operative mine at Creede are to be started. There are 40,000 tons of ore ready for treatment. Shipments will be increased.

MONTROSE COUNTY.

Uraconite, yellow sulphate of uranium, has been identified as one of the mineral species of Sierra La Sal. As the mineral is derived from the alteration of pitchblende, the Georgetown *Courier* thinks the discovery of the latter may be anticipated.

OURAY COUNTY.

Ouray *Herald*: In the Calliope mine, at the face of the tunnel, in 1500 feet, a new shaft is being sunk which is down 65 feet. An additional force will be put on. The vein is rich in wire silver.——The Sim Noel mine, a short distance from the Calliope, has a tunnel 100 feet and a 4-foot vein is being worked.

SAN JUAN COUNTY.

Silverton *Standard*: The Empire tunnel was started on April 1 last, and on April 15 had been driven 800 feet—a daily average of nearly 8 feet.——B. A. Taft will put a steam pump in at his Gem claim, at Bear Creek, and continue the shaft 20 feet deeper and drift on the lead, which shows petzite.——The Sampson mill produces three tons of concentrates daily.

The Red & Bonita Mountain G. & S. Co. has been developing the past two years and has opened up a number of veins, showing heavy bodies of low-grade ore. The property is owned in Quincy, Ill., and it has been decided to construct a mill. The contract for machinery was let to the Gates Iron Works of Chicago and the mill is to be ready in three months. The property has 3800 feet of tunnel and it is reported that there are 25,000 tons of ore in sight that will yield $15 per ton in gold, silver, copper and lead. The company has expended $50,000 in development and the 100-ton mill will cost $25,000.

SAN MIGUEL COUNTY.

Denver *Republican*: John Morton of New York, president of the Fortune M. Co. of Bridal Veil Basin, Telluride district, has gone to New York. The Fortune has been working a small force during the winter and as soon as Mr. Morton returns the force will be increased.

Telluride *Journal*: D. Martin has made a strike in the Silver Tip mine, near Ophir, the quartz showing gold.

Telluride *Examiner*: The Waterloo owners are arranging for a mill of twenty stamps. About 1500 tons of ore are on the dump. In the ground opened by the 700-foot tunnel and 112-foot shaft is a large ore supply.

SUMMIT COUNTY.

The high price of lead has had the effect of causing preparations to be made for working the lead-silver claims about Montezuma, many of which carry from 50% to 70%.

In Frisco the finding of veins carrying from one to ten ounces in gold has insured the permanency of the camp. Since the first of this month the mayor and council have sold lots, the proceeds to go into the town treasury for town improvement.

TELLER COUNTY.

The large air compressor in the new electric light plant at Goldfield is in operation and will supply water for drills used in mines belonging to the Smith-Moffat syndicate.

A strike is reported on the Mitchell lease on block 4 of the Orpha May No. 2 at Cripple Creek which at a depth of 40 feet 10 inches of ore was opened up which runs from two to twenty ounces. On the Keith and Grube lease adjoining a good vein has been opened.

Denver *Republican*: Gold hill is receiving more attention than for some time. C. Johnson has made a strike on the Half Moon of the Matoa Co. The International Gold King reports a find of sylvanite ore.——The Jerseyville Leasing Co. has the Grace Greenwood under lease and has an ore body 24 feet wide.——Two machine drills are now in use at the East Porter Gold King, a small compressor having been added to the plant by the new lessees. The first shipment from the Phillips lease on the same property is being prepared. At a depth of 60 feet they have an ore body 1 foot wide which carries sylvanite and free gold.——A strike on the Steelsmith lease on Findley is reported in the fifth or 400-foot level, where an ore body 4 feet wide has been cut, from which samples vary from $26 to $50 to the ton.——A shipment of smelting grade ore has been sent from the Elgin lease on the Republic of the Mary McKinney Co. Sinking is in progress, the present depth being 300 feet. A new level will be started at 325.——A good find has been made by Horan and associates, leasing on the Deadwood at Victor. Horan & Co. have worked this block for eighteen months without having found ore.——The Murphy mill, near Victor, is to be started up. Everything but the roaster will be in position.

IDAHO.

At Wallace A. B. Campbell has bought a three-sixteenths interest in the Sixteen to One group for $25,000.

The Lucky Boy mill at Custer, which had been closed during the winter, will soon start up.

Buffalo Camp is on the Bitter Root forest reserve and liquor dealers have been served by Forest Supt. Glendening to remove their stocks of goods from the reservation within twenty days.

At Wardner the Miners' Union demand that the Bunker Hill & Sullivan Co., employing 300 men, advance wages to $3.50 all around and recognize the union. The company is paying $3 and $2.50. The managers are willing to advance wages to $3.50 for miners and $3 for car men and shovelers, but will not recognize the union.

A company has been formed to run a long tunnel into the mountain on which the Big Buffalo group are situated. It will reach a point 2000 feet below the apex of the hill. The plans of the company include the installation of an air compressor and drills. Work is to begin as soon as the snow has gone. M. W. Musgrove is Mgr.

The Black Jack mine near Silver City has been shut down pending proposed unwatering of the property.

Boise *Statesman*: There is much controversy over the alleged depreciation of the Big Buffalo ore in depth. It is asserted that the report that values were falling off was circulated by the men holding the bond. The owners have since visited the mine and samples taken by them are claimed to show an increased richness of the ore with depth.

Cuprum *Standard*: A contract has been let by the Northwest Copper Co. to F. Algers for the sinking of a shaft on the Peacock mine 100 feet. F. Pierce is Supt. The shaft will be sunk on new ground in a cut run on the ledge from 30 to 40 feet wide and 30 feet deep. Ten men will work on eight-hour shifts.

Grangeville *Press*: The Dewey mine on the Clearwater has been bonded for $16,000.

MICHIGAN.

The following table gives the annual production of the Lake Superior copper mines in long tons since 1845:

Year.	*Tons*	*Year.*	*Tons.*
1845	12	1872	11,961
1846	26	1873	13,433
1847	213	1874	13,327
1848	461	1875	16,089
1849	673	1876	17,085
1850	672	1877	17,422
1851	770	1878	17,719
1852	792	1879	19,129
1853	1,297	1880	22,204
1854	1,819	1881	24,363
1855	2,593	1882	25,439
1856	3,666	1883	25,439
1857	4,255	1884	30 961
1858	4,088	1885	32,209
1859	3,985	1886	36,124
1860	5,388	1887	33,941
1861	6,713	1888	38,604
1862	6,165	1889	39,364
1863	5,797	1890	45,273
1864	5,576	1891	50,992
1865	6,410	1892	54,999
1866	6,138	1893	50,270
1867	7,824	1894	51,031
18 8	9,346	1895	57.737
1869	11,886	1896	64,073
1870	10,992	1897	64,858
1871	11,942	1898	78,014

Boston *News Bureau*: The strike is still on at the Tamarack-Osceola mills, near Houghton, and will continue unless employes are given 10% raise all around. Mills were started, but forced to close down at 3 o'clock on account of firemen quitting.——The Atlantic M. Co. has struck the Baltic lode on its section 16 and found it copper bearing. Explorations were begun many months ago on this property and a crosscut driven southeast in search of the lode. Atlantic drove the crosscut to the Baltic mine and the Baltic has since continued it.

MONTANA.

Dillon *Examiner*: The first carload of copper ore from the Goldsmith mine at Argenta has been shipped to Butte. The ore goes 25% in copper. French Bros. are operating the Goldsmith mine under a lease from W. A. Clark.

Helena *Independent*: At the Granite and Bimetallic mines more men are being added to the payroll.—The Watseka mine at Rochester is being reopened by leasers and new machinery being put in. A new shaft is to be sunk 400 feet.——The Clark mill will start up May 1st.

NEVADA.

The second elevator attachments below the 1850-foot level in the C. & C. shaft on the Comstock at Virginia City will be soon in operation. It is confidently expected that with this the water will be held at a point 130 feet below the 1750 level until the one in the other compartment is lowered 200 feet deeper. Mgr. Ross reports the elevator working steadily. His last report, dated the 27th, says:

"VIRGINIA, April 27th, '99.

"Elevator working steadily. Water in the 1750-foot level winze is 34 feet 4 inches below the station."

At the gold mining camp in Jumbo district, west of Mount Davidson, a 4-stamp mill operated by steam was built last fall near the Selby mine and has been in operation two months, crushing ore from the Selby mine. The place is called Selbyville.

The London mine, owned by R. Fulstone of Lovelock, has been opened by a 500-foot tunnel and a lot of ore is on the dump.

Twenty-five men are employed in mining and prospecting in the district.

At Pine Grove the Wilson Leaching Co., a Salt Lake concern, J. J. Blake Supt., has been operated a year, with a capacity of sixty-five tons of tailings daily. The plant consists of twelve steel tanks, twenty-five tons each. The ore is chiefly sulphurets.

At Pine Grove, Esmeralda county, the Wilson Leaching Co., under the superintendency of J. J. Blake, has been in operation a year with a capacity of working sixty-five tons per day.

The Virginia City Miners' Union has appointed Messrs. Mack, Young, Bravin, Fallon and Rodgers a committee to handle funds for the Home of Disabled Miners. All money contributed from that jurisdiction can be deposited in the Hibernia Bank of San Francisco. The sum of $12,923.80 has been collected already.

A Reno dispatch reports the purchase of a group of Pyramid Lake mining properties by a San Francisco mining engineer, acting for Eastern men, for $150,000.

Dayton *Times*: E. H. Dickie, of Unionville, will erect a leaching plant at Como for Logan & Hully. Mr. Dickie has tested the ore by his process, and believes he can get a high per cent of the values. He thinks he can cyanide considerable of the ore without crushing it.

Lovelock *Tribune*: George Lovelock reports that he has bonded his nickel and cobalt property in Churchill county to Los Angeles parties. They will expend $50,000 in development.

NEW MEXICO.

Santa Fe *New Mexican*: The Jarillas mining camp is in Otero county in a range of foot hills two miles wide and fifteen miles long. For twenty years it has been known that the Jarillas contained deposits of low-grade ore and that occasional specimens of high-grade gold ore and turquoise were found, but lack of fuel, water and transportation delayed development. Ffteen years ago $50,000 was spent in search of turquoise and high-grade ore, but was abandoned. Tiffany of New York, entirely abandoned the camp after spending a fortune. One claim upon which he spent $80,000 mining turquoise is now considered valuable for low-grade gold ore. It is known that the immense vein of trachyte in which he found small seams of turquoise yields about $4 per ton in gold and is considered a promising cyanide proposition.

Santa Fe *New Mexican*: A. M. Crosier at his claim, The Copper King of the Sacramentos, five miles from Alamogordo, has three carloads of ore on the dump, giving an average of 33⅓% in copper to the ton, with a trace of gold and silver. It is taken to Alamogordo on burros.——The Timber Peak M. Co. has started its new mill. It and the mine are lighted by electricity. A hundred men are employed at the mill and the mine.——A rich strike is reported from the old Graphite mine at Kelly, and the mill at that place will be put into operation.——The Camasair tunnel, near Elizabethtown, owned by Conly & Marcati, on Bitter creek, is in 514 feet. A number of leads 2 to 8 feet wide have been cut, also a large one of sulphide ore. Two shifts are at work.——The Fraser copper mines on Rio Hondo have been leased to a Montana syndicate for $100,000.——The Moreno Placer M. Co. has started operations.——Around Elizabethtown, mines idle for two years are being worked again, and new machinery is being placed in that district.

OREGON.

Baker City *Republican*: The Bonanza mine produces $20,000 to $30,000 monthly. For ten years it was a failure financially.

Baker City *Democrat*: A rich free gold ledge has been crosscut on the 500-foot level, south, in the Flagstaff mine, eight miles east of Baker City, and an 8-foot ledge of high-grade ore has been crosscut on the 200-foot level north from the discovery shaft.

SOUTH DAKOTA.

The new concentrating mill at the Bismarck mine, Keystone district, has started up. It has a capacity of 200 tons daily.

Wolframite is found in a 2-foot vein in the Durango and Harrison mines at Lead City, near the Homestake mine.

Deadwood *Pioneer-Times*: The American M. Co. will not do anything further in the Dacy shaft, at Ragged Top, until pumps are put in, as the water is coming in faster than the men can bail it. J. Medill is Supt.——A vein of ore has been found on the Agate group of claims belonging to O. W. Matson of Deadwood, situated on the divide between Blacktail gulch, Polo creek and Falsebottom. A force of men are sinking a shaft.

Keystone *Miner*: The Holy Terror Co. is putting in an air compressor and has commenced sinking 200 feet in the main shaft. When finished they will place at the bottom the largest pump in the Southern Hills.

Custer *Chronicle*: The Holy Terror Co. are adding to their plant.——The Tungsten mine, near Custer City, is again being worked. The shaft is down 110 feet.

UTAH.

Salt Lake *Tribune*: The controlling interest in the York properties at Bingham has passed to J. Chipman, it is reported, on a basis of $100,000 for the whole capital stock.——The syndicate by which 1,600,000 of the 2,000,000 shares of stock of the Dalton & Lark were recently tied up, has, it is reported, tied up the Antelope group, adjoining. It has been prospected to a depth of 600 feet. According to surveys that are being followed by the Bingham tunnel, the Antelope will be the first with which connection is made at a depth of 1300 feet.——Unexpectedly, the new shaft of the Showers Con., at Diamond, has cut the vein at a depth of 200 feet.——At the Cigale West Dip a stratum of dolomitic limestone, that had been recognized as the footwall, has developed into the most productive portion of the vein, free from refractory properties, which renders the roasting of the ores unnecessary. It has been prospected for 30 feet at several places upon its dip.——At the Gold Dust at Mercur, in the main workings, a breast of cinnabar is exposed.——P. T. Farnsworth of the Washington mine at Frisco is shipping high-grade ore to Salt Lake.——The Peruvian mine at Alta has found ore. Twenty-five men are employed in camp. Snow is still deep, and numerous shipments of ore are waiting for better roads.——It is reported $200,000 has been offered in Boston for the Montreal copper mine, near Milford. The property of the Cactus M. Co. at Frisco has also been bonded.——An Eastern party has gone to the Colorado river to investigate placer deposits.——The old Lehi mining district has been reorganized, with P. Evans as recorder.——At the Dragon iron mine, Tintic, M. Weir will commence sinking a three-compartment shaft 1000 feet.——There is reported at Richfield a rich strike in the Annie Laurie mine on the Senator Stewart claim of the Annie Laurie group. The tunnel on the Annie Laurie follows a vein of gold ore for 400 feet. The vein is 19 feet wide. The strike is in a cut running from the tunnel.——The machinery for the new smelter at the Apex mine near St. George has arrived. It has a 10 H. P. gasoline engine, and will produce about four tons of bullion a day.——In the Green Chloride mine, Camp Floyd district, milling ores have been found and a contract for another 100 feet of work will be let.——J. J. Daly has had a preliminary survey made for running a spur of the Union Pacific as far as the Ontario tunnel. Mr. Daly is also looking for a site for a sampler to handle ores from the Daly-West mine.——A new shaft is to be sunk on the Joe Bowers ground at Diamond, Tintic district. The present workings are on disputed ground.——C. Ford is superintending the construction of the new mill at the New Mammoth, Bingham. When the plant is in operation, Mr. Ford will leave for the property of the Idaho M. Co. in Idaho, where he will build a mill, and that completed will go to California, where he will make additions to the mill on the Ivanhoe mine near Plymouth.——The new hoist on the Congor at Bingham is completed. Three shifts were put on in the mine.——The retimbering of the shaft of the Blue Bird at Diamond, Tintic district, has been completed and sinking resumed.

WASHINGTON.

A shaft is to be started on the Sampson at Republic by Supt. Pearson. The vein is 5 feet wide, as shown by a number of openings.

The Young America, near Bossburg, is running all of its drills and the concentrator and employing thirty men.——The Bonanza is running a full force and is shipping two cars per day, under Supt. Hanley.——The Big Gold Bug at Bossburg has been sold to Tacoma parties.

Spokesman-Review: Supt. W. H. Brown of the Mountain Lion at Republic is planning to equip that mine with machinery, including a mill.——The tunnel on the Gold Leaf at Republic is to be extended by contract.——W. Lewis has gone to the Mammoth group on Whisky hill, with an additional force of men to put it in the shipping list.——The Palmer mountain tunnel, near Loomis, is in 1800 feet.——At the Golden Zone the concentrator is being built.——Work on the Spokane at Golden will begin in a few days.

FOREIGN.

AUSTRALIA.

Melbourne *Mining Standard*: Until recently the Broken Hill Proprietary had eight 120-ton smelters running, together with three 80-ton smelters. An additional 120-ton smelter has been blown in, and another of an equal capacity will be ready April 5th. As soon as the latter is in blast, it is intended to convert the three 80-ton into three 120-ton smelters.——The mines near Kalgoorlie are getting down into the sulphide zone, but no steps have been taken to treat any of this class of ore.——The problem of water supply for mining purposes is now solved. There is more water running to waste than is being used, and this will be increased when companies now starting at the south end of the field get fairly to work. One company is said to be wasting 150,000 gallons per day, and others up to 20,000 gallons.

London *Mining Journal*: The gold yield of Victoria for the past three months amounted to 184,908 ounces, an increase of 10,154.

BRITISH COLUMBIA.

Fort Steele *Prospector*: The Try Again mine, eight miles from Fort Steele, has been bonded by A. W. Bleasdell to Chas. Estmere, who rebonded to Spokane men for $10,000.

The claim has a 4-foot vein in a tunnel.——The Stemwinder mine in the Tracy Creek district, is reported to have 30 feet of pyrrhotite ore and the wall not reached. Galena also occurs.

Cœur d'Alene *Press*: A strike of copper ore is reported on the Highland King claim, assays going $211 in gold, silver and copper. It is on Diorite creek, twenty-eight miles from Fort Steele.——The shaft on the Mother Lode at Deadwood is down 215 feet; twenty-six men are employed.——The Old Ironsides, at Greenwood, has started its compressor, which runs ten drills, two hoists and three pumps. ——The first payment of $7000 has been made to Genzel, Wood & McDonnell on the bond on the Snowshoe in Greenwood, recently taken by J. W. Astley.——The water jackets for the Hall mines' smelter at Nelson have arrived. The lead furnace will be blown in, and there is enough ore on hand to keep it running six or eight weeks ——Eight men have been put on at the Ajax Fraction in the Slocan.——A new ledge has been struck on the Great Western, at Ymir, at a depth of 25 feet.——A shipment of ore from the Madison, in the Slocan, assays 572 ounces silver and $6 gold.——The upraise in the Evening Star, at Rossland, is in solid ore, which assays $40 to the ton.

Ashcroft *Journal*: S. Baker will work forty men on his West creek hydraulic mines, near the mouth of Cottonwood creek. M. Davis is foreman.

MEXICO.

A Durango dispatch says Warner Miller of New York has a ninety days' option on the Candelaria mine at San Dimas, owned by D. M. Burns of San Francisco. He agrees to pay $1,000,000 for the property.

The Mexican Esperenza G. M. Co., Ltd., of London, Eng., has allowed its bond on the Esperenza mines in the State of Toluca to go by default, after having paid $100,000 forfeit. The price to have been paid was $4,000,000 The company was organized for the particular purpose of buying and operating this property, but after deliberating at a recent meeting it was concluded not to take it up.

San Diego *Union*: President A. H. Butler and Manager M. S. Tweedie of the California & Oriental Steamship Co. have gone to Ensenada, accompanied by W. E. Webb, owner of the Tepustete iron mine at San Isidro, fifty miles south of Ensenada, Lower California. Butler and Tweedie visit the iron mine for the purpose of arriving at some conclusion concerning the probable amount of ore that can be loaded upon vessels within a given time for shipment to Japan by the steamers of the California & Oriental Co. through this port.

SOUTH AFRICA.

Johannesburg *Mining Journal*: Eighty additional stamps for the Robinson Deep are to arrive in April. The mortar frames are ready to be put in. The addition to the cyanide plant is progressing. One-third of the rock hoisted is sorted out as waste under present conditions.

THE KLONDIKE.

A lucrative business in Dawson is leasing thawing machines to work claims. One L. E Miller has an income therefrom of $250 per day.

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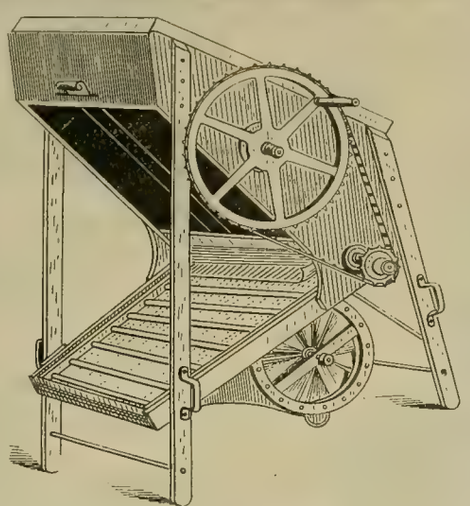

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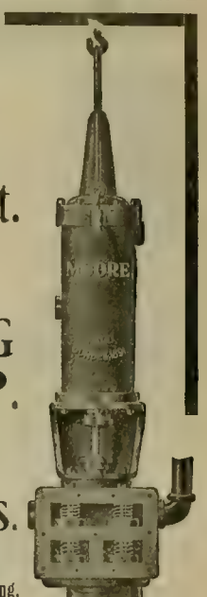

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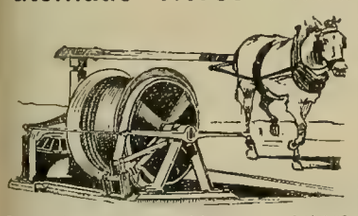

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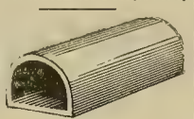

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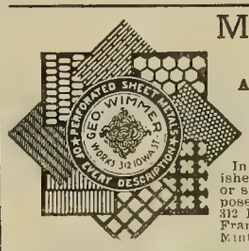

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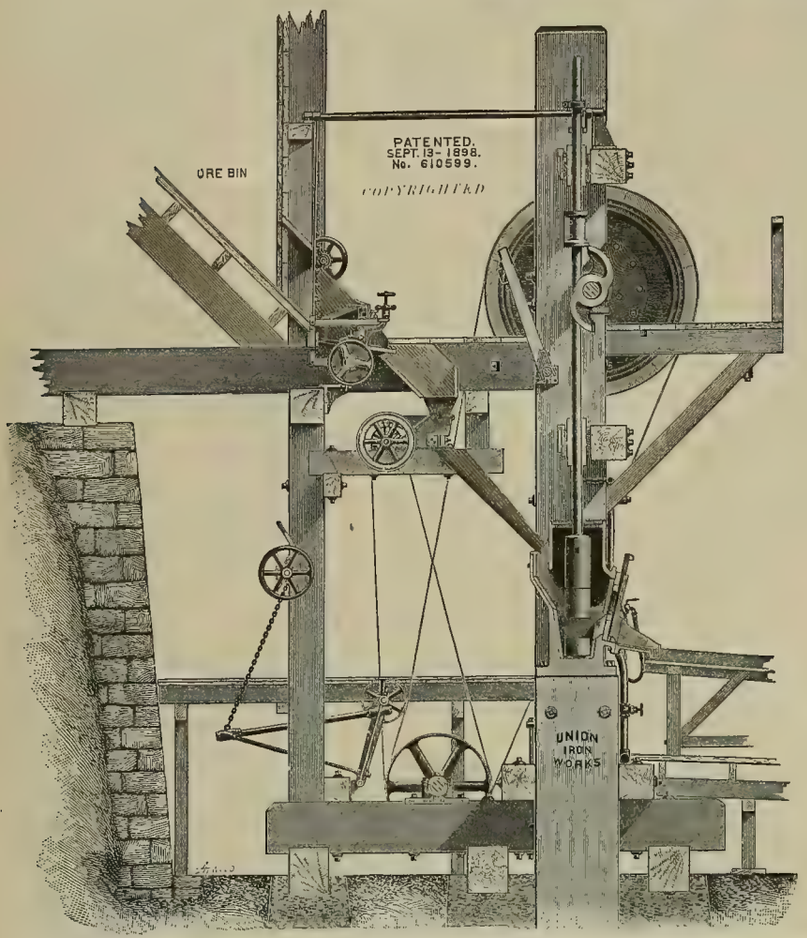

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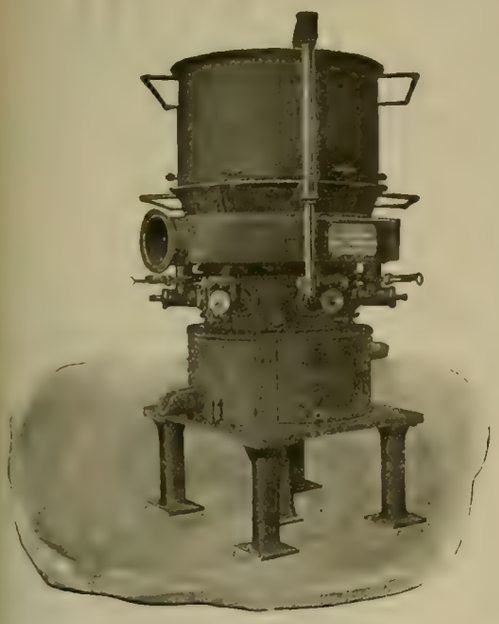

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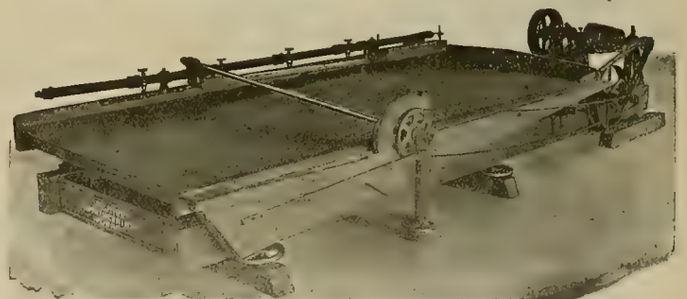

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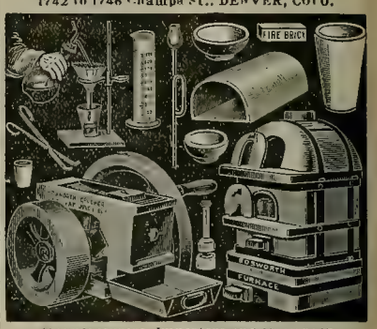

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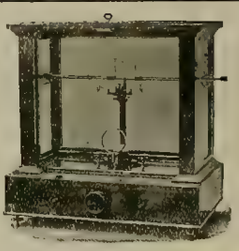

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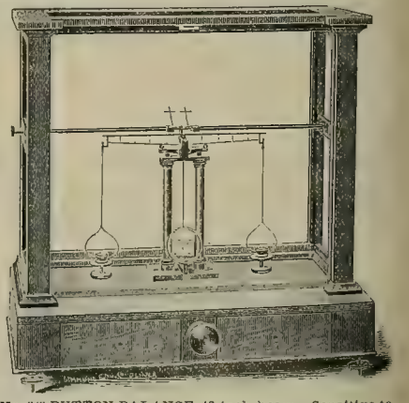

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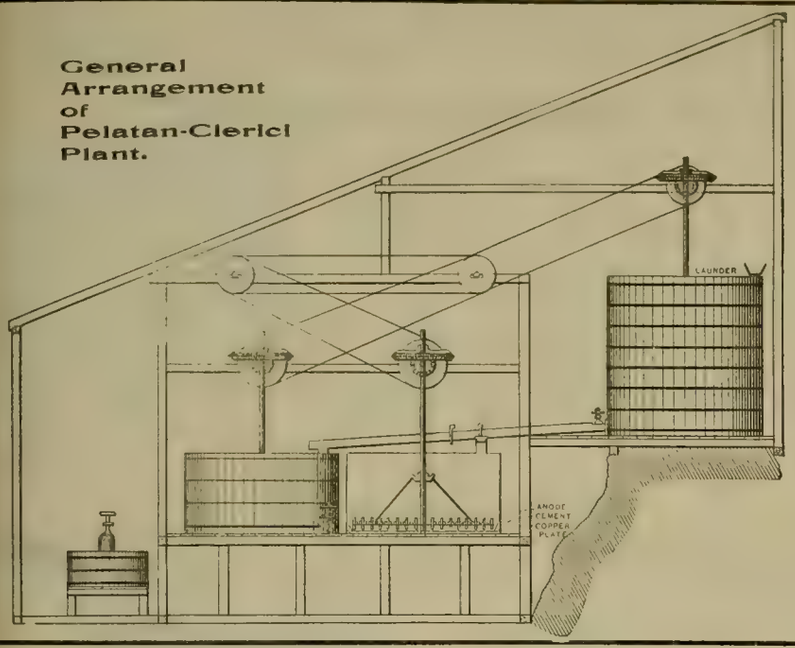

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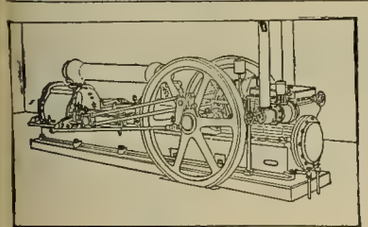

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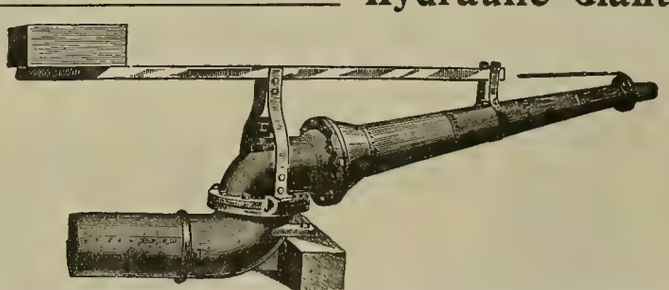

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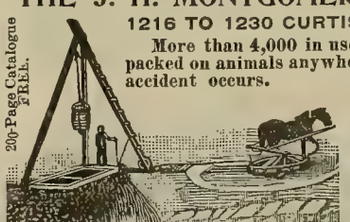

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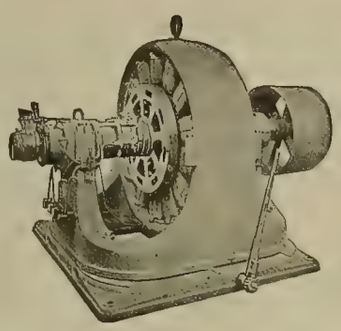

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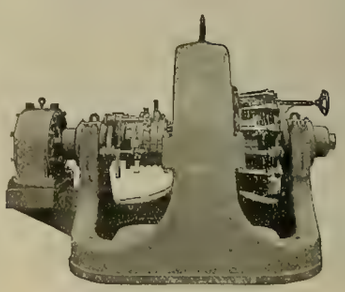

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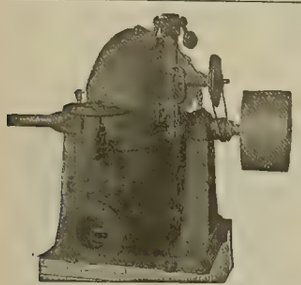

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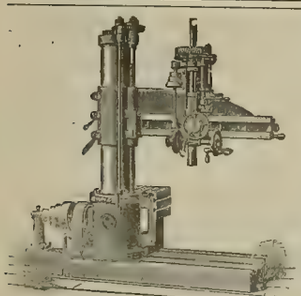

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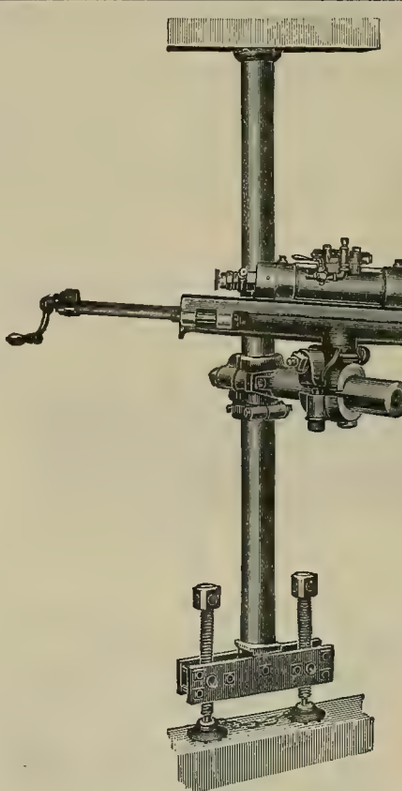

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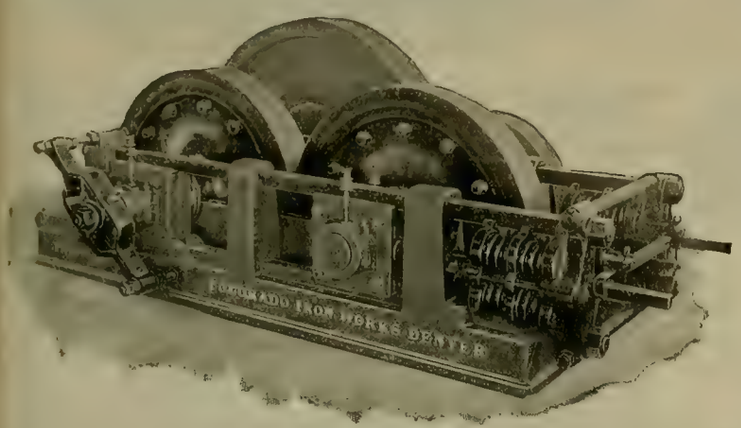

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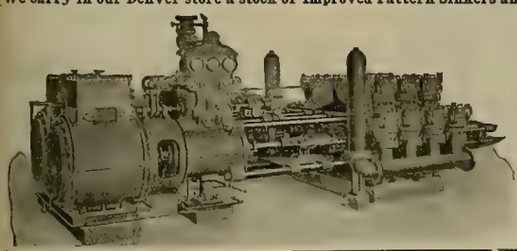

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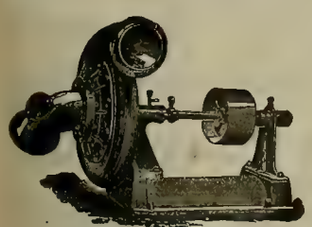

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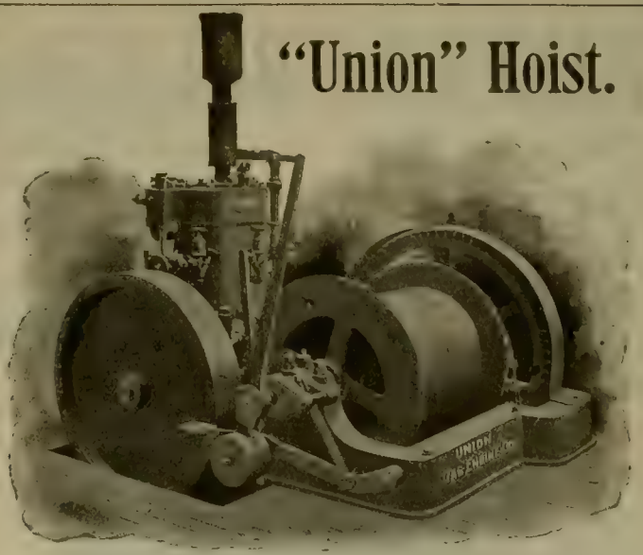

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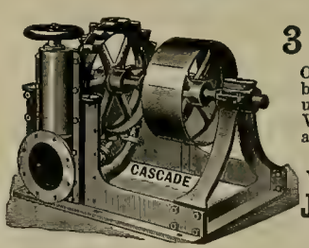

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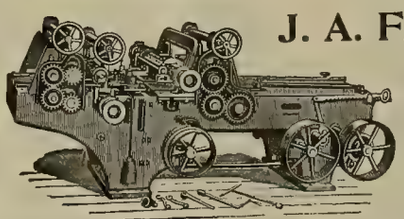

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The RATCHET or ROTATING DEVICE has never been broken.
Valve motion positive and designed for Air or Steam and will not freeze or stick.
Easily handled and works rapidly.

—— PRICES VERY REASONABLE. ——

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THE JACKSON HAND POWER ROCK DRILL.

NO JAR. EASY RUNNING. POWERFUL BLOW. RAPID STROKE.
Operated by One Man. Works in Any Rock or Position.

.....Write for Circulars and Testimonials to Your Hardware Dealer or to the Company.....

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Offices 1756 Larimer St. Box 1352. Denver, Colorado.
New York Office, 120 Liberty St. Cable Address: "Jack Drill," N. Y., ABC Code (4th Ed.) and Lieber.
WE ALSO DEAL IN GENERAL MINING MACHINERY AND SUPPLIES.

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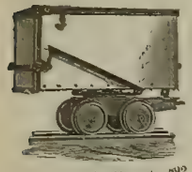

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AUTOMATIC ORE CARS,

— Made by —

THE TRUAX MFG. CO.,

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— Send for Catalogue. —

Patented: { ... 692,
Aug. 27, 1895.
July 19, 1898.
In Canada: June 21, 1898.

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SOLE MANUFACTURERS OF
Anti-Caloric Sectional Coverings and Blocks for Boilers.
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ANTI-CALORIC PLASTER.
The Best and Cheapest Insulating Plaster in the Market.
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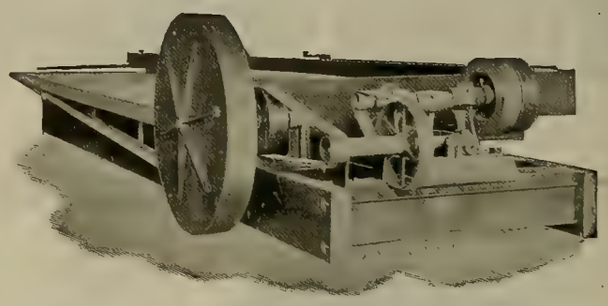
Constructing Engineers and Contractors,

OFFICE, 306 PINE STREET, - - SAN FRANCISCO, CAL.

Sole Pacific Coast Agents and Builders of the Celebrated

WILFLEY CONCENTRATOR.



The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

PRICE, $450, F. O. B., San Francisco.

One of these machines will take the place of two or three belt concentrators of any style and do very much better work.

We furnish superior Machinery and erect Stamp Mills, Hoisting and Pumping Works operated by Steam or Water Motors. Complete Concentrating and Smelting Plants for the concentration and recovery of gold, silver, copper and lead. Improved Power Drills and Air Compressors, Wire Rope Tramways, etc.

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Averaging some 700,000 H. P.

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Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

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HAVE REMOVED THEIR Machine Works TO 183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

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Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

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All sizes of Steel Water Pipe for City and Town Supply, Placer, Hydraulic and Quartz Mining. Cut, punched and rolled to be riveted at destination or made up complete.

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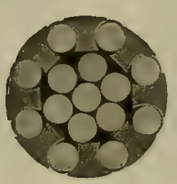
Bleichert Tramway of the Solvey Process Co., transporting rock.



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The Coeur d'Alene,
The Kootenai, . . .
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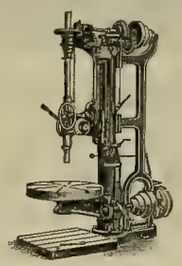
or—
E. C. WARD, General Agent, 630 Market St., San Francisco.



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Dredges and
Traction Dredges

Suitable for all kinds of **Excavating Work,** making a specialty of

PLACER MINING MACHINES,

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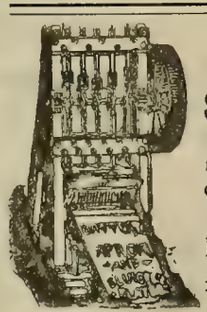

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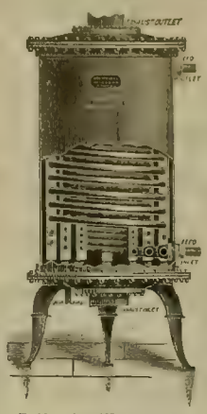

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CEMENT MACHINERY.

GATES ROCK & ORE BREAKERS
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We design complete plants and build all the machinery.

It is not necessary to divide orders for a modern cement mill.

We have the leading specialists in the country on our staff.

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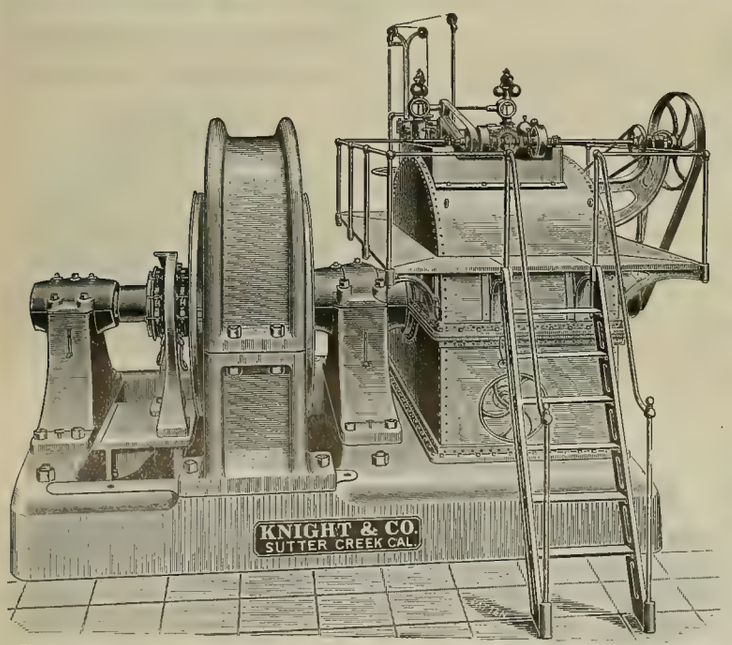

The accompanying cut shows the general arrangement of **The Knight Water Wheel**, direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**

WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.

Wheels for mill and reversible hoisting works a specialty.

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And Other Aquarious Chemical Solutions. OUR **FILTER PRESS** Removes all Slimes and Hastens the Deposition of the Metals.

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Stamp Mills

Of the Latest Improved Design for

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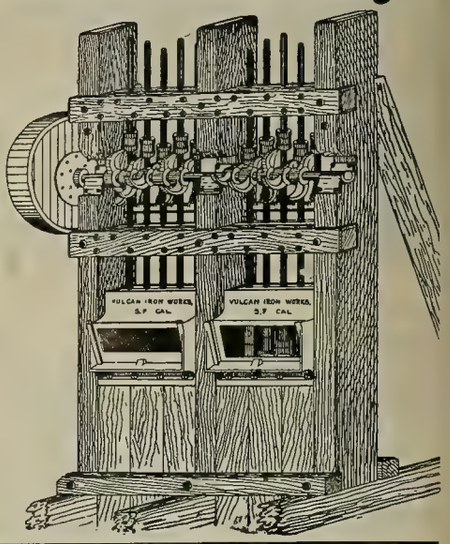

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For Conveying Ore, Etc.

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Office: 505 Mission Street, San Francisco, Cal.

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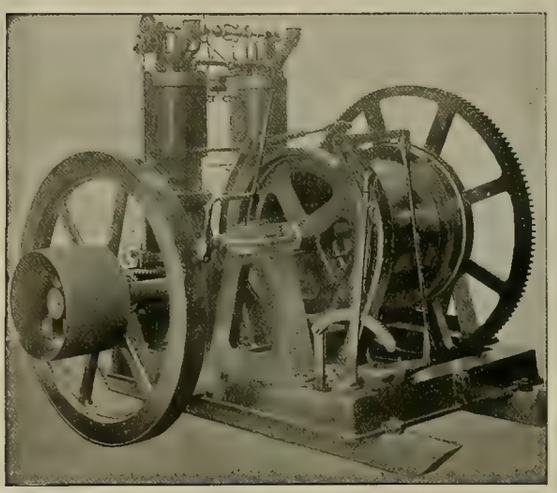

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Will Raise More Ore at Less Cost Than Any Other.

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Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

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TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS,** Brooklyn, N. Y.

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ENGINES { "Oil City" Stationary, "Bates" Corliss, "Oil City" Gasoline.

AIR COMPRESSORS.

Shafting, Belting, Pulleys, Hangers, Boxes, Etc.

THE MACHINERY & ELECTRICAL CO., 351-353 N. Main St., Los Angeles, Cal.

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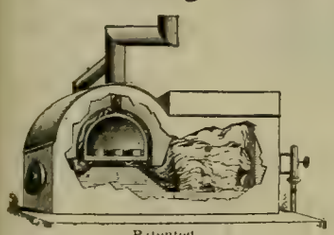

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FURNACES, MUFFLES, CRUCIBLES, GASOLINE TANKS, CHEMICAL GLASSWARE, FINE BALANCES, DIOXIDE SODIUM, ZINC SHAVINGS, C. P. TEST LEAD, BORAX GLASS,

Headquarters for C. P. Cyanide Potash--98-99 Per Cent.

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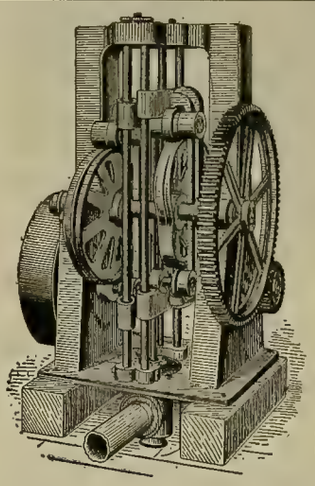

Our 12-in. Duplex Deep Well Pump, 4 ft. 4 in. high, weighs 1000 lbs.

Our Triumph Duplex Deep Well Pump

differs from all others in these particulars: It throws a continuous, unbroken stream without pulsation, vibration, water hammer, air chamber, counter balance, or fly wheel. It has no dead centers or cranks. All work comes on the lift stroke, moving vertically on the center line. We need no anchor bolts with our pumps. Requires less power. Is a perfect pump.

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Lumber, Shingles, Shakes, R. R. Ties.

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Mining Timber and Plank for Arizona and Mexico Shipment.

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ATLAS ENGINES AND BOILERS.

HOISTING ENGINES.

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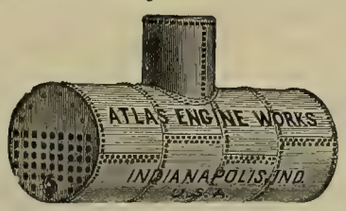

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We manufacture Water Pipe for

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IRRIGATION SUPPLIES OF ALL KINDS.

WELL CASING, OIL TANKS,

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General Sheet Iron Work.

Write to us for an estimate on your next job.

Lacy Manufacturing Co., Office, Room 4, Baker Block, LOS ANGELES.

RECEIVED FIRST PREMIUM.

THE MAIT DRY GOLD SAVER

Received first prize at Agricultural Fair 1897 in Los Angeles over some dozen competitors, and has been used in southern California in various mining districts with success. The materials used for the construction are of the best. It is well bolted (not nailed) and screwed together. The woodwork is of spruce and poplar; castings, iron and brass; linings, galvanized iron, heavy quality; riffle screen, No. 70 mesh, brass wire; hopper screen, ¾-inch mesh, well secured; fans, galvanized iron, neatly painted and well varnished. It can be easily taken apart and packed, convenient for shipping to any part of the country. If you are interested investigate by writing us for prices and our illustrated descriptive circulars. Address

WM. H. HOEGEE, 140 S. MAIN ST., LOS ANGELES, CAL.

Market Reports.

SAN FRANCISCO, April 27, 1899.

SILVER.—London, 29d; New York, 63¼; San Francisco, 61; Mexican Dollars, 49½@50. New York exchange, sight, 5; telegraphic, 7½ cents premium.

LEAD.—New York reports steady, $4.30 bid, $4.35 asked; brokers' price, $4.10.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 7c; bar, 7¼c.

COPPER.—New York reports Lake firm at $19.25; brokers' price, $19.21.

A Birmingham, England, dispatch of the 26th says: The enormous rise in the price of copper is playing havoc with the leading industries in the Midlands. At Kynochs batches of hundreds of men have been discharged since the rise in the price of the metal began, and now instead of 4000 men only 2000 are at work there. The Government has decided not to give any more orders for cartridge shells while the present prices prevail, and orders have been issued stopping all the work possible. The electrical fitting firms are also losing business for the same reason. Local, bar, 24½c per lb.

IRON.—American, soft, $22.50@24 50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Pig, 31c per lb.; Bar, 35c. New York reports firmer, $25.30 bid, $25.40 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $42.50; export, $38; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

RED LEAD AND LITHARGE.—One ton and over, at one purchase, 6½c; 500 lbs. and less than one ton, 6½c; less than 500 lbs., 7c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¼@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¾c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia)	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, April 27, 1899.

9:30 A. M. SESSION.

100 Andes	13c	200 Ophir	$1 30
200 Best & Belcher	62c	300 Sierra Nevada	$1 05
100 Challenge	36c	50 Standard	$2 75
400 C. Cal. & Va	$1 90	200 Union Con	53c
100 Justice	19c	800 Yellow Jacket	45c
500 Mexican	60c		

2:30 P. M. SESSION.

200 Ophir	$1 40	100 Yellow Jacket	49c
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500 Gould & Curry	43c	100 Utah	13c
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Recent Mining Incorporations.

Gold Ridge M. & M. Co., Sonora, Cal.; capital stock $500,000, subscribed $50,000; F. P. Otis, R. Inch, E. P. Troist, W. Jones.

Red Mountain M. M. & D. Co., Fresno, Cal.; capital stock $100,000, subscribed $50,000; T. E. Hughes, W. D. Foots, W. B. Tinnin, R. B. Butler, Fresno, directors.

Quail M. & M. Co., Sonora, Cal.; capital stock, $300,000; subscribed, $25; N. F. Pickle, A. Colby, R. McCraney, C. H. Teaff, J. C. Bunner.

Recently Declared Mining Dividends.

Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000; April 24.

Boston & Montana, regular quarterly dividend $4, extra $2; April 25.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from E. H. Adams in the Gold Bug Mine, near Clipper Mills, Butte Co., to deposit tailings in Grizzly Creek; from John McCollum in the Santa Rosa Placer Mine, in Mohawk Valley, Plumas Co., to deposit tailings in Sulphur Creek; and from the Plumas Development Co. in the Yankee Hill Mine, near La Porte, Plumas Co., to deposit tailings in St. Louis Ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on May 15, 1899, at 1:30 P. M.

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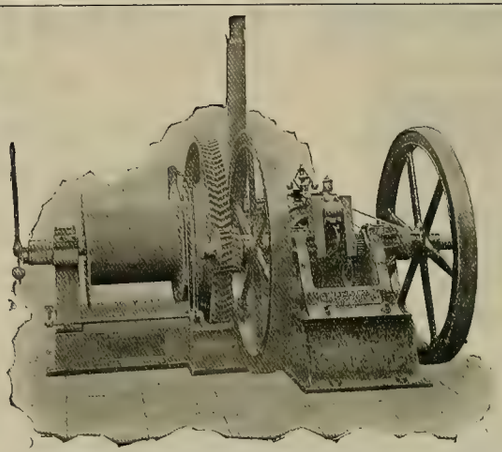

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CONSOLIDATED CALIFORNIA & VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the nineteenth day of April, 1899, an assessment (No. 13) of twenty-five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the twenty-fourth day of May, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the fourteenth day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3rd day of April, 1899, an assessment (No. 24) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of May, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 29th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of he corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of April, 1899, an assessment (No. 18) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 17th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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J. J. CRAWFORD, Secretary.

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MEETING NOTICE.

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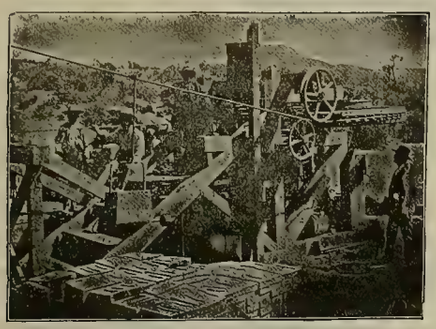

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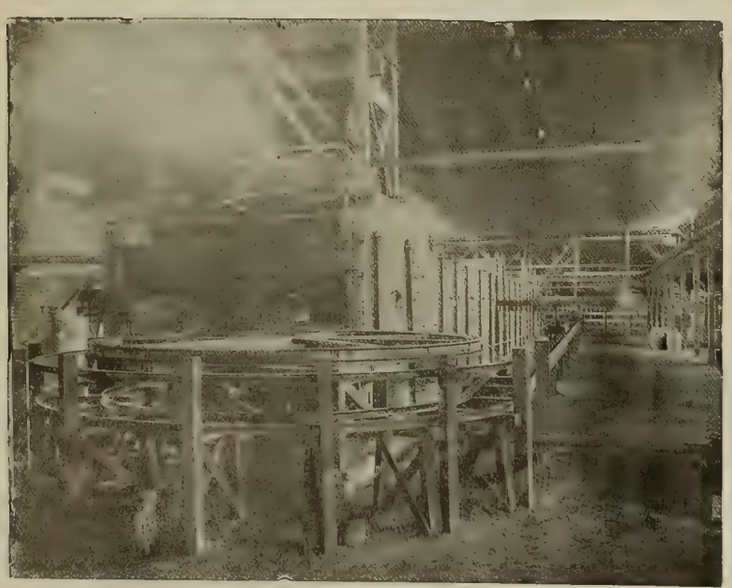

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The Genesis of Petroleum and Asphaltum in California.

An interesting series of articles, written by A. S. Cooper, State Mineralogist of California, was concluded in the issue of April 29th, '99. The subject has been exhaustively treated from a scientific and practical standpoint, and conveys a fund of valuable information. The existence of these peculiar mineral deposits has proven a great benefit to the cities of the Pacific coast. The origin of these deposits forms one of the most interesting subjects for study by the student of geology. The accompanying illustration is that of a bituminous rock quarry near Santa Cruz, Cal. The deposits lie almost horizontal, usually, though sometimes gently sloping or rolling, due to slight folding of the formation. Their edges are exposed along the steep hillsides. Usually they are found covered with light-colored shales or clay deposits which must be removed before the bituminous rock can be mined. No underground mining operations are carried on. It is cheaper to remove the overburden than to attempt to support it artificially after the bituminous rock is mined. The bituminous strata vary in thickness in different localities, being usually 10 to 20 feet in depth. In some cases there are two distinct strata of the bituminous rock, the separating stratum being usually sandstone, which is also bituminous, but the percentage is too small to make it commercially valuable. The density of the rock varies greatly, being from 15 to 20 cubic feet per ton.

A peculiar feature of these deposits of bituminized sand is the occurrence of jointing planes, which usually are nearly at right angles to the stratification of the deposit. This is remarkable when the sticky consistency of the material is considered. Vertical deposits of high-grade bitumen also occur which appear as a filling of crevices made subsequent to the deposition of the bitumen, having evidently seeped in.

One of the interesting features of quarrying in these deposits is the unearthing from time to time of the bones of large extinct animals.

THE DELAMAR GOLDEN GATE MILL AT MERCUR, UTAH,—THE LARGEST CYANIDE MILL OF ITS KIND.
(See page 483.)

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San Francisco, May 6, 1899.

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SILVER the past two weeks has made a noticeable advance in price. The real reason of this sudden advance is not apparent, unless it is the result of the decided speculative tendency lately developed. It may also be in part sympathetic with copper and iron.

THERE is a growing tendency on the part of the land office department at Washington to enforce more strictly the regulations concerning the location of mining claims. This has taken a definite form in recent instructions issued to United States mineral land surveyors, who are directed as follows: "These provisions of the law (regarding the location of mining claims) must be strictly complied with in each case to entitle the claimant to a survey and patent, and, therefore, should a claimant under a location made subsequent to the passage of the Act of May 10th, '72, who has not complied with said requirements in regard to marking the location upon the ground and recording the same, apply for a survey, you will decline to make it."

SOUTHERN CALIFORNIA has organized a branch of the California State Miners' Association. This was accomplished on Saturday evening, the 29th ult., in the rooms of the Chamber of Commerce in Los Angeles. E. H. Benjamin, secretary of the California Miners' Association; A. H. Ricketts, chairman of the Mineral Lands Committee; Attorney General Tirey L. Ford, chairman on a national Department of Mines and Mining; Senator John F. Davis of Amador, chairman of the Senate Mining Committee, and Charles G. Yale were the representatives present from San Francisco. President Jacob H. Neff was detained by sickness, and Vice-President Ralston telegraphed his proxy to ex-Senator Stephen M. White, with the request that he represent him. The meeting was called to order by Secretary Benjamin and Stephen M. White became chairman. The representatives of the California Miners' Association all pleaded for unity, and were supported by others. A resolution organizing a southern California branch of the California Miners' Association was passed without a dissenting vote. Stephen M. White was made president and Mr. Breese secretary. County organizations will be formed in the seven southern counties, which will unite in the forming of a southern California organization, with headquarters at Los Angeles, but this organization will be part of the California Miners' Association.

Production of Gold and Silver in California in 1898.

The Superintendent of the U. S. Mint in this city has forwarded to the Director of the Mint at Washington a report on the production of the precious metals in this State for the last calendar year. The figures given are the result of a compilation from returns by producers to the San Francisco Mint. The following table shows the approximate yield of counties:

PRODUCT OF CALIFORNIA BY COUNTIES, 1898.

County.	*Gold.*	*Silver.*	*Total.*
Amador	$1,806,363	$1,742	$1,808,105
Butte	514,508	9,317	523,825
Calaveras	1,019,023	3,432	1,022,455
Del Norte	9,057	....	9,057
El Dorado	501,966	4,174	506,140
Fresno	27,557	....	27,557
Humboldt	57,512	....	57,512
Inyo	137,107	73,503	210,610
Kern	1,017,930	6,543	1,024,473
Lassen	37,460	300	37,760
Los Angeles	21,300	...	21,300
Madera	94,884	50	94,934
Mariposa	336,418	993	337,411
Mono	446,017	66,667	512,684
Nevada	2,017,628	19,476	2,037,104
Placer	1,488,022	5,670	1,493,692
Plumas	369,609	....	369,609
Riverside	189,188	1,384	190,572
Sacramento	57,301	....	57,301
San Bernardino	261,512	32,000	293,512
San Diego	673,196	300	673,496
San Luis Obispo	1,000	....	1,000
Santa Barbara	1,000	....	1,000
Shasta	860,180	171,768	1,031,948
Sierra	399,063	519	399,582
Siskiyou	768,804	321	769,125
Stanislaus	19,400	....	19,400
Trinity	859,255	314	959,569
Tulare	12,400	....	12,400
Tuolumne	1,734,953	15,582	1,750,535
Yuba	166,865	....	166,865
	$15,906,478	$414,055	$16,320,533

Comparing these figures with those obtained from the same source in 1897, the gold yield shows a gain of $35,077 and the silver shows a loss of $38,734, making a net loss of $3657, so that the output for the two years is practically the same. The drought the past two years has had a serious effect on the mining industry of California. It is this fact which accounts for the aggregate gold yield of the State remaining about the same during the past two years. In some counties there has been an increase, particularly in the south, and others show a decreased yield; but many new mines have become producers, thus keeping up the average yield. Had not these new producers come to the front, the year's returns would have shown a falling off.

In the year 1898 there were thirty-one counties in the State of California which produced gold, and there was a product of silver also from twenty of these. Of the thirty-one counties, seven produced over $1,000,000 each in the precious metals, and one of these exceeded the $2,000,000 mark. These counties are, in their order of production, Nevada, Amador, Tuolumne, Placer, Shasta, Kern, Calaveras. Both Shasta and Kern counties appear for the first time in the list of counties yielding over $1,000,000 a year in gold and silver. The one showing the largest increase over output of the previous year is Amador county, while Nevada county again leads the list as the largest producer of gold and silver. Twelve counties show an aggregate increased yield of $1,602,723 from previous year, while nineteen counties show an aggregate decrease of $1,606,380, leaving a total decrease of $3657.

The relative importance of the different kinds of gold mining carried on in the counties of California is a matter of interest as to the origin of the metal, whether from alluvial washings or rock in place. Figures collected by the Mint show that not only is quartz mining by far the most important branch of the gold mining industry, but that its importance is steadily on the increase as compared with other forms. Considering both gold and silver, the placer mines of California yielded in 1898 the sum of $1,841,473, the hydraulic mines $962,192, drift mines $1,028,547, and quartz mines $12,488,321. Comparing these returns with corresponding ones of the previous year, it is seen that quartz mining shows a gain of $1,098,191, placer mining a loss of $538,441, hydraulic mining a loss of $388,896, and drift mining a loss of $174,511. The placer, drift and hydraulic mines suffered more, proportionately, from the very dry seasons than did quartz mining. It is found somewhat difficult to separate properly in the returns these forms of gravel mining, as many simply say "placer" in response to the question, when they may actually be engaged in drift or hydraulic mining. For this and the further reason that unless otherwise specified the Chinese are enumerated as "placer miners" (since they never work quartz), some of the gold attributed to "placers" may have come from hydraulic or drift claims. The drift tailings worked by Chinese are also called under the heading "placer."

Inquiry was also made by the Mint officials as to the number of men employed in gold, silver, lead and copper mines of California in 1898. The number is found to be 19,823, and, as compared with the number in 1897, an increase of 3060 is shown. The counties in which over a thousand miners are employed are Amador, Calaveras, El Dorado, Kern, Nevada, Placer, Shasta, Siskiyou, Trinity and Tuolumne. The highest number is employed in Nevada county (1949), which county is also the largest gold producer. The largest producer of silver is Shasta county.

These figures of source of gold and silver are checked by return figures of destination—that is, total receipts of all U. S. mints, U. S. assay offices, refineries, smelting and reduction works all over the United States. The aggregate returns from producers—in source—are larger than those shown by the receipts of mints, assay offices, etc.

Strike and Dip.

A frequent source of error in the location of quartz mines is found in the inability of the prospector to distinguish between the true and apparent strike of a vein. Many veins have a winding course, swinging first one way and then another, but most veins are practically straight for considerable distances. There is less likelihood of error in locating a vein which stands perpendicular, or nearly so, for the topography of the ground does not affect it materially; but where veins have a low angle of dip in a rough country the locator finds his vein striking in a zigzag line across the ridges and gulches and he is often puzzled to know how to locate his claim so as to cover the lode. This difficulty may be solved by a correct understanding of the meaning of strike and dip. The strike of a vein is its direction on a horizontal line, taken at right angles to its dip.

When about to locate a mine the strike must be taken in a horizontal direction (on the level), and not down the slope of the hill. This is the true strike, so do not locate the claim with an elbow in the center, but straight—parallel with the real strike.

A CAUTIOUS investor says mining is a gamble. It must be admitted that this is true in a measure. What business is not? Mining, however, may be conducted in such a manner as to largely remove the speculative element. In the beginning of the history of a mine the prospector stakes a chance when he locates his claim in the hope, if not the belief, that it will contain mineral which it will pay him to develop. As work progresses, and the value of the mine becomes more apparent, whether it be great or small, the risk diminishes. If the prospect is a poor one the possible investor feels less inclined to invest. If it is rich he considers it a fair gamble. With a greater amount of development the prospect becomes a mine with a certain absolute value, and this value increases with the extension of development work until the limit of worth is determined by the actual value of the mine. It may be said that a developed mine showing certain value, whether being operated or not, has a prospective merit, the extent of which it is difficult to determine; but as a matter of course, when the investor is willing to pay for that which he cannot see, he enters the realm of chance and he measures this risk by the indications of a reasonable probability of a continuance of ore deposits only partially developed.

BRITISH COLUMBIA, it appears, has had just enough experience with the American extra-lateral right law to raise some very nice legal problems, which are heightened by the complex geological features of that region.

IT is now thought that copper will at least reach the 20-cent mark, if it does not go beyond it. It seems to be not so much a question of price as to where to look for sufficient metal to supply the still increasing demand.

Concentrates.

EIGHTEEN feet of gravel in bank, one ton.

TWELVE INCHES—1 foot—equal .3058 meter.

TWENTY feet of broken quartz weighs a ton.

LONG belts are more effective than short ones.

ONE Troy pound equals .822857 pound avoirdupois.

TWENTY-SEVEN feet of dry gravel or sand in a pile, one ton.

EACH set of high-speed crushing rolls requires 10 to 50 H. P.

A MINER'S INCH is approximately twelve U. S. gallons per minute.

NEVADA COUNTY, Cal., leads in the gold output for '98 with $2,017,628.

BY doubling the diameter of a pipe its capacity is increased four times.

A U. S. GALLON contains 231 cubic inches; the English gallon 277.274 cubic inches.

IN water pipes the friction increases approximately as the square of the velocity.

ONE pound avoirdupois equals 14 ounces 11 pennyweights 16 grains Troy, or 7000 grains.

MULTIPLY a vertical head of water in feet by .434 and it will give the pressure in pounds.

THIRTEEN cubic feet of solid quartz in place in the mine weighs about one ton—2000 pounds.

A 10x16 JAW CRUSHER requires 15 H. P., more or less, according to the hardness of the ore.

TO REDUCE avoirdupois pounds to Troy ounces multiply the avoirdupois pounds by 14.5816.

IN a quartz mill each 850-pound stamp, dropping ninety-five times a minute, requires 1.33 H. P.

ELBOWS and other irregularities in pipes increase the friction of air or water passing along the pipes.

UNDER 100-foot head 124.6 cubic feet of water per minute will develop 20 H. P. with an impact wheel.

THE amount of water usually required for an ordinary belt concentrator is 200 to 300 gallons per hour.

THE gold ores of California contain on an average about 2% sulphurets, worth from $40 to $200 per ton.

PLIABLE ropes are better for transmission than those that are stiff, as it requires less power to bend them.

THE value of the total mineral production of California in '98, both metallic and non-metallic, was $27,289,079.

THE diamonds mined from South African fields are estimated at 63,000,000 carats, valued at over $400,000,000.

IT is estimated that the present annual output of the United Verde copper mine, in Arizona, exceeds $15,000,000.

THE theory of concentration is based on the difference in specific gravity of the various minerals contained in an ore.

WHERE a rock is soft, the edge of a bit should be sharp, and, as the hardness of the rock increases, the edge should be less acute.

A VOLUME of 386 cubic feet of air traveling 1000 feet through a 3-inch pipe under 60 pounds pressure looses about 3¼ pounds by friction.

ABOUT five gallons of water are required for steam making hourly for each horse power. Each stamp requires 60 to 80 gallons per hour in the battery.

IT is stated that the New Idria quicksilver mine in San Benito county, Cal., can produce quicksilver cheaper than any other mine in the United States.

A GALLON of water (U. S. standard) contains 231 cubic inches and weighs 8⅓ pounds. A cubic foot of water weighs 62½ pounds and contains 7½ gallons.

HEAVILY sulphureted quartz requires fewer cubic feet, but the difference is not particularly noticeable until the amount of sulphurets present is considerable.

PISTON SPEED in engines has been increased from 200 feet per minute to 500 and 600 feet in late years, and now 1000 feet per minute or more is not uncommon.

WHEN estimating requirements when selecting a cable for hoisting in a mine, it is best to allow from one-fifth to one-seventh of the strength, according to speed.

TO ASCERTAIN the speed of drums and pulleys, multiply the diameter of the driver by the number of its revolutions, and divide the product by the diameter of the driver.

THE tunnel on the line of the San Francisco and San Joaquin Valley Railroad near Pinole, in Alameda county, has been completed. It is 1045 feet long and 18 feet square.

IN starting a line of holes for feather and plug work, the line should begin at the face and end at the back, with a deep hole to insure carrying down the side in a true line.

A GOOD preservative of wire rope above ground is raw linseed oil applied with a piece of sheepskin, wool inside, or the oil may be mixed with equal parts of Spanish brown or lampblack.

ONE atmospheric pressure is 14.7 pounds. It will raise a column of water to the height of 33.8 feet at sea level, theoretically, but few pumps produce a vacuum complete enough to do it.

THE resistance of belts to slipping is independent of their breadth, hence there is no advantage in increasing its width beyond what is necessary to enable it to resist the strain it is subject to.

WIRE ROPE must not be coiled and uncoiled, like hemp or other rope. If not on a reel, the coil should be rolled along the ground on its edge, like a wheel; any attempt to uncoil it will cause it to kink.

ELEPHANT BOILERS is a name given to boilers of large size and peculiar construction. They are used when the power required varies greatly, as in electric and cable railroads. They are capable of developing upward of 50% beyond their rating for short periods. Some of the largest boilers of this type have exceeded 50 feet in length.

IN the Leucite hills northwest of Point of Rocks, Wyoming, occurs a leucite rock which is allied to phonolite. The rock has a felsitic texture, though finely porous, and is of light yellowish-gray color.

A HALF-INCH rope running over a 5-foot sheave running 100 revolutions per minute will transmit 20.6 H. P. A ¾-inch rope on a 12-foot sheave running 100 revolutions per minute will transmit 180 H. P.

MOLYBDENITE is the sulphide of molybdenum, and is used in the manufacture of steel, but is not in use on the Pacific coast. The pure concentrated mineral is worth about $200 per ton in Eastern markets.

A STRAIGHT-EDGED drill bit causes most of the cutting work to be done by the outside points. It cuts more rapidly, but the drill must be changed more frequently. A taper or curve is more economical.

AT sea level the atmospheric pressure is nearly 15 pounds per square inch, at 1250 feet altitude about 14 pounds, at 2500 feet 13.33 pounds, at 3750 feet 12.66 pounds, at one mile 12.02 pounds, at two miles 9.88 pounds.

THE greater the diameter of sheaves and drums of winding engines the longer wire rope will last. The wear on a wire rope increases with speed, consequently it is economy to increase the load rather than the speed.

A GALLON of liquid air, weighing about eight pounds, it is estimated, on expanding to normal temperatures, has a total capacity of generating three-fourths of 1 H. P. Of this a good engine might use one-fourth H. P.

IN the year A. D. 1800 the average steam pressure in engines was 5 pounds per square inch; in 1840 it was 20 pounds; about 1850, 50 pounds; 75 pounds a quarter of a century later, and now 120, 150 and 175, and even higher.

IN slotted battery screens a No. 5 screen is 20 mesh; the slot is 29-1000 of an inch wide. A No. 7 screen is 30 mesh and the slot is 24-1000 of an inch wide. No. 9 is 40 mesh and is 20-1000 of an inch wide. No. 12 is 60 mesh, 15-1000 of an inch wide.

A WIRE CABLE running under ground or in water may be protected by applying mineral or vegetable tar, to a barrel of which has been added one bushel of fresh slacked lime; boil it well and apply. The lime will neutralize any acid in the water.

THE average cost of producing the greater bulk of copper in the United States is 7 cents per pound, though at most mines the cost is greater. The lowest cost is said to be at the works of the Boston & Montana Co., where it is 5 cents, the next lowest being Calumet & Hecla.

COMPRESSED AIR under seventy-five pounds pressure per square inch, if allowed to escape from the receiver through a hole, issues into the atmosphere at a velocity of 548 feet per second. If the escape be made through a short length of pipe, the velocity increases to 658 feet per second.

A STRAIGHT-EDGED drill bit does not work to advantage in marble. A straight-edged bit will break on the edges or become dull quickly. The bit should be bluntly pointed and the point should be a little to one side of the center to avoid sticking and to accomplish the best work.

IN feather and plug work in quarrying the depth of the holes must be determined by the cleavage properties of the rock. In all cases they should be deep enough to prevent running off. The plugs are usually alternately short and long, the long holes being on the outside nearest the edge.

THE chief function of air receivers in connection with air compressors is not for the storage of air but to neutralize the pulsations caused by the regular discharge of air from the compressor cylinders and also to collect a large percentage of the moisture incident to the compression of the air.

EVERY 850-pound stamp in a mill dropping ninety-five times a minute requires 1.33 H. P.; each 4-foot belt concentrator requires about ¾ H. P., and an 8x12 rock-breaker requires from 6 to 8 H. P. according to character of ore. Abundant power should always be provided in either hoist or mill.

SINGLE edge bits on drills are always used in hand work, but this type of bit is not suitable for use on percussion drills in hard rock for the reason that the blow is so heavy that the edge cannot be made to stand. For this reason the bit is divided into several edges and the force of the blow is thus distributed.

THE manufacture of zinc spelter, or the process of zinc smelting, is briefly as follows: The ore is first calcined —roasted to drive off the carbonic acid and sulphur and to be transformed into an oxide. It is then crushed fine and mixed with half its weight of fine crushed coke. The mixture is next charged into cylindrical retorts, and there heated to 1300° C. At that temperature the oxide is reduced and vaporizes, passing from the heated retorts into a condenser, where it liquefies, is drawn off and cast into molds.

THE first diamond discovered in South Africa was recognized in March, 1867, by John O'Reilly, near Orange river. The diamond was found on a table in a farm house. It is supposed to have come from the Vaal river. For several years diamond mining was carried on along the river by a system similar to placer mining, but not before 1870 was the real source of the diamonds discovered, when several were found at Dutoitspan, about fourteen miles from the Vaal river. The largest diamond discovered in the river placers weighed 83¾ carats before cutting.

DRILLING in sandstone has a remarkable effect on drill bits. Sandstones are usually soft, but drills cannot be used effectively which are finely pointed. On the contrary, they should be flattened. A bit with a knife-like edge will become shaped like a razor—that is, the edges will become concave. This is due to the bedding of the bit in the grit of the rock, and it is rubbed as though on a grindstone. The sandstone is not usually hard enough to dull or turn the sharp edge, and the more the bit is used the sharper it becomes. It cannot be used long, for the reason that the outside edges, where the most wear takes place, become dulled and the ends become tapered and no longer cut the hole clear. The most successful sandstone bit is that with a blunt, flat edge. It is usually called the stub bit. The bit is usually made 1½ inches long, with a face ⅜-inch to ⅝-inch wide. The cutting face should be square and rectangular. It should be kept thin to secure best results and rapid cutting. If a cornered hole results, it may be overcome by flattening the bit a little. The bit is simply heated and hammered to a square edge. The chief work being done on the outer edges, they must be kept up to gauge.

IN the case of a heavy and unexpected flood of water in a mine, which it becomes necessary to stop by the construction of a bulkhead, a pipe with a valve or gate should be constructed in the bulkhead, affording an outlet for the water while the bulkhead is under course of construction, and which may be closed when the bulkhead is completed. A pressure gauge attached to this pipe will indicate the pressure per square inch. Divide this pressure by .434 and it will give the vertical height of the column or reservoir of water that has been encountered, but this gives no indication of the volume of water.

WHERE A has located and secured a patent upon a placer claim B has no right in a lode or vein which he may subsequently discover on the land of A. There is no law in California imposing a tax on mining locations simply because they are locations. Where claims are on the public domain the title is vested in the United States, the claim holder having only possessory rights. The improvements, however, may be assessed and are taxable, and where the claim is located on an agricultural patent, as many in California are, the improvements are taxable and also the land covered by the claim, the same as any other portion of the ranch.

IN the Moffitt system of ore reduction the ore is first crushed and pulverized by a combined crusher and pulverizer, thence passed into an oxidizing furnace, which has a rotating cylinder with plow-pipe troughs with a high degree of heat under atmospheric pressure, the pressure blower forcing the sulphur, arsenic and other fumes under water, the material passing through a pulverizer, thence over an amalgamating table, thence into the chlorine tanks, then passed through the pressure rubber rolls, the liquid being turned back into the chlorine tanks. This solution is then run into a retort furnace and condensed until all values are in a metallic form.

TO MAKE concrete for machinery or retaining walls, use six parts of broken rock small enough to go through a 3-inch ring, two parts of clean sharp sand, and one part of Portland cement; thoroughly mix when dry. Do not add water until required for use, then add enough water to make a thick mortar; mix in small quantities and use at once; thoroughly tamp with a suitable bar immediately. Concrete made in this manner will set enough in twenty-four hours to carry a load, and in three or four days will be hard enough to run machinery on. If broken rock cannot be obtained, clean creek gravel of about the same size may be used. Never use loam, clay or very fine sand. For special strength use more cement.

A MAP of the workings of a going mine on which the progress of development is indicated, if not daily at least very frequently, is always of great service in giving a more thorough understanding of the relative position of the various shoots or stopes as exposed in the workings, and, in the event of closing down for a long period, an accurate map of the workings has great value should the mine be reopened. The possession of such a map, known to be absolutely correct, would have been worth thousands of dollars to several California mines opened recently after a long idleness. The great danger arising from tapping unexpectedly large bodies of water in old flooded levels in the extension of new work is obviated by the possession of a correct map of the old workings.

THE miner's inch is of California origin and is used very little elsewhere. The term is not a definite one, as various water companies have different methods of measuring the volume of water; for this reason, the miner's inch varies from 1.36 to 1.73 cubic feet per minute. The most common measurement is through an aperture 2 inches in height and of whatever length may be required, and through a plank 1¼ inches thick. The lower edge of the aperture should be 2 inches above the bottom of the box and the plank 5 inches high above the top of the aperture, thus making a 6-inch head, measuring from the upper edge of the plank—with which the surface of the water must be even—to the center of the 2-inch aperture. Each square inch of the aperture represents 1 miner's inch and is equal to 1⅓ cubic feet per minute.

THE Boston & Colorado Smelting Co. was started at Blackhawk, Colo., by N. P. Hill in '67, and, by giving Colorado miners a home cash market for their ores, aided greatly in the development of Colorado's great mining industry. In the building of the little pioneer reverberatory and calcining furnace every firebrick cost $1, being railroaded from St. Louis and then hauled 600 miles in wagons; the iron cost 22 cents per pound, the skilled labor $8 per day, and the smelting charges were proportionate—from $20 to $45 per ton, according to the kind of ore. The resultant matte was hauled 600 miles to the Missouri river, thence railroaded to New York City, thence by vessel to Swansea, Wales, to be separated and refined. Ten years after its establishment it removed to Argo, and at the time of its recent absorption had a record of gold, silver and copper production of over one hundred million dollars.

PHONOLITE and clinkstone are synonymous; the former name is derived from the ringing sound given out when a slab of the rock is struck with a hammer. The essential constituent minerals are sanidine, nepheline and usually hornblende and magnetite. Nosean and hauyne (silicates of alumina and soda) are also often present in considerable quantity, also leucite and tridymite. A number of other minerals also occur, among them augite and olivine. Phonolite graduates over toward trachite when oligoclase appears as a constituent. The oligoclase-sanidine rocks are called trachyphonolites. The amount of silica in phonolites ranges usually from 50% to 60%. As in most other rocks, there are several divisions in the phonolites, based upon the predominance of some particular mineral, as nepheline-phonolite, leucite-nepheline phonolite, nepheline-nosean phonolite, sanidine-nosean phonolite, etc. The proportions vary considerably. Plagioclase rarely occurs in phonolite. Until recently it was presumed that phonolites in America were of rare occurrence, but the association of the rock with rich gold veins in Colorado and South Dakota has led to a search for the rock elsewhere, and there is no doubt it will actually be found more abundant than had been supposed.

Placer Mining and the Future Possibilities of This Branch of the Mining Industry.

Written for the MINING AND SCIENTIFIC PRESS by JOHN W. GRAY.

Placer mining has always been an attractive branch of the industry of mining. It has also been a profitable one. A very large part of the money wealth of the world has been wrested from mother earth by this method, and a large part of that to be gotten in years to come will be obtained in the same manner.

To the moneyed man this branch of mining offers profitable investment for capital, in many cases with less risk and a surer promise of good returns than the same investment in the competitive channels of ordinary industrial enterprises. To the individual it offers, as it always has, the opportunity to engage in mining with far less capital than is usually required in the more laborious and expensive methods of metal mining. To the business man and the public generally it offers a permanent field for disposal of their manufactures, goods and productions, the natural result of the constant production and circulation of the gold obtained. To the State it means increase in population and wealth, and consequent increase in taxable property. The full development of this branch of mining, where the proper field for it exists, means great good to a great many, in a great number of ways, and so it ought to be aided and encouraged by all the parties to be benefited thereby.

From rough crude ways this method of mining has been slowly improved, by successive evolutions of better contrivances and operations, until to-day many of the problems incident thereto have been fairly well solved by the skill of man. The end is not yet attained, however, and the future of this branch of mining will see other improved methods and operations, and its development will be more complete, bringing golden reward in abundance to gladden the heart of the sturdy worker, and a full measure, besides, to those who may aid in this development, or become connected with it in business ways.

Placer mining has passed beyond its primitive stage. Time was, and not so long ago, when the three essentials in its operation were rich gravel, water in abundance and plenty of dump room. The text books extant upon the subject still so declare.

Such is not the case, however. These three attributes are by no means all essential, and it is a matter of fact that successful operations may be satisfactorily carried on without any one of these so called essentials existing. New and improved methods of operation, and the modern machines and contrivances now in use, have opened a new field of possibilities, and already have given practical and profitable proof that a new order of things exists.

California, although she has many skilled miners, and a number of mines operated by the improved methods and machinery, has still a long lane to travel. Other parts of the world are quite abreast of us, and some a distance ahead in the line of travel. In some parts of the world Government and local aid is given and steady effort made to develop this branch of mining. Concessions are allowed, subsidies granted, and the industry is fostered as one of the most beneficial pursuits of man. The great and widespread good coming from a full development of the possibilities of placer mining is understood, and persistent effort is made to attain this end. In this land such is by no means the case, national aid is a thing unknown, the same may be said of the local governments, and in a great measure is this also true of the general public. Progress has to be made against many obstacles, and, in some instances, against constant opposition.

Some little time since I had occasion to become familiar with the conditions of an enterprise on this coast which was being offered in London. The property possessed merit and value, was being offered without overload, and upon perfectly business-like and reasonable conditions. The enterprise was considered promising, but it was decided by the London capitalists that the reports submitted could not be relied upon, since California was the part of the world where such operations were most extensively carried on, and that it was impossible that properties of real merit should be subject to disposal away from there. The very fact that the property was not taken and operated by California people was considered sufficient cause to condemn it. This decision seems surprisingly silly, yet it is not uncommon. The real truth of the matter is that such enterprises in this part of the world are seldom undertaken by local capital, and most of the large operations out here have been developed, and are now being carried on by eastern and foreign capital. Why our mining interests are in a great measure overlooked and neglected by local capital is not so easy to answer, but it is nevertheless so.

And now a word as to the conditions of the industry, some of the lines along which full and permanent development may come, and the possibilities which offer themselves.

Placer mining for the most part is carried on by large companies, with a big capitalization, controlling large areas of ground, and usually controlling also the water supply, great or small, as the case may be. The operations, although by improved methods, are often extravagant and wasteful, and although profitable, are not as much so as they might be made. The best conducted mines have skillful managers and approved appliances. Dredging operations are carried on with a measure of economy and success by the use of improved machines constructed by our well-known manufacturers. Very large areas, however, of the best ground in the State are now unworked, or only partly worked, as a result of the debris law, which prohibits discharge of tailings into the rivers and streams which form the natural dumping ground. There are also many other areas bearing gold in paying quantity which are not only not worked, but not even developed. Restraining barriers to impound the tailings from the large mines now idle have long been talked of. Large sums of money have for several years been appropriated by nation and State for the construction of available dams, etc., but, although the Government engineers have been continuously at work to discover and plan the best thing to be done, no actual work of construction has yet been undertaken, so difficult do the problems appear of solution. Therefore, in a very great measure, the placer mining possibilities of the State await the solution of vexed problems, the assistance of capital and the friendly aid of the public generally to spring strong into life again.

There is a method of mining which may be said to be the reverse of present methods. Instead of wasteful and extravagant use of water, the latter is carefully husbanded, only being used when and where most needed, and then in comparatively small quantity. The foundation principles of this method are economy in the use of water and the substitution, in great measure, of power-driven machines and appliances for hand labor; small tips are used in cutting the ground; boulders and large stones are separated from the fine material; a small quantity of water only is used in washing; the material is run through short sluices of little grade; a number of faces are simultaneously worked; the faces are first cleared and put in the best condition for the economical use of water, and the water is used only so long as complete efficiency is utilized. Again, the faces are prepared, the process repeated, and so continued. The claims made for this method are much greater efficiency in the use of water as an actual getter of gold, and a much greater saving of fine gold, and that it is applicable in connection with mechanical elevating appliances, where requisite dump room cannot be naturally obtained. It is also claimed that the method doing away with long and expensive sluices, costly rock cuts, etc., under proper conditions, can be operated at a moderate cost per cubic yard of material, and, taking into account the greater saving of gold, in final results will compare favorably with other methods of mining. The dredge and other appliances similar in principle are, in a measure, typical of this method in their respective ways, and it has already become well known with what economy it is possible to handle and wash material and elevate the tailings under ordinary conditions.

I have seen this method of mining in operation in a number of places, but have not seen it in practice, in its best form, on this coast. In one place I visited a long terrace was being so worked. From the front the claims extended back indefinitely. The faces were worked in widths of from 100 to 200 feet, three men to each face. Sluices were short and so arranged as to be easily advanced and cleaned. Boulders, large rocks, etc., were dumped behind the work as it advanced, only the fine material being washed. The banks are from 60 to 80 feet high and the water was used under this pressure. Water was used from two hours a day to four hours every other day. The water supply of the terrace was about 400 inches, and it was parceled out and sold to the different faces at the time and in the quantity needed. A very satisfactory quantity of ground was being worked, and the miners, owners of the claims themselves, were making good wages, and paying very liberally for the water besides. Some of these claims had been so operated for a number of years, and had ground remaining more than sufficient to last the lifetime of the owners.

In another place I saw material worked in this fashion, the tailings being elevated by mechanical means over 80 feet, and then washed through second sluices to the dump. The men were paid good wages, and the manager told me that all material going over 10 cents per yard paid a profit. In a large way the cost of handling the material would have been considerably reduced. In another place I saw miners, with free water, easily making wages from ground not averaging over one grain of gold to the yard.

In some portions of the world much work has been done by the Government in the way of supplying water for placer mining. In most cases the mining is done in the manner just outlined. Permanent and prosperous mining communities have thus been created. I have visited some of the mining sections thus developed, and found them busy, active communities, prosperous to a degree, and affording the best markets of the region.

In many places in California, as elsewhere, the development of a water supply and the system of mining I have mentioned would give rise to permanent and really prosperous communities. Operations would be profitable alike to capital and worker. A superior mining class is thus formed, excellent markets created, and local prosperity assured. Gold-bearing fields can be so worked which are of too small average value to pay large companies great profits, but which will nevertheless pay satisfactory incomes for an indefinite time to all industrious workers. The full development of all the fields ought thus to be brought about, thus benefiting all classes in a most desirable manner and profiting to the utmost from this source of wealth. I have in mind, as I write, various localities possessing the necessary natural conditions. Here mining communities could be established which ought to become models of their kind, and substantial sources of constantly created wealth.

Possibly a solution of the vexed mining problems confronting the regions affected by the debris law might be worked out along the lines reviewed. One of the marvels of the present time is the ease, rapidity and cheapness with which material can be loosened, elevated, moved and disposed of in large quantities by the use of power machines and improved modern appliances for such work. The rivers will supply power cheaply and in great abundance, which could be easily distributed to the different localities. The present ditches would supply water for hundreds of separate operations, each one paying satisfactory wages to the workers and a handsome tribute to the capital employed. Probably, in the end, as much money would be made by the land and water owners as under present methods, and incalculably more good would result to the sections interested and the public generally. If this could be done, the debris question might be practically settled, and it is within the range of possibility that, if the money appropriated for restraining barriers, etc., could be expended along the lines suggested, more ultimate good might result from the work than in the direction now being pursued.

A Reverberatory Furnace for Smelting Gold Slimes.*

By W. BETTEL.

Not long ago I noticed a description of a furnace for smelting the ash from the calcination of charcoal, which had been used for the precipitation of gold from liquors obtained in chlorination works.

The similarity of this, in arrangement and construction, to an old style of pan furnace which I had used many years ago in the several smelting establishments, and its adaptability to conditions obtaining on these fields, has induced me to bring the matter before the public.

The furnace is constructed somewhat like a cupellation furnace, only with a rectangular instead of an oval opening to admit the removable brick-lined cast iron pan (furnished with a tap hole and spout, to be lined in the usual way). Two bearers of heavy iron are built into the brickwork, and carry four long screws which support the pan. A simple arrangement is used for regulating the temperature of the furnace, which makes the furnace very economical in fuel consumption.

The method of working here would be as follows: The pan being lined (with brick set in clay) is heated until all the moisture is driven off; the fire is then urged until a good melting temperature is obtained in the furnace, and a charge of fairly clean slag is melted therein. When it is judged that the brickwork in the "pan" is fairly saturated, the excess of slag is tapped out (the basin of the brick lining sloping in all directions to the tap hole) into a large mould (holding about 2 cwts.) having a tap hole near the base to draw off the slag after the particles of gold have subsided. The furnace is now ready for charging with the mixture of calcined slimes and flux, thoroughly moistened with water, either put into paper bags or compressed. The moisture prevents all but a minute loss by dusting (about 0.04% to 0.05%) during melting. When a charge is melted the furnace is again charged with fluxed slimes until the brick-lined pan is full of molten slag. It is now rabbled with an iron paddle to thoroughly mix the slag and collect the particles of gold. These, being fairly pure, have a high melting point, and they sink unmelted, but as coherent masses, to the floor of the furnace. About twenty minutes' firing cleans the slag sufficiently. It is then tapped out, the gold being left unmelted. When all the slag has drained out the heat is rapidly raised (a smoky fire being avoided), and the oxidizing flame quickly melts and refines the gold. The molten gold is then, with due precautions, tapped out into moulds. If, however, a large quantity of slimes has to be melted, the slag is tapped from time to time, leaving the gold unmelted in the furnace until after the last tapping out of the slag, when the gold is then smelted down, refined and tapped. The bullion is remelted in the

*Journal of the Chem. and Met. Society, South Africa.

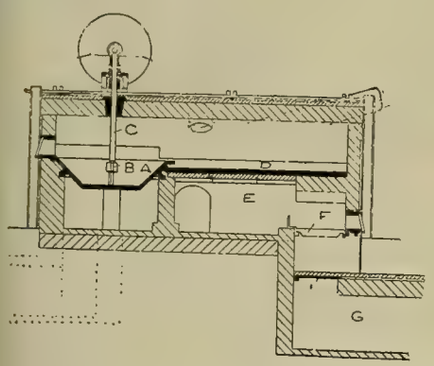
usual manner for casting into bars. When convenient the lining is taken out of the pan, the dark colored brick separated from unstained firebrick, the former crushed in a small mill, and the gold recovered by cradling, panning, or amalgamation in the usual way, the residue, if rich, being resmelted with rich slag. If poor, it is to be mixed with the bulk of the slag for sale.

The small amount of gold collected in the flue (and dust chamber, which is not an expensive addition) after say six months' smelting, is smelted with the next batch of slimes.

This simplifies slimes smelting. It is less expensive than ordinary smelting with plumbago pots. The bullion is obtained of any fineness up to 995, and with ordinary precautions customary in handling gold-bearing materials, can be relied upon to prevent losses at present unavoidable. The refractory material (firebricks) is easibly obtainable, and the cost per ounce of gold for renewal extremely small. After smelting, the pan may be removed from the furnace, if thought advisable, and placed under lock and key until the following smelting, thus avoiding all risk of theft of the small amount of gold it may contain.

The Manufacture of Sulphate of Copper.

What is claimed to be an entirely novel process for the manufacture of sulphate of copper has recently been devised by a chemist at Bordeaux. It is well known, says *Industries and Iron*, that when commercial sulphuric acid at 66° Baume in which copper is immersed is heated, the acid is partially decomposed; the copper is transformed first into a sulphide, then into an oxide, sulphurous acid and steam being liberated. The undecomposed sulphuric acid unites with the oxide of copper and transforms it into sulphate. By continuing the heating operation, the excess of sulphuric acid, if any, volatilizes; anhydrous sulphate mixed with a small quantity of sulphide of copper remains. On again treating the mass with hot water the sulphate dissolves; the liquor is decanted, and crystallizes on cooling. The copper still unattacked, if such exists, is collected and again enters the cycle of operations; the same applies to the sulphide.



FURNACE AND PAN USED IN MAKING COPPER SULPHATE.

The copper is introduced either in the state of fragments, granulated, precipitated or the like into a cast metal vertical shaft shown at *C*, to which a movement of rotation is imparted from the outside. It carries two horizontal arms, marked *B*, provided with toothed ribs in the form of plow shares capable of sliding vertically along the driving shaft in such a manner as to constantly clean the bottom of the pan and prevent the adhesion of material, whatever their degree of wear may be. This pan is heated. When almost the whole of the copper has combined with the acid the contents of the pan are transferred by the operatives to a sole plate *D*, which is also heated, and where the reaction is completed. When this has taken place the mass is caused to fall into a vault or cellar, shown at *E*, of dimensions varying with the magnitude of the operations. Cooling takes place in this cellar, and the mass is then removed by the operatives to the dissolution vessel. There are always two operations in progress in the furnace, one in the pan and the other upon the sole plate. The sole plate and the pan are heated by the grate marked *F*; but should there exist at hand a sufficient source of waste heat, the bars of the grate may be removed when once the furnace has been started, and the door of the grate and the ash-pit may be walled up. A damper is shown at the covering of the stone marked *G*.

It is stated that the deepest ocean sounding yet recorded has been made by H. M. S. Penguin during a cruise in the Pacific. A depth of 4762 fathoms was found between Auckland and the Tongan archipelago. The Penguin also investigated the recent disappearance of Falcon island, which was formed during a volcanic eruption in 1885 and vanished in September last year, and it was found that the island had sunk three fathoms below the surface.

The Crosshead in Shafts.

To the Editor:—Noticing an article on crossheads in your issue of April 1st, '99, I desire to bring your attention to two improvements in same (according to my idea). In the first place, 24 inches is too small, as the crosshead is apt to pitch and get stuck in the guides, thereby running risk of pulling

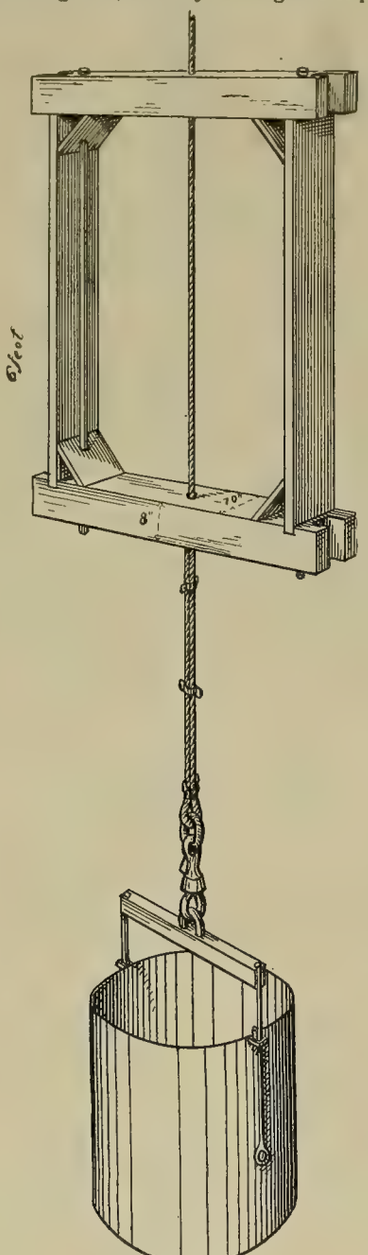


FIG. 1.

guides out. The law or custom in Montana is to make them about 7 feet long, as they run more smoothly and are not dangerous. The upper and lower deck are made of wood, as in sinking vertical shafts the less you have above you to become loosened the better. Iron straps are liable to come off and are subjected to a severe strain when you dump the bucket on top. As the crosshead goes down it rests on the chuck blocks placed near the bottom of the shaft and stops there. The bucket descends to the bottom. Miners riding the bucket guide it with their candlesticks by touching walls until it reaches the crosshead, which can be kept any distance from the bucket desired. The cable can be turned back the desired amount and secured

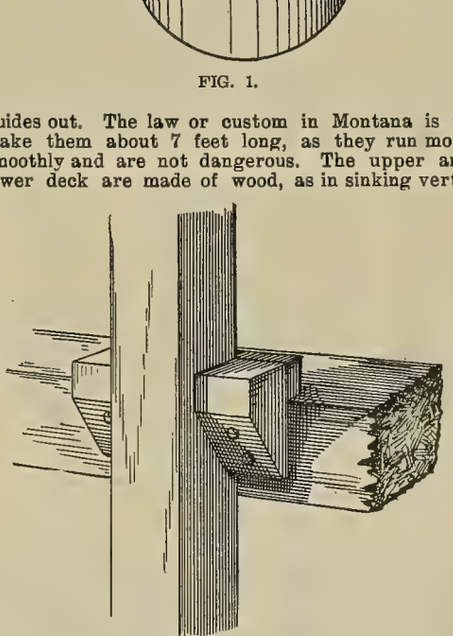
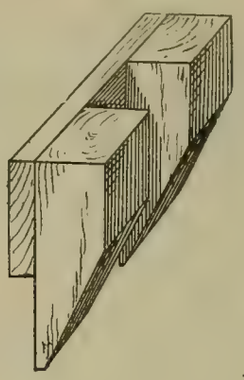
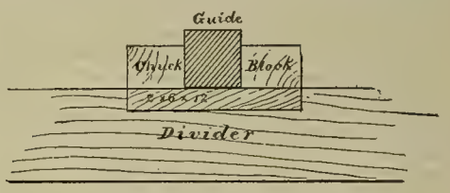


FIG. 2.



THE CHUCK BLOCK.

by clips. Engineers must lower the bucket slowly when approaching the chuck block, so as not to let the crosshead fall upon them, as they may be knocked loose. When possible it is best to sink 35 or 40 feet below timbers and then put in a number of sets at a time and bring them down as far as you can with safety. My idea is that the vertical height of the crosshead should be one and one-half times its width. In using a wood deck with side of jaws



PLAN OF CHUCK BLOCK.

made of wood (cut from one piece) there is no danger of picking out splinters in guides.

The accompanying drawings will illustrate the construction of the crosshead, and of the chuck blocks and their position in the shaft. The chuck block is so arranged that the wedge-shaped blocks have a position on each side of the guides—are joined by a piece 2x6, which rests upon end plate or divider. For security the wedge ends should be nailed to the timber. The chuck blocks should be placed on each side of the shaft. Fig. 1 shows the general arrangement of the crosshead. Fig. 2 shows the chuck blocks in position. CROSSHEAD.

Auburn, Cal., May 1st, '99.

Government Assistance in Australia.

A change has been made in South Australian mining conditions by the repeal of a regulation having respect to State assistance in prospecting, and the substitution of a different provision. The Minister will receive applications for Government assistance from any person or company engaged in deep-sinking, and may grant such applicants subsidies as he may think proper, but no subsidy shall exceed 100% on the amount proposed to be expended, and the total grant to any person or company shall not exceed $5000. The amount of the subsidy shall be a debt due to the Crown, and 50% of the net profits of the mine shall, until the subsidy is repaid, be applied in payment of the subsidy. The person or company, before the subsidy is paid, shall execute a bill of sale to the Minister, to secure payment of all chattels belonging to the person or company used in connection with the mine, or which shall thereafter be acquired in connection with the mine. In the event of the insolvency of any person, or the winding up of any company to whom a subsidy has been granted, the Minister shall have a first charge on all assets of such person or company in respect to such portion of the subsidy as shall be unpaid.

The California Water and Forest Society, lately organized to deal with the vast problem of the State's water resources and their conservation, has gone ahead in the direction of carrying out the laws which failed to receive the Governor's signature, as if they had been approved, and has appointed the officers contemplated. The Commissioner of Irrigation is Professor George Davidson and the Forestry Commission is composed of Professor E. W. Hilgard of the University of California, Professor Dudley of Stanford University, Abbot Kinney of Los Angeles, Warren Olney, Sr., of San Francisco and George Towle of Placer county. The officers named are simply officers of a voluntary society, but it is the idea that they shall in a large measure fulfill the functions of such State officers.

Some Experiences of a Working Miner.

NUMBER XII.

Written for the MINING AND SCIENTIFIC PRESS.

Mining probably affords better opportunity for gross misstatement and exaggeration of facts, with a fair chance of finding a believer, than any other business. The prospector is proverbially optimistic—he must be to succeed—and he assiduously endeavors to impress all others with his ultra-sanguine views of things, particularly the value of his own property. There are a few—a very few—exceptions to this general rule. I once met a prospector named McN——, who owned about a hundred locations, and he wanted me to go up and make an examination of one of them, several miles distant. He explained in some detail the existing conditions at his prospect, stating that at the surface he had a vein 12 inches wide which assayed $100 per ton, but at the bottom of the shaft, 12 feet in depth, the vein did not look well—in fact, he was not sure he had a vein there at all. Thinking it might be a case of fault, I and a friend went over to look at the place, and, true enough, there were pieces of ore about a foot wide which evidently had been taken from a vein near the surface, but which in sinking had pinched to a seam, and in the bottom of the shaft was absolutely nothing. My friend gazed down into the hole and remarked, "This fellow, at least, is discouragingly truthful." This was a rare instance.

When at the P—— M—— mines, at the invitation of the owner of a claim some seven miles distant I went with him to look at the prospect. He assured me he had 3 feet of ore which would mill $18 per ton. I doubted it, but, as in many previous cases and since, went anyhow, against my own judgment. We walked across the sands of the desert, heated under the scorching rays of a May sun, and eventually arrived at the place, where I found a cut 20 feet long and 4 feet wide. No quartz was visible anywhere, but there was a quantity of light gray dyke rock piled up on the dump, and lying in the cut was a boulder of the same material weighing perhaps 500 pounds. To say that I was disgusted is a very mild way of putting it. I asked what had become of the ore, and the prospective millionaire pointed to the pile of dyke rock. I remarked in somewhat forcible language that I doubted his statement and knocked off a piece of the light gray rock, which on close inspection was found to be spangled with fine points of gold. This simply illustrates that it is not always safe to doubt even the prospector, for in this case also he was truthful.

I have in mind another instance in which the usual relation of the claim owner to the intending investor is clearly shown. Two men owned the G—— mine and had done considerable work upon it, in the course of which some very rich gold ore was encountered, with the usual resulting notoriety. The widespread fame of the property came to the notice of two capitalists of O——, who went to examine the mine. They spent some time on the dump and in the large open cut, grinding and panning ore, always with surprisingly rich results. On being invited to go down into the shaft, one of the capitalists looked timidly down into the dark hole, and, discovering only two or three sticks of timber and a very frail ladder (he was a large man), declined the invitation, but asked how it looked below.

"Just the same as it does up here," was the unhesitating reply, which, by the way, was the truth, too; but he might have added, with equal truth, that there was little or no gold down there, though it looked the same.

"How much do you want for this property?" was the abrupt question of the would-be investor.

"Well," was the cautious answer, "I don't know; you see, we have never put a price on it."

"It is for sale, isn't it?" asked the rich man.

"Yes, I guess so," was the reply; "we will sell anything we have."

"Well, name your price," was the business-like remark of the capitalist.

In relating this circumstance afterward, one of the owners of the mine admitted to me he did not know what to say. He feared if he put it too low they might become suspicious, and, if too high, they would not buy. He explained to me:

"You see, we knew the mine better than anybody. There was nothing in the level at the foot of the shaft, and, although the face of the cut looked beautiful and showed lots of free gold, we knew there was nothing back of it, for we had drilled holes through and tested the drillings. Finally, I made a venture and said: 'Well, Mr. H——, we will take $50,000 for the mine.' To which Mr. H—— replied, without the least hesitation: 'All right; we will take it.' I nearly fell in the shaft. You could have knocked me down with a feather."

Now, you will naturally conclude that this deal was a go; but it was not. It almost passes belief that these two poor miners, having a chance to get a fortune for a prospect which they believed to be practically worthless, should let such an opportunity pass. But this is the way of the prospector. His cupidity—and, in this case, dishonesty as well—often results in his undoing.

The same day a third party, learning what had been done, talked and urged and plead with these two men to consolidate their property with one in the neighborhood on which he claimed to have a bond, representing that he could dispose of the whole property for half a million dollars, of which their share would be $200,000. They eventually consented, and when, a few days later, the capitalists returned with the coin to pay for the mine, they were informed that it would be impossible to close the deal, as they had made other and more satisfactory arrangements. The two capitalists were greatly disappointed and very angry. All this occurred several years ago, and the prospectors still have their mine, nothing ever having been done with it since, and it can now be had for a song. It may have been relocated by others, for all I know.

Some years ago when the E—— G—— mine was in full blast and making money, the superintendent concluded that the brick stacks should be replaced with water jackets, believing it would prove a financial benefit to his company. After much correspondence and telegraphing back and forth the directors finally held a meeting, at which the superintendent was present and explained his ideas fully. The directors were satisfied of the advisability of the suggested change, though it would involve the expense of a large amount of money. They finally, somewhat reluctantly, told the superintendent to go ahead and make the change. He returned to the mine, several hundred miles distant, after having ordered the furnaces. Almost immediately upon his arrival at the mine he commenced blowing out the furnaces and as rapidly as possible to tear the old brick stacks down. Within ten days he wrote the head office detailing progress in demolishing the old plant. The effect of this letter was almost electrical. Another meeting of the board of directors was held, at which it was determined that such unwarranted, precipitate action on the part of the superintendent was unheard of—how did he know but that they might want to reconsider the matter, change their mind, and countermand the order for the new furnaces. The promptitude of the superintendent almost cost him his place. However, he finally got them down to a business basis again and the work proceeded without further interruption. A large portion of the timber and lumber of the old plant was used in constructing the new. When the new furnaces were in readiness, one after another was blown in, and the first charges consisted of the bricks and refuse obtained from and about the old furnaces. The men found upon digging beneath the site of the old brick stacks that the metal had penetrated some distance into the earth. All this was cleaned up and charged into the new furnaces. The result was a large quantity of high-grade bullion—far higher than had ever been shipped from the mine at any previous time. The effect of this surprising output in the home office may be imagined, and it was all laid to the superiority of the new water jackets and the good judgment of the superintendent. When the waste and refuse of the old plant were exhausted, ore from the mine was again charged as formerly and the grade of bullion dropped from about $400 to $150 per ton. When the first consignment of the latter grade reached the home office the superintendent received a telegram reading "Make no bullion under $400 per ton." In reply to the mandatory telegram the superintendent was obliged to write a long letter explaining that the directors would have to furnish a correspondingly higher grade of ore to reach the $400 bullion mark. Incidentally I will add that the debris of the old plant which was run through the new paid all the cost of the change, and the ore was treated to a greater advantage at lower cost. MINER.

THE value of a pan prospect can only be determined when every factor in the case is known. One frequently hears an expression of satisfaction or pleasant surprise at the sight of gold in a pan prospect, with a remark as to its richness or poverty, when the observer knew nothing whatever of the quantity of ore or gravel from which the prospect resulted. It may have been an ounce, it might have been a pound or more. The value can only be determined when the relation of the quantity of material taken to the result in gold is known. Even when the quantity of ore or gravel is known, it is not always safe to venture a guess as to the value per ton unless one has become familiar with the material by frequent tests verified by assays, or treatment in mill or sluice. Many prospectors hazard a calculation as to the value of the ore by counting the number of colors, each color representing an arbitrary value per ton, as one color $1.50 per ton, twelve colors $18, etc. How unsafe this is may be readily understood when consideration is given to the fact that the colors, being very small, usually, give no indication of their shape. Light, scaly gold, while making a good showing, will not weigh up with round, shot-like gold, apparently much inferior in size. When one becomes accustomed to the gold in any particular mine, he may then make a fair approximation of the value of his ore by pan prospect; but if he remove to a new locality, all this has to be learned again by experiment.

Cinnabar in San Luis Obispo County, Cal.

Written for the MINING AND SCIENTIFIC PRESS by F. VON LEICHT, E. M.

Deposits of cinnabar in the rocks of the Santa Lucia range of mountains have been known to exist in San Luis Obispo county as early as 1862, when Mexicans opened the first mine, and since then many other cinnabar prospects have been found and over 150 claims located.

Among these, the Oceanic mine is the most important in production of quicksilver as well as in the extent of its ore deposit. The mine was worked during the years from 1876 until 1879, when the price of quicksilver went down to $25.25, a price which forced most of the quicksilver mines in this State to shut down, the Oceanic mine being among this number.

The Oceanic mine is located in the hills north of Santa Rosa creek, five miles east of Cambria, along a large fissure which follows near the contact of sandstone and serpentine. The trend of this fissure is nearly east and west and the outcroppings of the harder portions of the vein can be plainly seen, reaching to the west towards the ocean and extending to the east into the higher parts of the mountain range. The ore is mainly composed of material derived from attrition of the two rock formations, and this material has been recemented, more or less, and is of different grades of fineness and cohesiveness, being classified as sandstone, loose sand and mud rock. All these grades of vein material are impregnated with cinnabar and sometimes with small globules of native quicksilver. The average ore contains nearly three-fourths of one per cent in cinnabar distributed through the mass of vein material in small grains, in small seams and sometimes in small masses.

The fissure which contains the sandstone ore body has a length of 250 feet and a varying width from 6 to 22 feet, while the fissure filled with the so-called mud rock is about 50 feet in width and probably of the same length as the sandstone ore shoot, the two ore bodies being separated by a barren sandstone formation about 20 feet in width. The sandstone vein has been penetrated to the depth of 600 feet and is shown to contain the same character of ore to that depth, while the mud rock deposit has been only opened to 150 feet in depth, showing the same width of deposit there and indicating that it will reach to greater depth. There is a large quantity of ore in sight, all of similar grade and value. The country around the mine is delightful, and Cambria is a thriving little town of about 350 inhabitants, where nearly all supplies needed at the mine can be purchased at very moderate prices.

A NEW EXPLOSIVE is being experimented on at Sydney, Australia. It is called kallenite, and differs from dynamite in that, instead of being largely composed of an incombustible base-like infusorial earth, eucalyptus leaves and ti-tree bark are used. These contain a large quantity of gas, and their combustion adds to the force of the explosion. The whole compound, in short, is explosive, and this, it is claimed, adds to its efficiency and economy at the same time. In the experiments at Sydney four holes were drilled to a depth of 16 feet, and each was charged with twelve pounds of kallenite. The charge was fired by electricity, and dislodged with comparatively little upheaval 200 cubic yards of stone. There was little noise and hardly any perceptible smoke or fumes. These qualities would indicate kallenite to be a desirable explosive for military as well as for mining purposes.—Johannesburg, S. A., Mining Journal.

CONCERNING silver, former Director of the Mint E. O. Leech is credited with saying: "It is my suspicion that some one in London may profess to have advance information in regard to the recommendations to be made by the Indian currency commission, which has been taking testimony for several months and is expected to make a report next fall. If it is contemplated to reopen the mints of India to the coinage of silver upon any terms, in order to supply the need there for more currency, the demand thus created would tend to advance the price of the metal more than any other influence. The belief that such a step might be taken, whether well founded or not, has influenced the silver market on several occasions since the Indian mints were closed in 1893."

THE Ute reservation in Colorado was thrown open to occupation at noon on May 4th by proclamation of President McKinley. The strip is fifteen miles wide by sixty in length and embraces valley and mesa lands. Only a limited amount of prospecting has been done on the reservation, but it is believed to be underlaid by coal and oil.

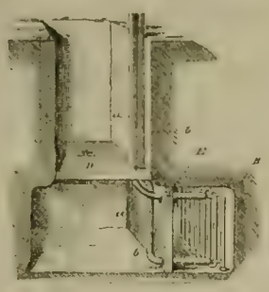
THE powder works at Point Pinole, in Alameda county, Cal., exploded on the morning of the 4th inst., without killing any of the workmen, fortunately, though there were several who had narrow escapes. This is the second time within a year these works have been destroyed.

Latest Mining and Metallurgical Patents.

Patents Issued April 25, 1899.

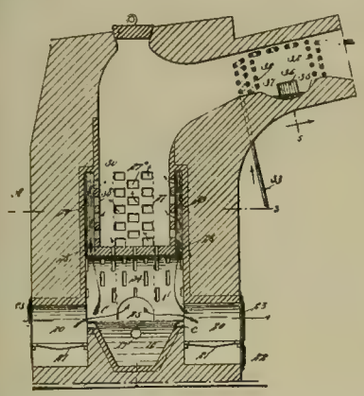
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR FACILITATING EXCAVATING OR MINING.—No. 623,598; H. Francis, Madison, N. J.,



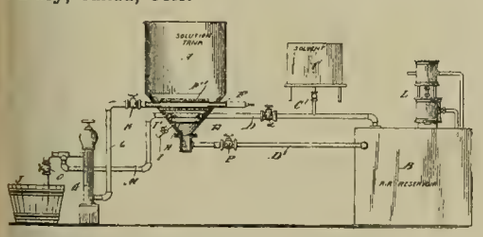
An apparatus for facilitating mining operations in frozen soil, the combination of the descending and return pipes *a b* having horizontal lateral bends, an upright or perpendicularly presented movable coil *B* forming extremity or connection between pipes, the upright movable shield *E* for confining the heat and protecting operatives, and movable non-conductive diaphragm or shield *D* for preventing displacement of the warm air by cold air.

SMELTING FURNACE. — No. 623,762; C. Bishop, Knoxville, Cal.



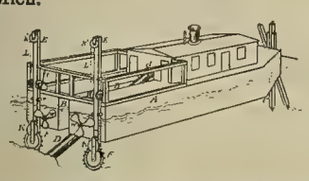
Smelting furnace, provided with fireboxes, an ore supporting arch between the fireboxes into which the said fireboxes open, and side flues having lower ends leading through the arch provided with perforations in their inner walls, an exit flue provided with a settling box, a condenser in the said flue, fireboxes opening into the central chamber, a settling pot in the bottom of the central chamber and provided with a slag and a bullion off-take, a bullion pot into which the bullion off-take leads, an apertured arch above the settling pot, and apertured flues, two of which lead through the sides of the arch at the bottom and the other two through the top at the ends.

APPARATUS FOR LEACHING ORES.—No. 623,772; A. F. Duey, Salida, Colo.



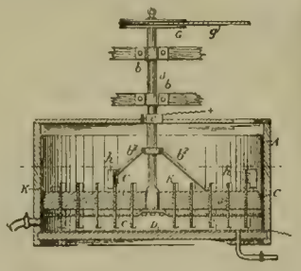
Leaching apparatus, comprising leaching tank or vat, means for forcing air through the ore with the leaching liquid, a hollow filter in the tank above the inlet for the air and leaching liquid, a pipe leading from the filter, a pump connected with the pipe leading from the filter, an air compressor, a tank for storing leaching liquid, perforated pipe in the bottom of the leaching tank, connections from the air compressor and liquid storing tank to the perforated pipe, perforated drainage pipe in the bottom of the tank, and layer of filtering material about said pipe.

HYDRAULIC DREDGE.—No. 623,804; B. H. Muehle, Detroit, Mich.



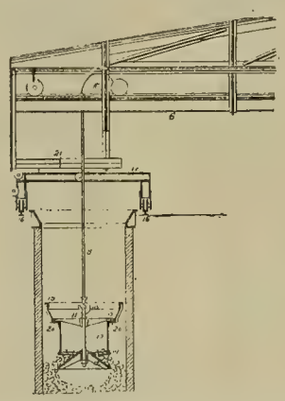
Dredge hull provided with an upright spud at or near one end, and a traction wheel carried by said spud, traction wheel constructed and arranged to travel on the river or analogous bottom transversely of said hull, whereby the end of the dredge hull to which the traction wheel in engaged may be moved laterally. A vertically adjustable suction tube *D*, and moving around a pivotal spud *C* by means of one or more traction wheels *F* upon spuds *E*.

APPARATUS FOR TREATING ORES.—No. 623,822; Luis Pelatan, Paris, France.



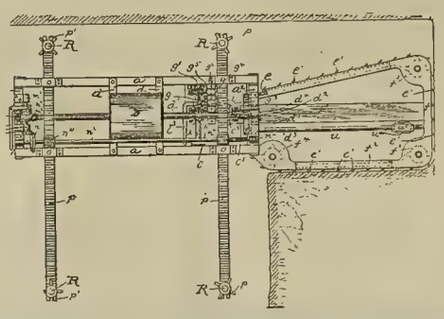
Apparatus of the kind described, combination with a vat, of a mercury cathode at the bottom thereof, an anode suspended in the vat entirely from above whereby an unobstructed space is provided between the surfaces of the anode and cathode, said anode consisting of an arm extending close to the sides of the vat, and pins or stirrers projecting from said arms upwardly and downwardly to within a short distance of, but none of them touching, the cathode. The combination with an annular vat, of an annular mercury cathode at the bottom thereof, a rotatable annular cathode above and parallel to the cathode, the anode consisting of arms extending close to the inner and outer internal walls of the annular vat and provided with pins or stirrers projecting from arms upwardly and downwardly to within short distance of, but none of them touching, the cathode.

BLAST FURNACE CHARGING APPARATUS.—No. 623,854; S. T. Wellman, J. W. Seaver, and C. H. Wellman, Cleveland, Ohio.



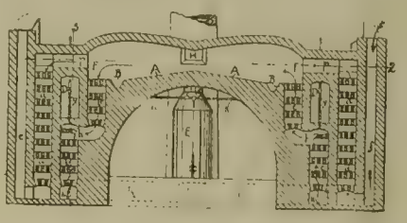
An apparatus for feeding or charging a furnace, comprising a main crane having a portion extending over the furnace, a bucket suspended from said crane and having a movable bottom connected to the suspension device, a raising and lowering device on the crane for said bucket, a flange on the bucket and a ring adapted to engage flange and support the bucket, a supplementary crane having raising and lowering mechanism for ring, a structure depending from the main crane and adapted to support the bucket when the support of the suspension device is removed.

MINING MACHINE.—No. 623,924; J. M. McHugh, Boston, Pa.



Mining machine, the combination of a suitable frame, cutting mechanism on frame, means for advancing cutting mechanism longitudinally into the coal and for moving frame transversely of the cut, a rocking bar on frame, a cutter guide on bar adapted to form a longitudinal groove in the coal, and means for locking bar in position, the combination of a main frame having channel bars extending longitudinally thereof, the open faces of channel bars facing each other, downwardly projecting flanges on bars, pins passing through bars and flanges forming racks thereon, a movable frame, cutting mechanism carried by frame, a shaft on frame, pinious on shaft engaging racks, and mechanism for rotating shaft.

ROASTING AND SMELTING FURNACE.—No. 623,833; J. A. Russell, Tacoma, Wash.



A roasting and smelting furnace having a hearth sloping and widening from a central summit, superheating and gas generating chambers at each end of said hearth, generating chambers each divided by an offset into two parts, an opening from side to side of the furnace above the lower part of each of said generating chambers and means in openings for alternately discharging liquid hydrocarbons into said lower generating chambers.

Fireproof Mortar.

Many mixtures have been tried by builders and architects with a view of producing mortars which will really possess fire-resisting properties, and nothing satisfactory up to the present has been discovered; but now some one has discovered that serpentine rock, which contains a considerable amount of asbestos, possesses very high fire-resisting properties. This rock, when powdered and mixed with good lime, etc., can be heated up to 1100° F. without experiencing any damage whatever.

One of the great dangers when a building is on fire is that the mortar after being heated cracks or disintegrates when water from the firemen's hose is thrown upon it. The new material, however, it is claimed, can be heated to 1100° F. and immediately plunged into water without cracking. Another great advantage possessed by this new material is its high degree of elasticity. The advantage of this will be readily appreciated by architects and others who are constantly called upon to advise with regard to sinking or settling buildings. As soon as the building begins to settle, ordinary mortar begins to crack, but this new mortar is so elastic that it does not crack, but simply yields to the strain. But perhaps one of the most remarkable properties of all is the ease with which nails can be hammered into joints made with the new mortar without damaging it in the slightest degree. It flows readily from the trowel and can be easily pointed up.—Iron and Steel.

Serpentine is very abundant in California, but it does not usually contain asbestos in any considerable amount. Small veins of crysotile in serpentine masses are not of infrequent occurrence, and occasionally a locality is found where asbestos occurs in considerable abundance, which, though unsuited to the ordinary uses to which that mineral is put, may be sufficiently good for the purpose of making fireproof mortars, as described above.

The Copper Combine.

The much talked of copper combine has at last taken tangible shape. The Boston *Financial Review* says:

The charter of the Amalgamated Copper Co. (present issue of capital $75,000,000, with power of unlimited increase) has been filed at Trenton, N. J. In New York City the Amalgamated Copper Co. organized for business with the following officers and directors: President, Marcus Daly; vice-president, Henry H. Rogers; secretary and treasurer, Wm. G. Rockefeller. Executive Committee—President ex-officio, Wm. Rockefeller, Henry H. Rogers, A. C. Burrage. Directors—Marcus Daly, Wm. Rockefeller, Henry H. Rogers, A. C. Burrage, Robert Bacon of J. P. Morgan & Co., R. P. Flower of Flower & Co., F. D. Olcott, Pres. Central Trust Co. of New York, James Stillman, Pres. National City Bank.

Seventy-five million dollars of the capital stock is offered for public subscription at $100 per share by the National City Bank of New York.

Golden Gate Mill, Mercur, Utah.

In a recent issue appeared two illustrations of the Golden Gate mill, Mercur, Utah, the largest cyanide mill of the kind, and on page 477 is presented what is in some respects a better outside view of the mill, which has attracted considerable attention. The ore is broken to 2-inch ring by No. 6 Gates crushers, and subsequently reduced to suitable cyaniding sizes in nine sets of Gates rolls, operated in series.

Manner of Determining the Quantity of Water and Sediment in Crude Petroleum.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER.

The presence of water in crude petroleum oil can be detected by flooding a pane of glass with the crude oil, so that a thin film of the oil is left upon the glass, and then holding the glass before strong daylight; if water is present, it will show as bright round spots in the darker ground of the film of oil. To make sure that these brighter spots are not air bubbles, they can be pricked with the point of a needle.

In Allen's "Commercial Organic Analysis" the following occurs: "The water and sediment present in crude petroleum of Pennsylvania are usually determined by mixing the sample with an equal quantity of petroleum spirit and keeping the mixture at 49° C. (= 120° F.) in a graduated glass vessel for at least six hours, after which the liquid is allowed to cool and settle for a period of not less than two hours for light-grade oils, increasing to eighteen hours for the heaviest qualities."

This test is good for such oils as have a paraffin base, such as the Eastern oils, as paraffin is soluble in petroleum spirits; but where the base of the oil is asphaltum, as at Summerland, the asphaltene, one of the constituents of asphaltum, being insoluble in petroleum spirits, remains undissolved. The undissolved asphaltene sinks slowly down through the solution and floats upon the surface of any water that has already separated from and reached the bottom of the tube. This stratum of asphaltene arrests the further settlement of any asphaltene sediment and water which were gradually sinking towards the bottom of the tube. The water, asphaltene and sediment form a mechanical mixture which is called "sludge."

California oils sometimes contain water to the extent of 15%, and if very heavy a considerable amount of silt. The following table gives the specific gravity of some petroleum oil and solvents for the same:

	Specific Gravity.
Petroleum spirits, a solvent of Eastern petroleum oil and paraffin, but is not a solvent of asphaltene	.725
Solvents of Eastern and California petroleum oil, paraffin and asphaltene:	
Turpentine	.870
Chloroform	1.527
Carbon disulphide	1.292
Eastern oil paraffin base	.823
Summerland oil asphaltum base	.957

Crude Eastern oil having a specific gravity of .823 is considered so dense that water and sediment will not settle from it without decreasing its density by the addition of petroleum spirits. One part of Eastern petroleum and one part of petroleum spirits give a solution having a specific gravity of .774 as follows:

	Specific Gravity.
One part petroleum spirits	.725
One part Eastern oil	.823
	1.548

and 1.548 divided by 2 equals .774, the specific gravity of the solution.

Even if petroleum spirits was a solvent of asphaltene, how absurd it is to attempt to determine the quantity of water in the Summerland oil which has a specific gravity of .957 by adding an equal amount of spirits of petroleum having a specific gravity of .725, which forms a solution having a specific gravity of .841, being a liquid denser than crude Eastern petroleum, from which it is claimed that water and sediment will not settle without reducing its specific gravity by the addition of light solvents. But this manner of determining the amount of sediment and water in crude and heavy California oil is in general use.

The following is one of the laws of solution: Let there be two liquids (Summerland oil and petroleum spirits) which dissolve one another only partially; then a homogeneous solution may always be produced by adding a third liquid (in the case of the Summerland oil—turpentine, chloroform, or bisulphide of carbon, which are solvents of asphaltene as well as the spirits of petroleum) which mixes in all proportions with each of the original pair.

Petroleum with an asphaltum base, and the solvents of asphaltene, all possess a high specific gravity, consequently a ternary mixture of crude Summerland oil, the solvents of asphaltene, and petroleum spirits, will require a large proportion of the light petroleum spirits in order to reduce its density to a degree that is suitable for the settlement and separation of water or sediment that may be mechanically held in the oil. For instance, in order to produce a solution of nearly the same density as is employed in the determination of water and sediment in the Eastern oils, the following proportions would have to be employed:

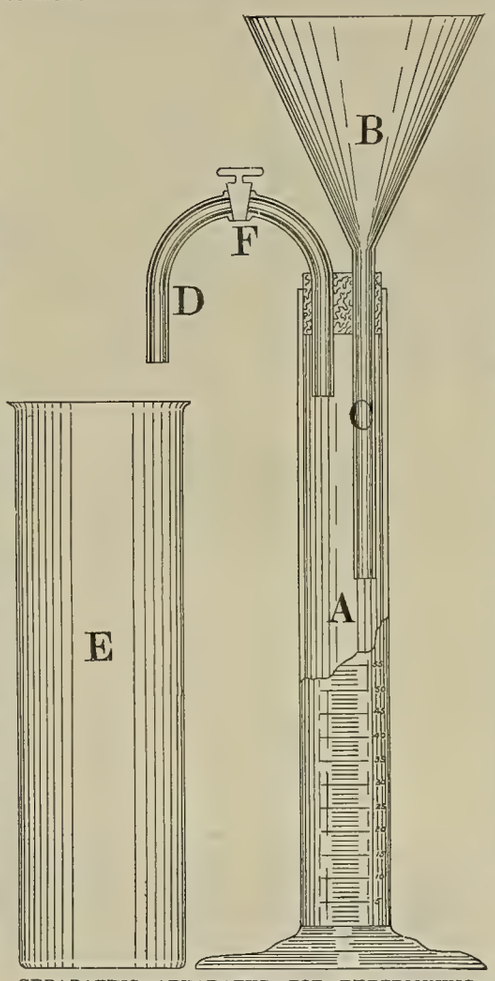
	Specific Gravity.
One part Summerland oil	.957
One part carbon bisulphide	1.292
Fourteen parts petroleum spirits	10.150
	12.399

and 12.399 divided by 16=.775, the specific gravity of the solution, or the following:

	Specific Gravity.
One part Summerland oil	.957
One part turpentine	.870
Five parts petroleum spirits	3.625
	5.452

and 5.452 divided by 7=.779, the specific gravity of the solution.

In reducing the heavy California petroleum oils by solvents to a density equaling the lighter Eastern oils reduced by petroleum spirits, a much larger amount of solvent is required; in fact, the amount of solvent is so great that it becomes impossible to ascertain the amount of water and sediment present by the use of an ordinary graduated glass vessel. To overcome this difficulty, the following apparatus can be used:

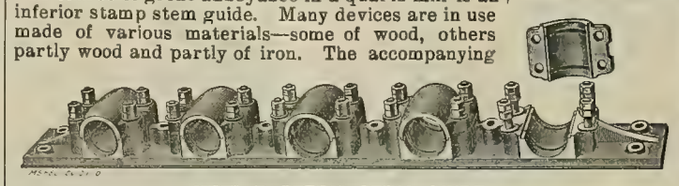


SEPARATING APPARATUS FOR DETERMINING AMOUNT OF WATER AND SEDIMENT IN CRUDE PETROLEUM.

The separator consists of a graduated cylindrical vessel *A*. Extending down into the cylinder *A* is the tube *C*, coming from the funnel *B*, as the water and sediment is heavier than the solutions described above, when the mixture of oil, water and sediment runs into the separator from the tube *C*, the water and sediment sinks to the bottom and the oil runs off through the pipe *D* into the vessel *E*. The cock *F* regulates the flow of the fluids. The amount of oil examined is of such volume that each division of the graduation on the glass is 1% of the same.

A New Battery Stem Guide.

A source of great annoyance in a quartz mill is an inferior stamp stem guide. Many devices are in use made of various materials—some of wood, others partly wood and partly of iron. The accompanying



NEW BATTERY STEM GUIDE.

illustration is that of a new device manufactured by the Globe Iron Works of Stockton, Cal.

There is no wood or babbitt metal used in its construction. It is made of the best quality of cast iron, the back of the guide being one solid piece, secured to the battery guide beam with bolts. The guide is so constructed that any stem can be readily removed, independent of the others. The bolts holding the caps in position do not pass through the back plate, but are set in a recess and may be removed. They are superior to the old-style wooden guides and will not cut or score the stems, as the stems immediately center on coming in contact with the guide.

The stems have very little play in the boxes, moving up and down without perceptible vibration. This has a tendency to make the shoes and dies nearly even and lessens the likelihood of breaking the stems. The weight of the guide complete for five stamps is 165 pounds.

Dredging for Gold.

The gradual erosion of gold-bearing banks by the streams and rivers naturally causes a deposition of strata lower down, containing more or less gold. These alluvial bottoms, sedimentary bars and beds of streams have, until recently, been considered as beyond the reach of any ordinary method of working.

They were not capable of being washed or sluiced, because they were already at the lowest level. Various attempts to dig the material up and elevate it into sluices, from which it could be worked, were made; but the constant presence of water in such workings and the great cost, or impossibility of drainage, rendered such efforts abortive. Miners were compelled to be content with scratching the surface or sinking shallow pits until overcome by the water, and speculating upon the unknown and untold riches that lay just beneath their feet.

The bottom of the alluvial deposit, or "bedrock," as it is termed, is generally where the richest pay is found, due to the natural gravitation of the gold. Thus it comes about that attention has been turned to dredging as a method of reaching these deep and submerged deposits effectively. On the face of it a simple enough problem, yet what vast sums have been spent in the mistaken efforts of those who did not fully appreciate all the conditions involved, and how elusive the little yellow grains are when attacked under water! The seductiveness of the gold attracts many to engage in a mad and determined search for it, and it is not strange that, like moths around a candle, some should come to grief.

The truth is that gold mining is a business which must be learned, like any other business, and it is just as amenable to the natural laws which govern it as any other of the practical sciences. What would be said of a tailor who engages in watch making, or of a merchant who engages to design a bridge or a locomotive? Yet we see the merchant, the manufacturer and the business man launch out into gold mining and make simple calculations of the enormous wealth that can be taken out of their claims at so much per cubic yard, and assume all the responsibility of the practical and technical work.—A. W. Robinson in Cassier's Magazine for May.

The Electro-Zinc Process, and Experimental Researches Which Led to Its Development.

In the issue of Feb. 18th, '99, under the above title, appeared an interesting paper by W. Bettel of Johannesburg, S. A. The author sends corrections, which change certain paragraphs to read as follows:

From the rapidity with which the gold in slimes dissolved in weak cyanide solutions I concluded that the state of division of the finer particles of gold in slimes approximated to that of the particles which, prepared chemically, cause a pink coloration in water, or, as is suggested by R. Zsigmondy, is in actual solution as so-called "colloidal" gold.

I thereupon made a solution of gold containing five milligrammes of gold per litre and added thereto a reducing agent in sufficient excess to separate metallic gold in the pink state. The liquid was then diluted to twenty times its volume.

This represented the amount of gold in an actual slimes pulp, carrying 3% of slimes assaying 5 dwts. fine gold per ton. In this solution was diffused some slimes residues from my filter-press treatment containing no free cyanide and only three grains fine gold per ton, in the proportion of 300 grammes per 10 litres (= 2.2 gallons), and then 22 grains of lime finely ground—the lime was white and well burnt—the slimes precipitated carrying with them practically all the gold.

THE American Smelting & Refining Co., the new corporation comprising the eighteen big smelters of the United States, recently incorporated, it is reported will make Denver, Colo., the center for the purchase and distribution of ores and the headquarters of its metallurgical works.

Metallurgic Standards.*

By FREDERICK T. SNYDER.

It is perhaps because of its great antiquity and the force of established custom that modern scientific methods have been so slowly adopted in metallurgical work. The other industrial branches that have to do with the transformation of power into useful results are found to have standards of comparison complete in proportion, as the industry is young, perhaps the most complete being the youngest of all—the commercial utilization of electricity. There is available in the transactions of various associations of mining interests a mass of records covering the operation of many plants under a wide variety of conditions—records that just miss being of great value, because they are expressed in units that are not standard, making the utilization of the experience they record impracticable. Speaking for my own department of the metallurgy of the precious metals, the great need is a group of standard units by which the results of one establishment may be utilized in planning and operating another under somewhat different circumstances. The most pressing of these are:

First.—A unit of weight.

Second.—A scale of sizes for crushed ore.

Third.—A coefficient that shall represent the mechanical condition of the ore.

Of these, the second has to do with milling work alone; the first and third underlie the operations of both milling and smelting.

The unit of weight is in much the most satisfactory condition. To the extent of which it is individually a factor, results can be expressed in terms whose accuracy lies within the limits of error of the ordinary observation. Its usage and form leave much to be desired. The common unit of weight in metallurgic work is the ton. The question at once arises, in considering a record: which of the four tons in extended use is it? Especially as their variation is too small to admit of the question being answered by a direct consideration of the records themselves. Fortunately, one of them, the metric ton, is rapidly driving the others out of use. It is desirable that forethought should be used in aiding its introduction, that multiple standards of weight may end as soon as practicable. Of the value of its decimal notation little need be said. Its close correspondence with the present English long ton (2205 lbs. in place of 2240 lbs.) involves in its introduction the minimum change in one's standards of experience. An additional feature, of distinct value from our present point of view, is the correspondence it brings about between laboratory and mill calculations. It is desirable that all weights in metallurgic practice should be "dry weights," and that a definite statement of the determination of moisture should form part of each record. It should be understood that competent assays and analysis are always made on dried pulp, and that they are of value only as applied to "dry weights" of ore. The practice of obtaining the weight of ore by calculation from volume is to be condemned. Estimates made in this way are practically worthless as records. Fallacious values that lead to disappointing investments can frequently be traced to this practice. A scale can so readily be introduced at some point in any process on which the pulp can be actually weighed, that a desire to avoid complication can hardly be urged in extenuation.

When we turn to a consideration of units of size, for crushed ore, we are at once in contact with the illusive question of "mesh."

These concentrates were crushed through a thirty-mesh screen. What does it mean? That it was a screen having thirty wires each way per lineal inch? Possibly, that was originally what it meant, but the screen that these concentrates came through had no wire at all. It was an indented slot screen. Even if it had been a wire screen, who is going to tell how much of each thirtieth of an inch was wire and how much hole. Then was it a woven screen or a sewed one? If woven, was it double-crimped or single? But grant that these are all known and made matters of record; that the available free area of the holes has been ascertained by a round taper needle, will this tell what sized tetrahedron of quartz will go through that same hole.

The angle at which the material strikes a screen is a factor in determining the size of the particles that go through.

Forty-mesh pulp (whatever that may mean) is produced by a twelve-mesh screen by throwing the material against it at a small angle—a feature of great importance to leaching plants, where the possibility of dry crushing and screening often means the difference between success and failure. It serves to illustrate most pertinently how wide a range of ratios the mesh of a screen has to the maximum size of the product passing through.

In stamp mill work another indefinite factor is the height of discharge. With the same screen the average size of the issuing pulp can be halved by doubling the height of the discharge. How are we to compare results? Because one battery with a thirty-mesh screen and a 4-inch discharge saves 60% of the gold in an ore on the amalgamated plates below, is it an inferior machine because the next battery with the same thirty-mesh screen, but an 8-inch discharge, saves 70% of the contained gold? A proper screen analysis of the pulp would explain the difference, and again illustrate what an indefinite standard "mesh" is when taken alone.

The necessity for definite data in my own work has led me to abandon screens entirely as primary standards of size and to measure the minimum diameter of the ore particles directly by a specially constructed micrometer. The special features consist in tipping the calipering points with disks one centimeter in diameter, the surface of which are parallel within one-thousandth of a millimeter (one thirty-thousandth of an inch) and in making the lower disk movable. In use, the micrometer is held vertically, the lower disk slid down and the ore particles, wet or dry, put upon it. It is then raised until the stop on the handle comes in contact with an adjustable shoulder. The lower disk is then locked in position by a screw. A series of tests has shown that this lower disk can be repeatedly replaced in the same position within one-five-hundredths of a millimeter, when working rapidly and without especial care. The upper disk is then unlocked by a screw, and, by the handle, is screwed down upon the ore particles. When the pressure of the ore particles reaches a predetermined and uniform pressure, a ratchet in the handle slips and the rotation of the barrel and advance of the disk stops. The amount the disks are separated is then read in hundredths of a millimeter on the scale. The upper disk is retracted by rotating the barrel and the lower disk withdrawn and the ore particles removed. The range of the instrument is from one-hundredth of a millimeter to about four centimeters, the precision being uniform over the entire scale, at about one-five-hundredths of a millimeter for groups of ten observations. It has been used so far entirely in the calibration of laboratory screens. A given material, to be examined, is screened, and the minimum diameter of the maximum-sized particles passed by the screen is determined by the micrometer. This is then marked on the screen and used in records where the mesh of the screen was formerly recorded. It should be noted that the screen will not calibrate the same for different materials, having different systems of cleavage, such as coal and quartz. Independent constants should be determined for each. The following screen analysis of tailings from the Belmont mine, Ontario, stamped through smooth slot screens, called 50 mesh, taken Sept. 27th, '98, will illustrate its use:

Milligrams.	*Per cent.*	*Maximum size millimeters.*	*Through corresponding mesh stamped on screen.*
5,640	100	.83	(on) 40
636	11.3	.50	40
432	7.7	.23	60
4,570	81.1	.17	80
5,638	100.1	...	..

Concentrates crushed on a mortar through a 100-mesh wire screen gave an average of $\frac{1.5}{100}$ of a millimeter. It should be noted from the construction of the micrometer and its method of use that it is the size of the largest particle or the actual free area of the screen that is determined.

A definite unit of size once available, it becomes of interest to determine whether some coefficient cannot be arranged that will permit of legitimate comparisons being made between the work of different mills under different conditions.

Other conditions being the same, it is evident that the amount of gold that will amalgamate from any given ore will be proportionate to the total area of surface exposed by crushing. In a given weight of ore the number of particles is inversely proportional to the cube of the diameter of each particle.

The area of each particle is proportional to the square of the diameter.

Therefore the total surface area of the particles in any given weight of ore is inversely proportionate to the average diameter of the ore particles.

In a leaching proposition the metal dissolved is proportionate to the area exposed, other conditions being equal.

It is evident that the work done in crushing ore is proportionate to the surfaces separated.

*Condensed from a paper read before the Canadian Mining Institute.

A Great Electric Ventilating Fan.

The well-known Hoosac tunnel, near Fitchburg, Mass., will soon be thoroughly ventilated, says the *Electrical Review*. One of the largest ventilating fans ever built will be placed at the western end of the tunnel, and when it is in operation it will draw the smoke-laden gases and atmosphere from the interior. The fan will be 16 feet in diameter, with a capacity of 600,000 cubic feet per minute. It will be operated by electric power.

If this experiment prove successful, it is very likely that ventilating fans of similar design will be employed in ventilating mines. Small fans run by electricity and placed near the face of workings, where the air is bad, would be greatly benefited, as the foul air, being driven out, would be replaced by fresh air from the surface.

Gold Production of Klondike in 1898.

The San Francisco Mint has obtained a statement of the bullion production of Alaska received at U. S. Mints and assay offices and private refineries and smelters during 1898. This statement shows that Alaska produced in that year the sum of $2,517,121 in gold and $127,101 silver (coining value).

There have been all sorts of estimates made of the output of the Klondike for 1898, some of these running as high as $20,000,000. The more conservative persons, however, like the managers of the leading transportation companies, have been inclined to put the amount at about $10,000,000. All the institutions securing gold have made inquiry as to source, that is exact region, and record has been kept of this. The San Francisco Mint has prepared a statement of all bullion of Northwest Territory (Klondike) production received at all U. S. Mints and assay offices and private refineries and smelters throughout the United States during the calendar year 1898. This shows the gold production of the Klondike to have been last year $11,038,478 and the silver $208,156 (coining value), or $80,498 commercial value. This statement proves that the amount of gold and silver named actually came out of the Klondike region in 1898. Doubtless some which was produced in that country during that year is still retained there; and some small amounts may have been carried direct to foreign countries without being sold or minted here. That which was retained will be duly credited to its source when it comes out this season. It must be remembered that in the Klondike the gravel is mined in the winter months and the gold is not washed out until the summer months when the thaw gives a water supply for the purpose. The figures given then practically show the result of the clean-ups of the summer of 1898, though some of the gravel may have been taken out in the fall months of the previous year. In the same way the gravel mined after the freeze in 1898 will only yield its auriferous contents during the summer of 1899. However, as the records are kept by calendar years, all this evens up eventually and the Klondike gets full credit for all its yield. It is not probable that any very large amount above the figures given was produced in the Klondike in 1898, as the number of months following the freeze of that year, and before December 31st, gave plenty of time for the gold to be brought out and counted in the year's returns of yield.

Motors in Mines.

In some of the mines on the Continent where both oil locomotives and electric motors have been used, some comparison between the cost of the two systems is possible. In one mine the cost of the former has been 1½d per train mile, as compared with 3½d in the case of the electric motor. The cost of two oil locomotives is said to have been one-fourth of the cost of one electric motor. The steam, nitrogen and carbonic acid evolved by the former is not enough to vitiate the atmosphere; and it has the advantage of compactness. It works on a 2-foot 1-inch gauge, and when exerting 6 H. P. is able to take a maximum load of seventeen tons. It is said that when running at the maximum speed of four and one-half miles per hour, and with the full load, the consumption of oil is barely six and one-half pounds per hour. An arrangement of friction clutches and chain gear on the crank shaft enables the engine to run backwards or forwards at the will of the operator.—Industries and Iron.

THE copper combine is said to be drawing off much of the speculative capital which would otherwise probably be engaged in exploiting other properties. The appearance of the new copper company is expected to be followed by a period of great activity and excitement in copper companies. It is understood that the basis upon which the different companies will go into the new company is such that on the earnings of the individual companies the new company will be able from the start to earn 6% at least on its $400,000,000 of capital.

THE directors of the New Primrose Mining Co. at Johannesburg, S. A. R., render the following report for the month of February: Mill—160 stamps ran 25 days 22 hours, crushing 21,731 tons of ore, yielding 6251.42 ounces of gold, at a cost of £17,135 2s 8d for milling, mining and general charges, including development, or 15s 9.2d per ton. Cyanide—About 15,096 tons of tailings treated yielded 4409.10 ounces gold; cost, £2617 16s 5d, or 2s 4.9d per ton. Financial—The total cost of working for the month has been £19,752 19s 1d.

NEARLY all the electric energy supplied in Hamilton, Ont., is conveyed from a distance of forty miles by the Cataract Power Co. The works of this company are located at De Cew Falls and were constructed at a cost of $600,000. This sum included not only the erection of a power house and the necessary lines for power transmission, but also a canal connecting with the Welland canal at Allanburg.—Electricity.

Mining Summary.

ALASKA.

It is reported a strike has been made on Forty-Mile, and miners are stampeding from Klondike to the American side.

The newly reported discoveries near Forty Mile are on Jack Wade creek. It is reached by passing up Forty Mile river to Fort Steel and up Steel creek, over the divide in what is known as the Healy mining district. There are side streams running from Jack Wade, but so far only two have been prospected. It is to these unprospected side streams that miners are heading. On Robertson creek as high as 40 cents to the pan was being taken out. It is twelve miles up Wade creek. On claim No. 8 above lower discovery nuggets worth as high as $44 have been picked out of pans that went as high as $22 in fine gold. From one hole $500 was taken. Bedrock is found at a depth of 18 feet.

ARIZONA.

(Special Correspondence.) — The veins at Stockton Hill, Mojave county, are well defined and usually of considerable continuity. In size they vary from a seam to several feet. The ores are principally galena, pyrite and chalcopyrite and zinc blende in greater or less amount. The value is chiefly in the silver, which occurs native in sheets and wires and also in the form of ruby silver, beside black sulphide. Specimens run up into thousands of ounces per ton. A cross lead on the Black Warrior claim is almost wholly quartz carrying a little copper sulphide and visible gold, while the Black Warrior vein itself is a heavily sulphureted vein, with values in silver and little gold. The mines could be reached to a depth of several hundred feet if a long tunnel were driven in from the south side of the hill, a feasible proposition.

Stockton Hill, April 29th, 99.

It is reported that the Old Dominion Copper Co. at Globe has absorbed the property of the Continental Copper Co., the price paid being $60,000 to $70,000.

H. E. Owen has been buying mining properties near Jerome and developing them. He is reported to have made a strike in one and has purchased machinery for development.

Prospectors report finding rich ore in the Canada del Oro, near the Mammoth mine.——The capacity of the Mammoth mine is to be doubled.

Kingman *Mineral Wealth*: Carter & Nellis have made the last payment on the Bullion-Beck mine, an extension of the Mollie Gibson at Chloride.——Jones & Dryden have good ore on the New London mine. It is about to be sold to Los Angeles parties.——The Kingman Sampling Works worked thirty-five tons of T. L. Ayers' ore this week from his mine at Cerbat, also gold ore for G. McGregor, from his mine in El Dorado canyon.——Work of development has commenced on properties near the Sunlight, owned by E. T. Loy and others.

Tucson *Citizen*: J. C. Valentine of Indiana is about to open an old property in the Sierritas, on which the Mexicans operated an arrastra many years.

Phœnix *Republican*: The Lottie mine in the Big Bug district has a tunnel in the ledge 1000 feet. Near the surface several ore chutes are known which will be cut by this tunnel. In this property a year ago, in a 200-foot shaft water was encountered that could not be controlled by pumps, the shaft filling with water. This led to the running of the tunnel.

Tombstone *Epitaph*: G. H. Dunlap is developing a copper property in the Huachuca range. It is the intention of his company to sink a shaft 700 feet in depth. The shaft is now down 300 feet.

CALIFORNIA.

Amador.

(Special Correspondence).—Several mining operations of considerable magnitude at and near Jackson have suspended work the past year. Whatever merit these properties may possess, the owners probably know better than the general public. One of them—the Alma—has expended a large amount of money and opened a great deal of ground. The property has been drifted between 700 and 800 feet along the vein, and about as much more ground lies within the limits of the claim upon which no development has been done. An ore shoot may yet be found by drifting the full length of the claim.

Jackson, May 1st, '99.

Supt. Dye of the Amador Queen No. 1 mine near Jackson will let a contract to run 200 feet of drift on the 1100 level. Power drills are to be used.

Jackson *Republican*: There is a report that the Bunker Hill mine near Amador City will change hands in June.——It is reported that C. D. Lane of Angels has bought two mines near Pine Grove and will soon begin their development.——It is reported that work at the old Newton copper mine at Ranlett, between Jackson and Ione, is to be resumed.——The Bellwether mine at Jackson will pass to a new company which will be known as the Hepburn G. M. Co. The work of sinking will begin in three months.

Butte.

Marysville *Appeal*: G. M. Sparks has filed a claim against Butte county for the sum of $6000, of which amount $4800 is alleged to be due for 240 loads—480-tons—of gold-bearing gravel and tailings removed by O. M. Turner et al. under orders of Supervisor Ormsby from his (Spark's) land and used on the county road. He values said gravel at $10 a ton.

Oroville *Mercury*: Machinery for the Golden Trout mine, on the South Fork between Lumpkin and Strawberry Valley, will arrive soon and the saw mill, which is to cut lumber for the buildings, mill, and mine timbers, will be built. The ledge is said to average 5½ feet, never less than 4 feet. Five tunnels have been run, three on one side and two on the other side of the river, the length of ledge shown being 1500 feet. A shaft is being sunk on the east side of the river and an upraise to connect two of the tunnels has been begun. A 10-stamp mill will probably be erected. J. Watson is Supt.

Calaveras.

At a recent meeting of the stockholders of the Gwin M. Co. the following officers were elected: F. F. Thomas, Pres.; C. S. Benedict, Vice-Pres.; J. J. Crawford, Sec. Directors—E. C. Voorheis, C. M. Belshaw, D. McClure Jr., D. C. Hyland.

A corporation has been organized to operate the Lindsay mine near Angels, about half a mile west of the Utica mine.

San Andreas *Citizen*: Placer mining is active near Wallace; many locations are being made. New claims have recently been located three miles east of Sheep Ranch. The ore is high grade.——The Petticoat mine near Railroad being operated by Rosenfeld & Sons of San Francisco is looking well. There are 3000 tons of ore on the dump.——J. W. Anthony, representing San Francisco capitalists, has purchased the Oro Fino gravel mine on the Williams ranch, midway between San Andreas and Mokelumne Hill, from Edwards & Co. The mine has been worked in a primitive way. There is a tunnel 200 feet from which a crosscut 100 feet has been run and the old river bed found. Buildings will be erected on the property, new machinery will be placed and a process new to this county for handling gravel introduced.——At the Thorpe mine near Fourth Crossing thirty stamps are dropping, and sixty men are employed. The mill is operated with electric power and is lighted with electricity. The hoist is run by steam.

Mokelumne Hill *Chronicle*: It is reported that an addition of twenty stamps is to be made to the mill of the Gladiator mine, on Mokelumne river, making thirty. S. H. Lucas is Supt.——The Keystone mill is crushing ore from the Petticoat mine, near Railroad Flat.——Howard & Heuston have finished timbering the New York mine, near Railroad. The shaft is down 140 feet and is 4x8. The property will be developed by a San Francisco company.——Alexander & Parker of Cripple Creek, Colo., are to open up the Fair View mine, near Railroad.——The shaft on the Keystone mine is to be sunk 500 feet deeper.——The Kangaroo mine, owned by Beals & Trainor, one-half mile from Railroad, has a vein which averages 3 feet in width. Four shafts have been sunk on the mine, two of them being double-compartment. The deepest is 60 feet; one is 40 and two 30 feet.

San Andreas *Prospect*: It is reported that a strike was made in one of the upper levels of the Paragon mine near Railroad Flat recently. The company will drive a tunnel into the hill 1000 feet, which will tap the ledge at a greater depth. A large compressor will be installed, grading for which is in progress.——At the Petticoat mine, Railroad Flat, a pump station is being excavated at the 450 level. From a mill test the ore bodies in the 450 level proved better than expected. A contract has been let to sink the shaft 200 feet deeper.——Prospectors between Railroad Flat and West Point found pockets recently from which they took several thousand dollars.——The water is being taken out of the Poorman mine near Railroad Flat and the shaft retimbered.

El Dorado.

E. W. Chapman is developing the Gold Note mine, twenty-seven miles above Placerville. A double-compartment shaft is down 400 feet. The ledge runs from 5 to 7 feet in width. A new 20-stamp mill has been built and will soon commence crushing. Steam power is used. Water power will be added with a pressure of 400 feet.

Placerville *Republican*: A rich body of ore was discovered in the Mt. Pleasant mine near Grizzly Flat last week.

Placerville *Democrat*: A San Francisco company is about to take a bond on the Selby near Placerville.——The custom mill is running on ore from the Skinner mine near Placerville.

Inyo.

(Special Correspondence).—John Baxter is working a gold mine near Coso.——Rich gold rock is being taken from the Barnes & Anderson mine near Independence. Johnson and McGinnis also have a good prospect near the former mine.——D. Holland and partners have a 3-foot vein in the Guadalupe mine at Beveridge. Five men are at work sacking ore.——In the Panamint district the Harrison & Godmark 10-stamp mill in Pleasant Canyon is running.——It is reported that the World Beater has been sold by the Montgomerys. The ore is to be crushed in a rotary mill.——Thirty men are at work in the Anvil Springs camp eighteen miles south of Ballarat.——A. Williams has 12 feet of ore in the Birdie mine in Tuber canyon.——It is reported that the railroad is to be extended from Johannesburg in Kern county to Ballerat.

Kern.

A rich gold strike is reported from the desert, ten miles southeast of Kramer station. For a year Clarke, Duncan & Goldsberry have been dry-washing in that locality. Last November they found pay near Kramer. While dry-washing, they prospected for ledges. In January they found them. They have located twelve claims. The formation is described as quartzite and porphyry and the vein 20 feet wide.

Merced.

Hollister *Free Lance*: Coal has been discovered in the mountains southwest of Los Banos. Samples show the coal to be of good quality.

Napa.

The Ætna Co. is developing new ground, and the prospect is reported promising.

Mariposa.

(Special Correspondence).—It is again semi-officially reported that the Merced Co. will build an electric plant on the Merced river this season. Surveys of the river have been made from Merced Falls to Yosemite. The site selected is said to be just within the National Reservation.

Kendall Bros. & Whitney, who, under a bond, have been developing the Quail mine on Indian Gulch, have about completed a sale of their interests. At 700 feet their tunnel cut the ledge, showing 18 inches of high-grade ore.

The Mt. Gaines mill, near Hornitos, is now operating with electricity transmitted from Merced Falls.

The crosscut at the 200 level in the Murphy mine has cut the vein.

The 6-stamp mill on the Porter mine will be running by May 10th. Sinking will be at once resumed on the Mary Harrison and carried down to the 1000 level at least. Exploration of the hanging-wall country by crosscuts continues, the output of the mill has been somewhat increased of late by changes and additions to the crusher plant. Contracts have been awarded for a year's supply of wood for mine and mill, also for 2500 ties for the tramway to replace those of "Digger" pine laid a year ago.

Bear Valley, May 1st, '99.

Nevada.

The Grass Valley Miners' Union has joined the Western Federation of Miners.

Grass Valley *Union*: Last October a deal was consummated at Spenceville in the western part of this county of which no mention has been made. The paint and copper works there were sold to a company headed by M. B. Kerr. The copper mine has produced at a depth of 200 feet 50,000 tons of copper ore and the ore between the 200 and 100 levels has not been stoped out.——The new reservoir for the Empire M. Co. will be built by Horan Bros. It will be 310 feet long, 75 feet wide, with an average depth of 7 feet; 125,000 cubic feet will be excavated.

Grass Valley *Union*: Morse Bros. and J. Quinn are getting out timbers for a mill, which will be built on the property of the Otsego M. Co., on the Middle Fork, near Dodsons. Excavations for the mill have been completed. A wire rope tramway 1000 feet long will transport the ore from mine to mill.

Grass Valley *Union*: Thos. Hall shot and killed a Chinaman whom he found robbing his sluices at French Corral, a few days since.

Nevada City *Transcript*: S. Poorman of San Francisco and H. Davis of Auburn are at the Poorman & Hastings claim on the Middle Yuba, near Columbia Hill. The derrick and flumes washed away during winter will be replaced and the claim operated again.

Nevada City *Herald*: The Slide M. Co., operating on the South Yuba river, a mile and a half east of French Corral, will build a 10-stamp mill on its property, to be operated by electricity.

Placer.

Work is in progress at the Little Dipper mine near the Iowa Hill grade in Shirt Tail canyon. The mine is owned by Holmes & Pease of Yankee Jims. The old works have been timbered and arrangements are being made to breast the new gravel recently found.

J. Harrison, who is working the St. George gravel mine, has finished an upraise and is preparing to take out gravel. The tunnel is in 1200 feet.

G. A. Colwell has been taking out good gravel at his mine on Shirt Tail canyon. He is also prospecting a quartz ledge near his gravel claim.

Kavanaugh, Dougherty and Hodder, who have a lease on the Small Hope gravel mine, are cleaning bedrock. The mine is owned by Cranage & Federer.

The Trafton claim on Georgia Hill is being worked on a lease by Gilbert, McCoy, Lowell and Findley. The lessees are hydraulicking under permit from the U. S. Debris Commission. They use 100 inches of water under a pressure of 150 feet.

Auburn *Leader*: At Valley View mine new machinery is being put in which will double the capacity of the plant.——The Blue Canyon M. & D. Co. has its Azalea tunnel in 1430 feet, run for a gravel channel. Quartz veins have been struck in the tunnel.——At the California mine in Washington district a tunnel 2100 feet cuts the vein at a depth of 700 feet, and the ledge is 30 feet wide. The ore averages $6 per ton and is worked in a 20-stamp mill. The company will put in twenty more stamps this spring. The Supt. is Dana Harmon.——The Giant King near Washington is being developed by a San Francisco company, A. Pugh, Mgr. They have a large ledge of low-grade ore so situated as to handle it at a low figure. The same company is developing the Dillon mines, where they have a tunnel in on the vein 400 feet, with a depth of 250 feet.——The Eagle Bird has a 30-stamp mill at work. The mine is 800 feet deep. Thirty men are employed. G. W. Hall is Supt.——The Gray Eagle mine has a new air plant and is running a crosscut to tap the ledge 400 feet below the workings. J. Cohoe is Supt. This company has a mine on Canyon creek which is being developed.——The St. Patrick mines, six claims, on a ledge 50 feet wide, are opened by tunnels, giving a depth of 600 feet. They are building a 20-stamp mill and expect to add twenty more.

Grass Valley *Telegraph*: Directors of the Morning Star M. Co. held a meeting May 1st at Colfax. Pres. Neff and F. Richards were present. They decided to declare a dividend, No. 101, but the amount has not yet been made public. The dividends for March and April were $2.50 per share and in February was $3.50. For some time a hard formation has been encountered and the usual amount of gravel has not been taken out. The usual output is 900 cars a week, at present only 550 carloads being extracted.

Auburn *Herald*: Supt. T. W. Waterhouse has rebuilt the hoisting works at the Grass Ravine mine, which was burned a short time since, and is sinking the prospect shaft to 400 feet. The shaft is 235 feet deep in quartz. Six men are employed. The mill will be rebuilt as soon as the ore justifies. The ore from the bottom of the shaft shows galena sulphurets.——The Hathaway shaft, near Ophir, is down 630 feet and the ledge averages 2½ feet in width. The regular force is forty men, part of whom have been laid off during the repairing of the mill. Water is the motive power. The ledge runs east and west. A. B. Eastwood is Supt.——The Gold Blossom employs forty men. The mill has twenty stamps. The hoisting works are run by steam and the mill by water.——The Boulder mine, near Ophir, has been bonded and the shaft will be sunk deeper.——At the Bellevue the shaft is down 160 feet in good ore. The lessees, Brye & Lozano, have taken out some rich mill and sulphureted rock. The three shafts are to be sunk 1000 feet. These shafts are called the Center Star, the Belmont and the Almont. The first is 725, the second 250 and the third 530 feet deep. All the hoisting and drilling is done by air. Forty men are employed. E. J. Kendall is Mgr.

Colfax *Sentinel*: T. Browne, formerly of Red Point, has leased the Paragon drift mine at Bath and has with him D. J. Wheeler and W. H. Rea. They have given a sublease to Allen & Brown, who will work ten men, and also to Duffey & Greenwood. Work has commenced.——Development is in progress at the Caledonia mine on the middle fork of the American below Michigan Bluff. The ledge averages 5 feet. The upper tunnel is in 200 feet. Five men are running a tunnel 217 feet lower, now in 65 feet. The property has a 10-stamp mill.——At the Star drift mine at Last Chance, owned by G. Ray and H. May, two men make good wages from five cars of gravel per day.——Rich gravel is being taken from the El Dorado drift mine at Last Chance, owned by Ray & Co. The main tunnel is in 3600 feet.——At the Bishop mine at Last Chance, owned by H. Parmlee, one shift of men is taking out gravel. The main tunnel is in 1800 feet. Gravel is being taken from 300 feet in.——At the Savage mine near Bald mountain six men are employed. Supt. Savage is drifting north and south on the 200 level.——B. Kavanaugh is working his gravel mine on Bald mountain, where three men are employed sluicing. This claim has been worked each season for twenty years.——The Blue Eyes, a bench claim in Duncan canyon, near Bald mountain, is being worked with a pipe and sluices. The mine is owned by A. Nylen, Mrs. J. Dougherty, A. F. Sheehan and L. Woodworth.——J. Hodges of Yankee Jims is getting good returns from his gravel mine on the American river below Colfax.——The Washington drift mine is being worked by H. F. Adams. The tunnel is in 1000 feet.——The Cranage claim, owned by Federer, Enos & Cranage, northwest of the Small Hopes, is being worked on a lease by A. McCullom of Yankee Jims.

Plumas.

Quincy *Bulletin*: Eight stamps of the Crescent mill, near Crescent, are running, crushing ore from the Washington mine, owned by J. McGrath. Four more stamps will be started soon.——One hundred tons of ore taken from Dr. Carter's mine, near Crescent mills, was recently worked in the Crescent mill and yielded $5 per ton. J. Ghidotti has leased the mine from Dr. Carter.

Riverside.

Los Angeles *Mining and Metallurgical Journal*: At Virginia Dale the O. K. mine is the best developed mine in the district. It is down 200 feet, and the ledge is wider than at the surface, and is better ore. J. Ingersoll of San Bernardino is Mgr. He intends to sink another 100 feet, which will make the shaft 300 feet deep. The O. K. ledge is one of the strongest leads in the camp, there being 18,000 feet of this ledge located and many good prospects. Commencing at the south end and going north, first, is the Greenhorn, owned by Baird & Perry of Rialto, Cal.; the M. L., belonging to Palmer & Wellington of Los Angeles; O. K., owned by the O. K. Co.; Gold Basin No. 2, belonging to I. Reed; Single Standard; Dale, belonging to Reed & Curtis; Pipton, belonging to H. B. Botsford of Los Angeles; Jumbo, belonging to Ellerman & St. German; White Star, belonging to Furguson Bros., who have three more locations north of the White Star. The Greenhorn has a prospect shaft 12 feet. The M. L. has two prospect shafts; the O. K. one 20-foot shaft and main shaft 200 feet. It has 250 feet of drift at the 50-foot level, with upraise to the surface. At the 100-foot level it has a drift north 100 feet and south 200 feet, with upraise to the 50-foot level; and at 150 feet has 200 feet of drift running south, with upraise to the 100, and are drifting north and south at the 200. No ore has been stoped. The Gold Basin No. 2 has two shafts, one 50 feet and one 110 feet deep. The Single Standard has a tunnel in 50 feet. The Dale has one shaft 30 feet. The Jumbo has one shaft 80 feet and another 130 feet, with 100 feet of drift. The White Star has a shaft down about 150 feet, with some drifts and a tunnel 1400 feet in length.

Los Angeles *Herald*: McHaney & Pinkham have found a new mine. McHaney is one of the locators of the Desert Queen mine, and says the rock will average better than the Queen. The mine is twelve miles north of Indio. The vein is 4 feet wide.

Winchester *Recorder*: J. Norton has bought of W. P. Rice his interest in the Lettie and Anaconda mines south of Winchester. Assays show the ore to be rich.——Development at the Utica mine, twelve miles west of Winchester, shows a good body of ore.

San Benito.

Boston *News Bureau*: The New Idria Co. is sinking a new shaft, now down 200 feet, and should soon be in shape to double its output.

San Bernardino.

Redlands *Citrograph*: T. H. Oxnam and ten men from Delamar, Nev., arrived in Victor last week and went to the Gold Mountain

mines, where they will do development work on mines belonging to E. J. Baldwin of San Francisco. There has been no work done on these claims for twenty years.——The Silver Mountain mining district at Oro Grande has filed papers for record at the county recorder's office setting forth the reorganization of the district.

San Diego.

Los Angeles *Mining Review*: Straus & Shinn, who are operating the cyanide plant at the Stonewall mill, near Cuyamaca reservoir, are having trouble with the water company, who use the lake as a storage reservoir. The cyanide men were careful in placing their plant to avoid the possibility of contaminating the waters of the lake with cyanide solution. The tailings are elevated over a rise in the hill south of the lake and dumped into a gulch not tributary to the lake.

Shasta.

Redding *Free Press*: The Mountain Copper Co. will soon build a second matte furnace having double the capacity of the present furnace.

Sierra.

Downieville *Messenger*: Another strike has been made in the Mountain mine. The mill will soon be ready to run forty stamps.——W. York is running the lower tunnel and sinking the shaft at his mine. Some rock has been found in the lower tunnel, which prospects well. The mill is running day times.

National Bulletin: The Feather Fork G. M. Co. is washing the tailings dumped at the Thistle Shaft mine.

Solano.

Cordelia *X-Ray*: A flow of gas has been struck in a well at the Page tract below Cordelia, where boring for oil is in progress. The depth reached is 400 feet.

Tulare.

Porterville *Enterprise*: The principal mining district in this county is White River, twenty-five miles south of Porterville. Over $50,000 has been taken out during one year with the old way of mining, improved machinery as yet not having made its appearance. There are a 5-stamp mill and a 10-stamp mill. The ore is gold-bearing quartz, mostly oxidized. There are several other districts which have promising prospects. Four miles from Mountain Home are deposits of copper owned in Los Angeles.

Tuolumne.

At No. 2 level of the Santa Ysabel, on Quartz mountain, the ore body is 17 to 18 inches wide and 18 to 20 feet long; at No. 3 it is 5½ feet wide and 75 feet long; at No. 4 it is 8 feet wide and from 120 to 130 feet long. The width on the fifth level has not yet been ascertained. The striking of the Central ore chute on the fifth level demonstrates the continuity of the ore body and increases the reserves. Stoping has been started at the fourth level. At the fourth level and above the Central ore chute has averaged $12 to $14 per ton.

Sonora *Independent*: At the Shawmut-Eagle mine, near Jacksonville, 175 men are employed.——L. Green of the Jim Budd mine, on Eagle creek, near Columbia, reports the new shaft down 35 feet and a 2-foot vein of ore in sight.——Page & Vassallo, who bought the Potter place at Springfield, on which there is a quartz mine, have begun sinking on the vein.——It is reported that the Grey Eagle mine at American Camp will be started up. A new shaft will be sunk, operated by a steam hoist. The gasoline engine, formerly used for hoisting, will run the mill.

Jamestown *Magnet*: J. E. Nelson is developing the Black Star claim near Jacksonville. He is down 40 feet on the ledge.——A. G. Wiedekind has leased his gravel and quartz claims near Pine Log to Mr. Watkins and associates of Salinas, who have also purchased a quarter interest in the John Royal mine at Summit Pass, near Columbia.

Sonora *Union-Democrat*: The Mount Jefferson mine at Groveland is to have a 20-stamp mill.——The Free Lance mine, on the Tuolumne river near Ward's Ferry bridge, has been bonded to P. R. & F. J. Gardner and C. A. Myer of San Francisco for $6000, $1000 of which was paid down. The vein in a 130-foot tunnel averages 3 feet wide. A second tunnel will be started below the first. A mill is also contemplated. P. R. Gardner is Supt.——The Jubilee M. Co. at the Hazel Dell, eight miles north of Soulsbyville, is drifting. The vein has widened from 2 to 3½ feet. Two power drills are being put in. The 2-stamp will be completed in two weeks.——It is reported that the Sweeney mine at Quartz mountain, adjoining the Dutch on the north, will be put in active operation.——It is reported the Clio group of claims near Jacksonville are to be developed by Boston capital.

COLORADO.

BOULDER COUNTY.

Ward *Miner*: The Cold Spring group of eleven claims at Gold Hill has been sold for $75,000, the Bordeaux group of ten claims for $80,000 and the White Cloud mine for $13,000. The Bordeaux group was owned by G. Teal and G. Rogers. One-fourth of the purchase price was cash. The purchasers are the Cold Spring G. M. & M. Co. Its incorporators are W. H. Combs, J. M. Page and P. J. C. Robinson.——The Rag Tag Co. are preparing to resume operations on Michigan mountain. They are considering putting on a steam hoisting plant. They will resume sinking this month.——The Adit Dewdrop has forty men on the payroll and will add to this force as the work progresses. Three power drills are now run in the main and north tunnels and upraise, and three more machines have arrived which will give employment to more men.

CLEAR CREEK COUNTY.

The Delta-Hudson mine, in Virginia canyon, is now being worked under the management of the Denver Mines Agency Co.

A strike is reported in the Hardscrabble lode. The claim is in Pinckard gulch, west of the Shively. Assays from the streak which Mr. Frazier has opened gave 420 ounces silver, 20% lead and one-tenth of an ounce gold per ton.

The Pratt G. M. Co. has been organized at Yankee to acquire a group of claims at that place. A number of Virginia capitalists are interested in the company. They are making direct purchases. Machinery is to be installed. They will build a concentrating mill, 100 tons daily capacity. All veins have been tested and a number of lots of ore have been tried by the mills at Idaho Springs.

The Chesapeake tunnel at Yankee has been compelled to close down until the snow disappears, for it is impossible to get fuel to the tunnel. The company has a streak of mineral opened near the breast and for 400 feet have a continuous streak of pay ore.

The Butler Co. will resume work in the Cornucopia on Chicago creek. The shaft on the south side of the creek will be sunk and the adit on the north side extended toward a junction of this with another vein.

A. H. Colburn, who has a lease on the Silver Age for three years, will sink the new shaft at the mouth of the adit and drive levels into the ore bodies found in the winzes sunk from the adit. This ore is lead with gold and silver values.

FREMONT COUNTY.

Denver *Republican*: The first test run of the Junior Order cyanide plant at Bare Hills has been made and demonstrated a success. The cleanup shows an extraction of 95% at a cost of $1 per ton for mining and treatment. The mine is low grade, located on a diabase dike, from 20 to 30 feet in width. The plant is built close to the shaft, the ore trammed direct to the bins in the mill, a distance of 30 feet. Water is supplied from the old shaft, 100 feet in depth. Cyanide is adapted to the treatment of this ore, as, with coarse crushing, the values are extracted to 40 cents per ton in forty-eight hours. It is stated that arrangements will be commenced for a 100-ton plant.

GUNNISON COUNTY.

(Special Correspondence).—The snow is now nearly gone from the gold belt and things are taking on a lively aspect, with promise of an increased summer's work. Many new properties are being opened and a large per cent of them are finding good bodies of pay ore, and in the future I shall record what I have seen personally at these properties. It is reported that a rich strike has been made in the crosscut at the 150 station in the Gunnison. The last 5 feet of the vein on the north side shows a great deal of free gold and it is thought will run two to five ounces per ton. The vein at this crosscut shows a width of 20 feet solid quartz, all pay milling ore. It also is observed at this station that its width has increased a little with depth. Sinking is going on and at 200 feet and 250 feet crosscuts will be run to determine its width at those points. The management will then run levels and further develop the property. The erection of a mill at the mine is contemplated.

An option has lately been secured on the Eureka and Antioch claims by G. W. Bartholomew. The property is situated just west of the town of Du Boise on Goose creek. The claims run northerly and southerly and lie side by side. The main shaft is on the Eureka and is 100 feet deep. It was started on the vein, but at 20 feet the vein left the shaft, which was continued straight down. It is the intention to crosscut at the bottom of the shaft to the vein. Where the vein left the shaft it is 4 feet wide and carries good values in gold, lead and silver. The ore is generally soft and shows a good per cent in lead carbonates, from one to two ounces gold and ten to sixty ounces silver. A tunnel 400 feet long from Goose creek will give a depth of 400 feet at the shaft.

The vein on the Antioch is less promising, but it may be all right when opened. The Pride of Denver joins it on the west, where they claim to have shipping ore, its values principally gold.

East and adjoining the Eureka is the Mollie's Dream, worked by a tunnel from a gulch on the north end of the claim. Mr. Griffie says he has considerable ore saved for shipment on the dump. The vein is 2 to 3 feet wide and is lead carbonate, with from one-half an ounce to two ounces of gold, also some silver.

The Iowa, a silver-lead property, has been bonded to G. W. Bartholomew by H. F. Smith of Indiana. The property is a patented claim and has considerable work on it, exposing large bodies of argentiferous galena. Ores that would not stand transportation when the work was done can now be shipped at a profit. The values in lead are about 28% and from ten to sixty ounces of silver. The vein is from 10 to 12 feet wide and most of the ore will ship without concentrating. Work will be started on this property the middle of July. The bond price is $10,000, running two years from August 1st, '99.

At Quartz, near Pitkin, the Maid of Athens Co. have several hundred tons of ore on the track and ore bins full, awaiting shipment, which will commence as soon as the Colorado Southern is open. It is reported that this vein is over 30 feet wide and is improving. The mine is not deep, being new. The ore shoot was opened less than a year ago and today can output 100 tons per day. The value is chiefly in silver, with a little lead.

The Citizen, an extension of the Maid of Athens, has a 6-foot vein of gray copper running high in silver as well as copper.

Gunnison, Colo., April 25th, '99.

It is reported that the Vulcan, Chimney and Good Hope mines are to be purchased by a Boston syndicate, the buyers taking 51% of stock for $4,500,000.

LAKE COUNTY.

Mining Investor: S. D. Nicholson and his associates have combined under one management a large portion of Carbonate hill. The combination has brought under one management a number of leases and properties, making a total of eighty acres, with a number of shafts reaching down to various contacts, which are now being worked through the several shafts. The chief operations will be conducted through the Wolftone shaft, which is to be sunk to a depth of 1500 feet. The combination takes in the Mab, in which is a large body of ore at a depth of 1000 feet in the second contact. It was found last September by running a level from the bottom of the shaft, 800 feet. The ore is being extracted through the Mab shaft at the rate of 4500 tons per month, and at present this shaft is the chief producer in the combination. The ores are sulphides of iron and lead, the values being in silver and gold. From one of the stopes 100-ounce silver ore is being broken. The Wolftone shaft is outputting 600 tons per month.

Leadville *Miner*: Another strike has been made in the Valley City and Forest Rose mine. Six feet of work had been done when the ore was encountered. It is lead carbonate, carrying silver and gold. The carbonate runs 60% to 70% lead. The mine was recently leased by R. Fogel to Pres. Gates of the Illinois Steel Works, C. T. Roberts and others.——At the Bon Air shaft Supt. Newell has caught up and retimbered the shaft to a depth of 200 feet and good progress is being made.

MONTROSE COUNTY.

The La Sal Copper Co. continues shipments of ore, thirty-five teams being engaged in freighting the ore to the railroad at Placerville. The values continue unchanged.

OURAY COUNTY.

The Caroline M. Co. have a concentrating mill of 500 tons daily capacity in operation at Ouray.

PUEBLO COUNTY.

It is reported that the capacity of the Philadelphia Smelter & Refining Works at Pueblo is to be increased 40%, and the improvements will be started at once. New blast furnaces will be erected, with all the latest machinery. Eight roasters will also be erected. The copper plant will be enlarged, doubling the capacity. There are employed 800 men; and when the improvements are completed, the number will be increased to 1200.

TELLER COUNTY.

Victor *Record*: McDonald & Isaacson, leasing on block 3 of the Lonaconing of the Kimberly Co., have rich ore in the bottom level of the mine at a depth of 240 feet. In addition to a body of medium-grade ore, there is a seam, several inches wide, which shows sylvanite. This lease has previously mined medium-grade ore.——On the Lansing of the Pinnacle Co. a perpendicular working shaft is to be sunk. A contract for 100 feet has been let. An 8x10 steam hoist and boiler has been contracted for.——Van Norman, Thurston & others, leasing the Homestake on Big Bull mountain—the eastern limits of Goldfield—have their steam plant in operation and are hoisting rich ore showing free gold. The pay streak is small.

Denver *Republican*: It is estimated that there are 6,000,000 tons of ore in the dumps of Cripple Creek mines, valued at $5 per ton. Owners are receiving bids from mill men to work this ore.

IDAHO.

The Blue Jacket mine, in the Seven Devils, has 5 feet of solid copper ore in a 22-foot vein. It is cut by a tunnel 450 feet long at a depth of 310 feet. The ore also carries gold.

The present strike in the Cœur d'Alene mining district was inaugurated about April 20th and is directed principally against the Bunker Hill and Sullivan mines at Warder, where non-union men are employed. The demands of the miners for increased wages were met by the mine owners, but the miners demanded that the union be recognized and that non-union men be discharged. This the mine owners refused, and the Last Chance mine closed down. The Bunker Hill and Sullivan continued to run with non-union men until April 30th, when the concentrating mill and other buildings of the Bunker Hill and Sullivan Co. were blown up and destroyed by fire and the the non-union men driven out.

Work on the Humming Bird mine is in full blast. Brown & Rose have the contract for sinking the main shaft and have two shifts at work. It will take sixty days to complete the contract.

Spokesman-Review: J. Jones has resumed work on the Silver Eagle in Dobson's gulch near Wallace. It has been a year since work was done there except to sink a few feet last summer from near the face of the tunnel.——A mill has been ordered for the Conjecture mine on lake Pend d'Oreille.

Salt Lake *Herald*: The Melcher M. Co., whose property is in the Stokes mining district, Cassia county, will put in steam drills. The machinery is ordered. The tunnel will be run to cut six veins which parallel each other across the property. When the last vein has been cut a depth of 1700 feet will have been attained. The mine is thirty miles north of Kelton, on the Central Pacific.

Hailey *News-Miner*: The pump and pipe line at the Tiptop mine work successfully. The line of pipe is two miles long and takes water from Rock creek to supply the 20-stamp mill. The water has to be raised perpendicularly about 900 feet.——A company has been organized in Utah, known as the Harvest M. Co., capital $100,000, for working the Washington mine in Boise basin.

Grangeville *Press*: W. H. Walp, Supt. of the Iron Crown mine on Newsome creek, has $2110, proceeds of a mill run of 110 hours. The Iron Crown mine is a porphyry dyke running the full width of two claims. Since last fall 600 feet of tunnel has been run on the vein. From this tunnel four crosscuts have been run east and west. The mine is on the summit of the low divide between Newsome and Beaver creeks, at the head of the Allison gulch diggings, which were rich in placer gold. It is a blanket ledge on top of the hill.

MICHIGAN.

The Queen group of iron mines at Negaunee have been sold and transferred to the Oliver Iron Co., controlled by A. Carnegie. The Queen is a non-Bessemer, hematite mine, which since 1886 has produced 2,918,000 tons of ore.

The consolidation of the Ashbed and Humboldt mines is contemplated with the erection of a new mill and smelter at Eagle Harbor.

Boston *Financial News*: The Franklin M. Co. will by the middle of May start its mill. The company will then have expended on improvements $650,000. It is planned to stamp 1000 tons of rock per day at first and from that work up to 1500 tons. On the basis of 1000 tons the yield should be 30,000 pounds of copper per day.

MONTANA.

At Hassel it is reported that large ore bodies have been opened on the Cambria property, and it is thought to be the continuation of the Diamond Hill property which recently sold for $2,000,000.

The annual report of the United States Assay Office shows the following total mineral products of the State for '98:

	Fine Ounces.	*Value.*
Gold	253,867	$5,247,912 91
Silver	14,818,661	19,150,482 15
	Fine Pounds.	*Value.*
Copper	216,979,354	$26,162,616 20
Lead	21,403,592	860,055 70
Total value of production		$51,319,067 15

In gold Montana is third, both Colorado and California leading.

NEVADA.

The following telegram from Manager Ross explains the present situation on the Comstock: "Aug. Waterman, Sec'y Comstock Pumping Association, San Francisco—Elevator working steadily. Water in the 1750-foot level winze is 40 feet below the station." The work of installing the second elevator and attachments below the 1850-foot level of the C. & C. shaft is proceeding with all the expedition possible. It is expected that the new extension of the plant will be in operation by the 8th inst.

F. Emmitt, U. S. Marshal, last week posted official notices of sale upon the Silver Peak mining property, so long in litigation. This sale is advertised under the decree of court to take place by the Marshal on Thursday, May 25th, to satisfy the mortgages held by J. I. Blair, aggregating $642,140.85.

White Pine *News*: The discovery of a gold ledge west of White Pine, and its sale to Salt Lake people, has stimulated prospecting for gold in the mountains south. These mountains have been prospected for silver in years gone by, but no attention was paid to gold, and ledges cropping out prove to contain gold.——W. Watson of Ely and a companion found some very rich gold float, which, on horning, proved most satisfactory, so the boys next morning found a ledge of gold ore. These mines are six miles south of Cherry Creek.

Men have been put to work the past week on the Belcher and Yellow Jacket mines at Gold Hill. Work was also recommenced on the Hale & Norcross mine in the old tunnel, in which nothing has been done for five years.

The April Fool mine at De Lamar has been sold to A. H. Wethey of Butte, Mont., for $25,000. In the instrument of transfer Mr. Wethey is referred to as trustee. It is presumed he represents W. A. Clark. The property comprises five locations. The ore milled thus far runs $25 per ton.

Carson *Appeal*: The Little Bonanza mine near the Delphia property in Smith valley will be developed and a mill built. The property will be operated under the name of the Cayahago G. M. & M. Co.

Genoa *Courier*: E. Raycraft has two men at work on two mining claims back of Carter's station in Pine Nut. One is an old location known as the Betsy Jane; the other is new. Assays made of the rock return $22 in gold, 88 ounces in silver and $28 in gold, 51 ounces in silver, respectively. Both assays show 10% antimony.

Ely *News*: A coppor strike is reported from the Morris mine in West Camp.

Salt Lake *Tribune*: The first payment of $25,000 has been made by O. Stalmann on the purchase of the Copper Basin mines in Humboldt county. The total price is reported at $100,000. The property consists of twenty-one claims, the ores from which have been going to the smelter at Golconda and average 12% copper with $10 in gold.——The Glasgow & Western M. Co. of Salt Lake has made its third payment of $20,000 on the purchase of the Copper Canyon group of claims in Humboldt county. The total amount involved is $110,000. The company reports a steady output that averages 18% copper.

Salt Lake *Tribune*: H. E. Fruedenthal has bought a two-thirds interest in the Iron Silver mine, Bristol district, Nevada, for $15,000. A consignment of ore showed 32% copper, sixteen ounces silver and 70 cents in gold. The mine was owned by the J. Gilmer estate and had been idle for years.

NEW MEXICO.

It is rumored that the Standard Oil Co. have offered the Hearst estate $200,000 for its option of $1,200,000 on the Santa Rita mines. The option was not transferable; but, by agreement with the Bonanza Development Co., who are interested in the option, the non-transferable clause has been eliminated. The Standard Oil offer holds good until July 1.

Silver City *Enterprise*: The Romero mine, at Santa Rita, has been pumped out to the 100 level, where there is about 3000 feet of drifts and crosscuts, with little stoping. The mine was found in better condition and the ore richer than anticipated. There are sheets of copper from ¼-inch to 6 inches in thickness, in addition to the mass of ore, which contains cuprite, tenorite and melaconite. The average of ore shipped from the camp runs above 20% copper. The mine will be opened to the bottom of the 500-foot level.

Hillsboro *Advocate*: At the Black Maria, the working force has been doubled.——A

strike of copper sulphides has been made in the north workings of the Opportunity.——The Richmond is making a 100-ton shipment to the Trippe mill. —— Foreman Jack Burke has made a strike on the Robins & Crews Snake mine lease.——The Trippe mine made a 60-ton shipment to the El Paso smelters during the week.——W. F. Hall has taken a lease and bond on the Mastodon, and has eight men.——Six men have been added to the Warren mine force.——S. F. Keller is making a shipment of $130 ore to the Silver City Reduction Works. —— The Charter Oak and Percha mills sent $9980 in gold bars to the refinery. —— The total output of Hillsboro mines from Jan. 1st to April 27th, '99, was 4705 tons.

Denver *Republican*: Gilchrist & Dawson have purchased a twenty-four-one-hundredths interest in the Hanover copper mine at Hanover.——The Colorado Fuel & Iron Co. has increased its daily shipments of iron ore to Pueblo to 100 tons.——The water has been pumped out of the Romero copper mine at Santa Rita. The ore body was found larger and richer than anticipated. The poorest of the ore runs 20%.——A strike of gold ore averaging $32 to the ton has been made at White Oaks. The district is in better condition than in years.

OREGON.

(Special Correspondence).—The James Arthur placer mines at Cornucopia will commence operations May 10th with a full head of water, which will probably continue all season.

There are a great many mining men at Baker City investigating the mining region near here.

Baker City, April 25th, '99.

C. Reed has begun work on placers at Sturgill's bar and expects a big season's run.

It is reported that the Cornucopia mines have been bonded to Spokane capitalists until June 1st. They have forty-five men doing development work.

An expert is examining the Crystal Palace mine near Sparta, owned by Portland parties.

Seven hundred men are working on the railroad or prospecting in the lower end of Pine valley.

SOUTH DAKOTA.

(Special Correspondence).—At the head of Polo creek, three miles west of Deadwood, some discoveries of high-grade gold ore have recently been made. In this vicinity the rocks are chiefly trachyte and rhyolite, in which occur vertical veins which are gold-bearing. In Polo mountain the rocks of the Cambrian are found faulted and intercalated with sheets of intrusive rocks, in which it is probable ore deposits may be found. On the northeast side of this mountain, the basal member of the Cambrian, the conglomerate, is exposed at several places and may be gold-bearing. These conglomerates are the northern extension of the rich deposits in Blacktail and near Central City, the continuity of which is broken northward by faults, of which there are several. There are also several faults in Polo mountain which a cursory examination will discover. Some of the quartzite in this vicinity looks much like that about Terry's peak and it may be found ore-bearing.

Deadwood, April 25th, '99.

UTAH.

A. Murphy, Supt. for Mineral Ranch M. Co. near Milford, reports the walls of the vein 93 feet apart, and that the average contents of the ore, chiefly copper, are such as to insure a good margin. The company owns seventeen claims adjoining those of the Montreal.

Another strike has been made at the Bingham C. & G. M. Co., at Bingham, and ores show 18.2% copper, five ounces silver and $1.80 gold. The vein has been opened 35 feet, with neither wall exposed. The discovery was made at a vertical depth of 41 feet below the surface.

The Sioux mill at Mammoth, which has been silent for months, is to start up again under the direction of F. Peyton, the lessee, who has made arrangements with the Lower Mammoth for handling its milling ores, the delivery of which has commenced.

The Hunt and Riley mines at Mercur are reported sold to Eastern men for $30,000.

The two best known properties owned by the United States M. Co. are the old Telegraph and the old Jordan mines, which are among the oldest mines in Utah, having been worked over a quarter of a century. Their deepest workings are 400 to 500 feet. Before the gold and copper deposits were discovered in these properties a short time ago the mines had to their credit a record of from $40,000,000 to $50,000,000 in silver and lead, all of which went to smelters.

A shepherd on the southern range has written a letter to W. L. Pickard of Salt Lake, accompanying it with samples of what he describes as a fine grade of iron and there is a mountain of it. Mr. Pickard received a certificate from his assayer showing, instead of iron, 44% copper.

Salt Lake *Tribune*: A report from the superintendent of the Old Resolute at Ophir states that the strike in the new workings has developed 10 inches of ore rich in native silver. ——The silver chute underlying the auriferous in the Eagle M. Co.'s property at Mercur has been reached 200 feet west of the bottom of the shaft and 800 feet on the dip of the vein. Assays give thirty-six to sixty ounces silver, with an average of $1 in gold.——T. Kearns of Park City has purchased an interest in the Big Injun group, Lisbon valley, near Moab, and with C. E. Loose will continue development. It is reported the owners will erect a smelter.

Salt Lake *Review*: A steam hoist is to be put on the property of the Sindar M. Co. on the southwest dip of Camp Floyd district.—— A new lead-silver camp is being opened on Cottonwood creek near Peterson in Morgan county. The extent of the ore, which is carbonate, has not been determined. The ore runs 35% to 50% lead, 25% to 30% iron, six to ten ounces silver.

Beaver *Blade*: On Beaver creek, Newton district, the placers contain gold in paying quantities. The black sand carries $50 gold per ton.

Salt Lake *Tribune*: A strike has been made in the Eagle mine at Mercur. Mgr. Mayne says the ore has widened to 4 feet, much of it showing brittle silver and bromo-chlorides, with the real extent of the body yet to be determined. The success of the Eagle in prospecting the silver vein will induce others to drive to it. The point on the dip at which it has been found by the Eagle is the lowest at which it has been encountered in the camp, the apex of the vein being 900 feet above.—— At the Golden Gate mill over 700 tons of gold-bearing ore are being put through the crushers daily, which in a short time will be increased to 1000.

WASHINGTON.

A good strike is reported from the Alice-Eureka at Republic.

Supt. Stewart has uncovered 8 feet of ore on the Stray Horse, at Republic.

Reports from Princess Maud indicate an improvement in the size of the ledge. The values have not changed.

The Gold Finch group of claims, in Republic camp, are to be developed under the direction of J. Hales.

Work has started on the Gallatin at Republic. It is owned by a Spokane company. C. V. Ewell is Supt.

Ore from the bottom of the Mable shaft is reported to assay $60.

The report of a strike in the Morning Glory is confirmed. It is an 18-inch paystreak, clearly defined from the rest of the vein, and lies on the footwall, and between it and the balance of the vein is a horse, separating it from the hanging wall part of the vein.

Republic *Miner*: It is reported that a vein has been opened at Davis Camp, in the south half of the Colville reservation, 26 feet wide, which assays 38 ounces silver, 18% lead and $1.60 in gold.——A 4-foot vein assaying from $8 to $35 per ton has been opened on the Surprise at Republic.——The Mabel at Republic is reported to have 6 feet of $60 ore at the bottom of a 30-foot shaft.

Spokane *Chronicle*: The Morning Glory at Republic, it is reported, has an 18-inch pay streak in the face of the tunnel, in which free gold can be seen. An assay gave a return of $466. This ore body is the richest ever found in Republic. The ore is being sacked for shipment and shipping will begin as soon as the roads will permit.

WYOMING.

H. Yount of Grant has bonded his copper mine on Blue Grass to Cripple Creek men for $15,000. The bond carries a lease of the property and the agreement to develop it.

FOREIGN.

AUSTRALIA.

London *Mining Journal*: It is seventeen years since news was received in Sydney that some important finds of silver and copper ores had been made at Thackaringa, Umberumberka, and Purnamoota. A stampede of miners and prospectors quickly ensued, and further discoveries of gold, silver, lead and copper ores were rapidly made over an area of about 300 square miles; but the greatest attention was given to a bold outcrop of manganiferous gossan at Willyama, at a place known as the Broken Hill, which has since become famous. The deposit since its discovery has yielded minerals valued at more than £25,700,000, the principal figures being: Silver 7,573,531 ounces, valued at £1,336,067; silver-lead ore 1,379,389 tons and silver-lead 363,719 tons, valued at £22,891,434, or, including last year's returns, a total of £25,681,470 worth of raw ores.

BRITISH COLUMBIA.

A 6-foot vein of iron and copper ore has been struck in the shaft in the War Eagle mine at the 750 level which assays $60 in gold.

The Ruth mine in the Slocan is to have a concentrating mill.

The Ivanhoe, P. J. Hickey, Mgr., is reported to have let a contract for a concentrator, and the Wakefield mines will have concentrating machinery.

M. A. Ferguson of Greenwood has a placer on Boundary creek three miles south of Greenwood, and has located three claims. The dirt goes 25 to 50 cents to the yard. A company has been organized in London, capitalized at £10,000, and called the King Fungas Placer M. Co. P. B. Stanhope of Barnsby, Yorkshire, is en route to take charge of the work.

Spokesman-Review: A strike is reported on the Rosey claim, the property of the Cariboo No. 2 G. M. Co. at Camp McKinney. Supt. J. Murphy reports a strike of black sulphurets in Cariboo No. 2.

Spokane *Chronicle*: The shipments from the War Eagle last week reached 1360 tons. The new hoist has not been accepted by the company, but it is being operated more or less. The sinking of the main shaft continues; 15 feet were made during the week. The shaft is now down 749 feet. The ore encountered is of a good grade and in large bodies.

Spokesman-Review: The Ymir mill during the month ending April 10 treated 250 tons, yielding $1500 on the plates and an estimated value in concentrates of $600. There is 20 feet of this character of ore and 8 feet of high-grade ore. Since then forty stamps have been in operation. A contract has been let for hauling the concentrates to the railway.—— The Rossland-Ymir Co. has been incorporated to work the Bruce group one mile from Ymir. The group consists of five claims, the Bruce, Canadian, Simcoe, Colville and Hope. The promoters are J. E. Lane & Co. of Rossland. ——The showing on the Union Jack group is good. This group is seven miles from Ymir and consists of five claims—the Union Jack, Queen, Empress, Horseshoe and Climax. The ledge on the Union Jack is 7 feet wide. A shaft has been sunk 40 feet with a drift 15 feet at the botton, where 4 feet of ore averaging $10 per ton has been cut. On the Queen a ledge outcrops 20 feet wide. A shaft has been sunk in this ledge 20 feet and a tunnel is being driven to tap the shaft. The tunnel is in 90 feet. At the breast ore carrying iron, zinc and galena has been exposed, assaying $29.60 in gold.——The Tracy Creek G. M. Co. is a corporation formed to develop claims in the Tracy Creek camp, Fort Steele district of East Kootenay. The claims are the John L., J. H. C., and Hartwell, all on the Lewis creek side of Tracy mountain. The vein crops from 15 to 40 feet wide through the length of the John L. and J. H. C. claims. In an open cut they have a foot of solid gray copper.

Victoria *Times*: Eight feet of ore is showing in one of the Queen Bess tunnels.——Work was started last week on the Corncracker claim, southeast of Victoria.——A body of ore is reported to have been struck on the Whitewater Deep.——Fifteen tons of ore have been sacked on the Mollie Hughes and a 20-ton shipment is nearly ready. ——At the Tremont group, Four Mile, a tunnel is being driven and is now in 60 feet.——The reported sale of the Mountain Chief has been confirmed.——The Northwest Mining Syndicate has purchased the remaining eighth interest in the Alpha, Alpha Fraction, Lakeview No. 12 and Lakeview Fraction mineral claims, adjoining the Bosun.——The Rambler Cariboo M. Co. will install a five-drill compressor. Mgr. W. H. Adams has returned from Rossland. The company has on the property a boiler, hoist and three steam drills.

CANADA.

Toronto *Mining Gazette*: Toronto is to have the largest blast furnace in Canada. Its capacity will be 200 tons of ore per day.

Rat Portage *Miner*: The average assay of 2000 samples made by the Rat Portage Metallurgical Works was $11.11 per ton.——Work commenced on the Hecla concentrator, Lake of the Woods district, April 5th. The mill will have a capacity of 200 tons per twenty-four hours.——The Lucky Coon mine is in operation again. This mine was one of the first found on the Seine river.

Rat Portage *Miner*: The owners of the Golden Star mine, in the Seine river, Ontario, district, have sold that property to Toronto capitalists for a big consideration. The headquarters of the company will be removed to Toronto.

LOWER CALIFORNIA.

San Diego *Union*: The placer diggings recently discovered at Santa Clara, eighty miles southwest of Calmalli and fifteen miles from the sea coast, are the scenes of activity. All the men in the vicinity of Calmalli are gone to the new diggings, and men are arriving from Santa Rosalia and the copper district on the gulf coast. Several hundred men are reported to be on the ground, and Mexicans are headed in that direction from all over the peninsula. Only a few have returned to Calmalli and brought gold with which to outfit for another trip to the diggings. It is said that the largest nugget found at the Santa Clara placers is worth $85. The most primitive conditions prevail. Besides the idle Mexicans of the lower class, many prominent men of the peninsula are at the camp. Until their return to some place having communication with the outside world, the extent and richness of the new diggings will not be known.

MEXICO.

A rich strike of gold is reported from the State of Guerrero, in the Otallan district. The gold is free milling occurring in iron oxide. The formation in which the veins are found is said to be granite.

Commercial Paragraphs.

THE Colorado Iron Works Co. are putting in a 100-ton plant for the Detroit Reduction Co. at Cripple Creek, Colo., a 10-stamp mill on the property of the Planet-Saturn Co., near Congress, Ariz., and a 50-ton concentration mill for Charles A. Armstrong at Ouray, Colo.

THE Jeanesville Iron Works Co. of Jeanesville, Pa., are building a compound mine pump for one of the large zinc mines in the Joplin, Mo., district, capacity 1500 gallons a minute. It will be the largest steam mine pump in that district. They are also building a 23-inch and 38x14x48-inch compound pump for the Lawrence Coal Co. of Pennsylvania.

BAILEY & MONNIG of the State Ore Sampling Co., Denver, Colo., are handling 4000 tons of ore per month, which comes in the main from various Colorado districts and from Idaho and Montana. In addition to this they handle considerable quantities of uranium and wolframite. The black oxide of uranium they get comes mainly from Gilpin county, Colo., and the yellow oxide from Paradox valley. The tungstic acid in wolframite gives it its market value.

THE Thornton N. Motley Co. of No. 43 John street, New York City, have just completed a contract with the Jackson Drill & Mfg. Co. of Denver, Colo., whereby they become the sole licensees for the sale and manufacture of the Jackson hand-power rock drill throughout the Eastern United States and all foreign countries. That they have taken hold of the matter in a very energetic manner is evidenced by the fact that they have ordered quite a number of drills from the factory at Denver for the purpose of exporting, twenty-five of the machines being for Mexico alone.

Books Received.

"*Liquid Air*," by T. O'Conor Sloane, 368 pp.; an interesting volume, illustrated, giving the history and theory of the subject of the liquefaction of gases. It gives many experiments and shows how liquid air, like water, may be carried hundreds of miles and handled in open buckets. The book, while scientific, is written in popular style and may be read and understood by anyone. Norman W. Henley & Co., 132 Nassau street, New York City; price $2.50, postpaid.

Personal.

NICHOLAS TREWEEK of Salt Lake, Utah, is in Boston.

PH. DEIDESHEIMER has been examining the Texas mine at Nevada City, Cal.

W. E. RENSHAW is Mgr. of the Newton and Silver Age mills at Idado Springs, Colo.

A. N. BUTTS of Angels, Cal., has gone to Plumas Co., Cal., to develop mines at Nelson Point.

E. H. BENJAMIN has gone to Tuolumne Co. to investigate the Junction mine near Souls. byville.

CAPT. J. R. DELAMAR has returned to Mercur, Utah, after an absence of several months abroad.

W. H. WRIGHT, Supt. Oceanic quicksilver mine in San Luis Obispo Co., Cal., is in San Francisco.

LEO VON ROSENBERG has returned to San Francisco, Cal., from Arizona and has gone to New York.

W. BERNSTEIN, Gen. Mgr. of the Ibarra gold mines at Calmalli, Lower California, is in San Diego, Cal.

CAPT. JAMES of the Robinson mine, Johannesburg, S. A., returns to California next month on a vacation.

W. G. DODD of the Union Iron Works, San Francisco, Cal., leaves for China on the 16th inst. on mining business.

FRED W. WHITTEN, for years Supt. for Towle Bros., has accepted a position as Supt. Gold Run M. Co.'s mines, near Gold Run.

W. J. ADAMS, E. M., has arrived at Lituya bay, Alaska, where are located the gold-bearing beaches of the company he represents.

EX-SENATOR STEPHEN M. WHITE, Pres. of the southern California branch of California State Miners' Association, is in San Francisco, Cal.

EDWARD TWICKER, former Supt. of the Baisley-Elkhorn mine, Baker City, Oregon, was recently in Colorado and has gone to Mexico.

F. VON LEICHT, M. E., has returned to San Francisco, Cal., from an inspection of the Oceanic quicksilver mine near Cambria, San Luis Obispo Co., Cal.

SAMUEL H. DOTY, a civil engineer, for the past two years at the Louisiana mine, near Coulterville, was one of a party of four timber locators who perished on the trail near Astoria, Or., during April. The cause of their deaths is a mystery.

GEO. W. PEIRCE of the Golden Fleece mine at Lake City, was in Idaho Springs a few days making tests of Golden Fleece ore at the mills there. He states that the new 60-ton concentration mill for the Golden Fleece will be commenced in May.

EMILE R. ABADIE, mining engineer, has severed his connection with the Grand Central M. Co. of Minas Prietas, Sonora, Mex. Mr. Abadie's management of the property for the past two years has been successful, the mine having paid regular dividends, showing a good record for a 30-stamp mill. Mr. Abadie is on his way to San Francisco en route to London.

Industrial Notes.

—Stockton, Utah, is to have electric lights and electrical power to operate its mining machinery. Mgr. Lamson of the plant at Jordan Narrows has decided this and in a few days will make definite arrangements for the extension of wires into that camp.

—The report that a company has been formed with $15,000,000 capital to build a steel plant at Buffalo is confirmed. The plant will have an output of 800,000 to 1,000,000 tons of steel annually. Buffalo capitalists are said to have subscribed $2,500,000 for the enterprise.

—The Star & Crescent furnace at Rusk, Texas, went into blast recently. This furnace is owned by New Orleans people. Mr. Leach of New Orleans has the furnace, ore land, etc., leased. The furnace has a fifty-ton capacity; it has been built eight years, but has been idle for the most of the time since it was completed. The fuel used is charcoal.

—Describing the Southern California Electric Power Co.'s plant, E. E. Fowler, master mechanic of the Los Angeles, Cal., Railroad Co., shows that in this, the longest electric power transmission line in the world, water power is developed from mountain streams east of San Bernardino, and drives impulse wheels under a head of over 700 feet. These are directly connected to three-phase alternating current generators, which deliver current at 750 volts to air-cooled transformers which are arranged to raise the potential to 33,000 volts. The present capacity of the station is 4000 H. P., but this can be increased to 6000 H. P. or more when the demand warrants the installation of additional machinery. The transmission from the power station to Los Angeles, a distance of a little over eighty miles, is over six No. 1 copper wires (about 9.32 inch diameter) as to what loss in current occurs in this long line transmission and in the entire plant from the water applied to the wheels to the final application of the current for light or power in Los Angeles, the conclusion is arrived at that the electrical current finally delivered to the consumer in Los Angeles represents about 45% of the power originally available in the water at the power station.

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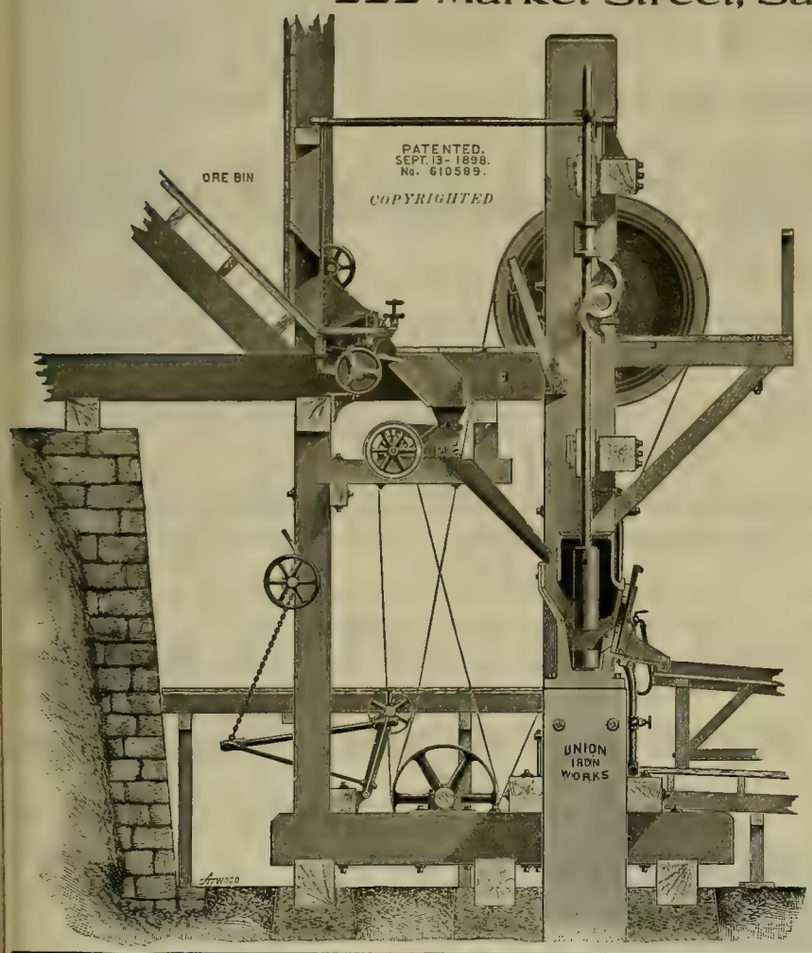

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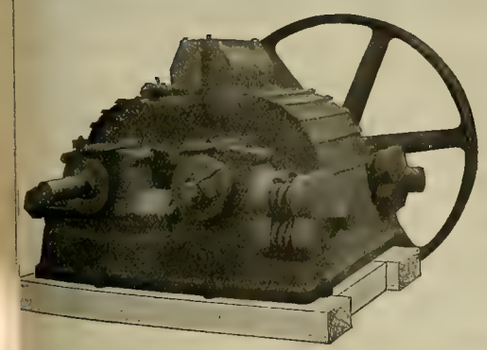

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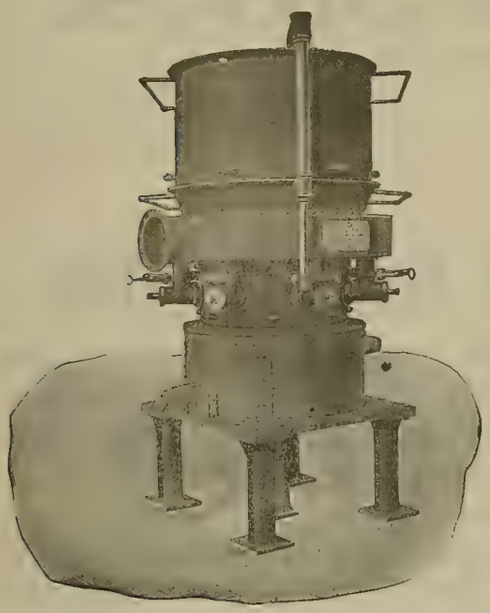

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(SEE PAGE 497.)

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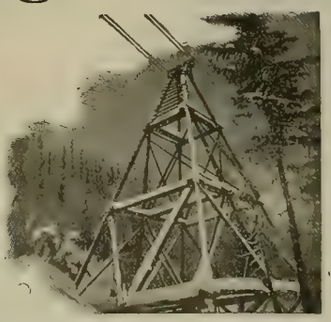

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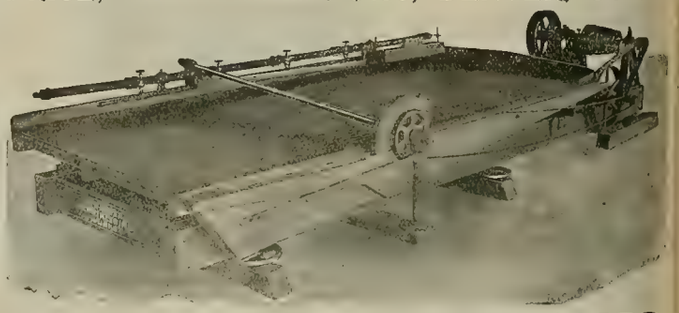

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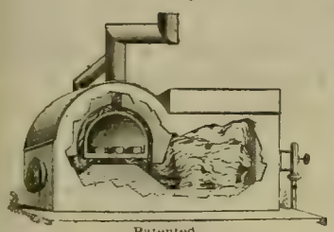

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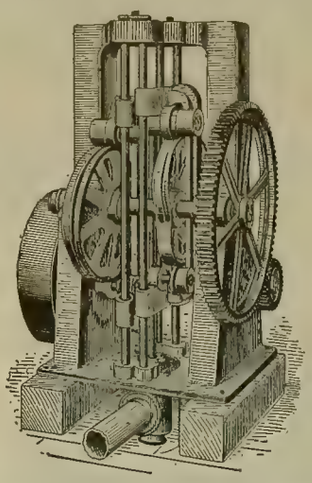

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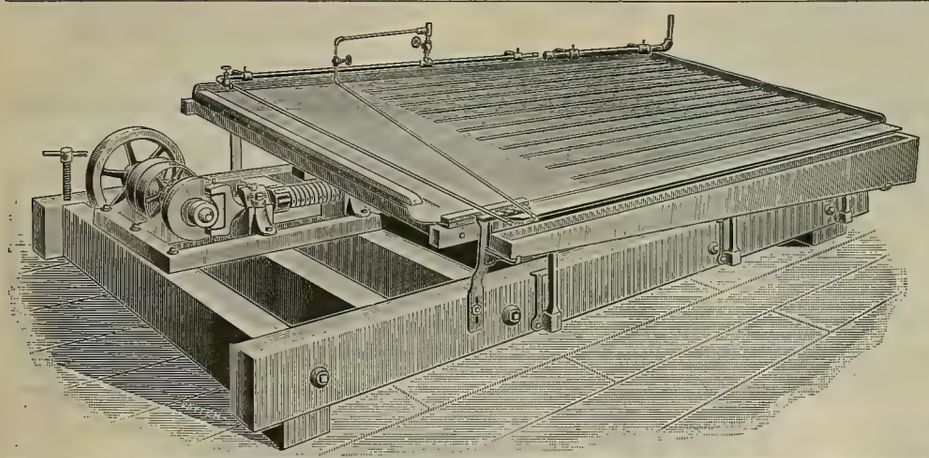

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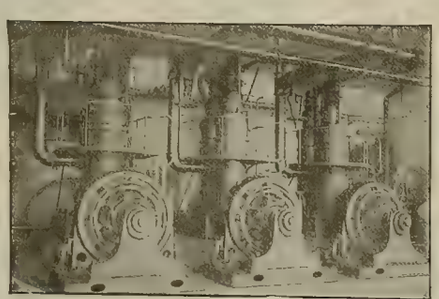

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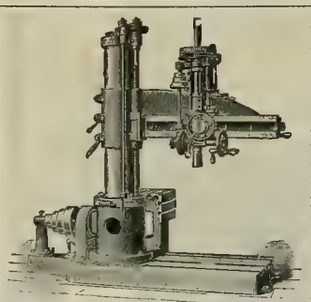

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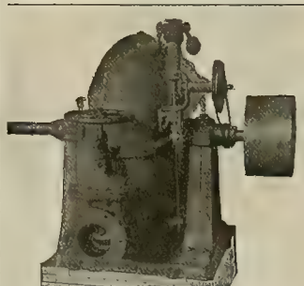

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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING APRIL 25, 1899.

623,580.—PIPES—E. F. Badgley, S. F.
623,702.—SMELTING FURNACE—C. Bishop, Knoxville, Cal.
623,650.—HYDROCARBON BURNER—V. W. Bumzarner, S. F.
623,773.—PRESSURE REGULATOR—T. A. Evans, Portland, Or.
623,661.—GATE—K. Gore, Auburn, Cal.
623,542.—CAR COUPLING—G. W. Hamilton, Globe, A. T.
623,667.—MERRY-GO-ROUND—J. C. Holloway, S. F.
623,906.—STATION INDICATOR—Hunter & Gustafson, S. F.
623,671.—RAILWAY SIGNAL—J. Jorgenson, S. F.
623,672.—RAILWAY SIGNAL—J. Jorgenson, S. F.
623,673.—GANG PLOW—T. E. Kavanagh, Vallejo, Cal.
623,793.—TIRE BOLT WRENCH—W. Larson, Kingsburg, Cal.
623,615—RUNWAY FOR LOADING VESSELS—A. Mullen, S. F.
623,823.—FELLY SHIELD—A. N. Poe, Calpella, Cal.
623,560.—BLOCKHOLDER—W. C. Read, Oakland, Cal.
623,833—SMELTING FURNACE—J. A. Russell, Tacoma, Wash.
623,633.—PRUNING TOOL—I. Smith, South Bend, Wash.
623,856.—CHAIN COUPLING—M. L. Williams, Tacoma, Wash.
623,644—BOTTLE—W. Wilson, Oakland, Cal.
30,615.—DESIGN, CAN OPENER—M. O. Finkbeiner, Myrtle, Cal.
30,618.—DESIGN, TOOL HEAD—J. Herfert, Tucker, Wash.
30,609.—DESIGN, HOOK—W. P. Murphy, Willow Glen, Cal.

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Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

REVERSIBLE GANG PLOW.—Thomas E. Kavanagh, Vallejo, Cal. No. 623,673. Dated April 25, 1899. This invention relates to gang plows and a means for reversing the position of the plows so that they can be used on hillsides, or wherever it is desired to throw the funnels in the same direction. It consists of a single beam having plow standards journaled vertically with relation to it, plows fixed to the lower parts of the standards and turnable with them so as to make either a right or a left-hand furrow, and a supplemental triangular frame having its rear apex pivoted to the plow beam and the base or front movable transversely with relation thereto, so that one side of the frame is brought approximately into line with the plow beam, extending diagonally with the line of travel, and the other essentially in the line of travel with the plow. Suitable mechanism is arranged to provide for these movements to bring the frames alternately into position. The shares of the plows are double-pointed so that when the positions are changed one share will throw the furrow in one direction and the other share in the opposite direction.

CENTRIFUGAL MERRY-GO-ROUND.—J. C. Holloway, San Francisco, Cal. No. 623,667. Dated April 25, 1899. This invention relates to that class of amusement devices known as "merry-go-rounds." It consists of a stationary support with a central vertical journal shaft, with means for applying power to rotate it, a framework carried by the upper end of the shaft, suspending arms pivoted to the periphery of the framework having cars or seats pivotally attached to the lower ends of the arms, so that they will swing outward and upward by centrifugal action when the apparatus is in motion. In conjunction with these are check ropes or stays connecting respectively with the cars and with the framework at points interior to the fulcrum points of the arms so that the relative position of the cars may be regulated and maintained. Devices are also connected with the apparatus to produce a rising and falling movement of the cars while they revolve by variation in the speed of rotation. The cars may thus be maintained in an essentially vertical position while revolving, and considerable changes in movement may be made during the operation.

BOTTLE.—William Wilson, Oakland, Cal. No. 623,644. Dated April 25, 1899. This invention relates to improvements in bottles of that class in which a device is employed to prevent the fraudulent refilling of the bottle after the contents have been emptied. The bottle has an annulus fixed within the neck and superposed fine screens secured to the annulus. There is a hollow stopper exterior to the screens and a sleeve surrounding the bottle neck having the outer end closed and adapted to seat upon the hollow stopper. By means of a spiral groove and pin the sleeve is turnable to move it outward along the neck of the bottle, and it has also a discharge passage made in the side interior to the closed end with a screen in the passage. An air passage is provided upon the opposite side from the sleeve with a valve or diaphragm which will close the openings of the passage when it is attempted to introduce liquid therethrough.

RAILROAD SIGNALS.—John Jorgenson, San Francisco, Cal. Nos. 623,671 and 623,672. Dated April 25, 1899. These patents relate to signaling devices which are employed in connection with railways for the purpose of signaling the approach of trains on main lines, or single cars on street railways. The invention comprises signals which may be either lights at night or colored signals during the day, and with these are opaque or concealing cases so depressed with relation to the signals and colored globes that the signals may be withdrawn into or covered by the concealing cases when not in use, and exposed when they are to be used. In connection with these signals are electrically or mechanically actuated devices which are so connected with the track that the passage of a car or train will, at a certain distance from the signal, act to expose it so as to give warning of the approach, and after the car or train has passed the point of danger, it operates another device by which the signal is again concealed.

DESIGN FOR HOOK.—Wm. P. Murphy, Willowglen, Cal. No. 30,609. Dated April 25, 1899. This invention relates to an improvement in hooks such as are used for hanging clothes and other articles. It consists in making the hook of a single piece of wire so curved as to form the necessary wall attachment, and to produce a plurality of upturned points for the hanging of such articles as may be desired.

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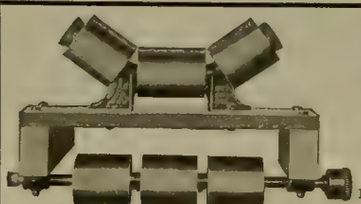
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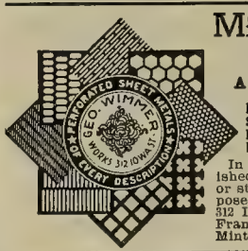

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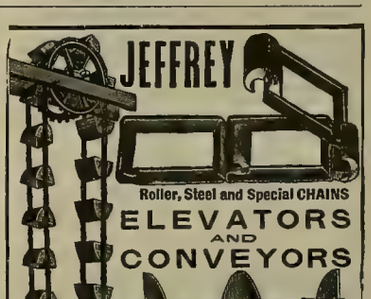

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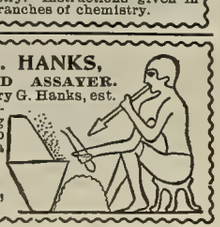

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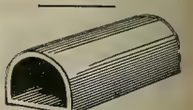
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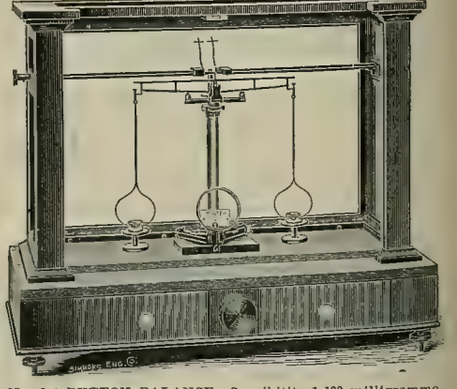
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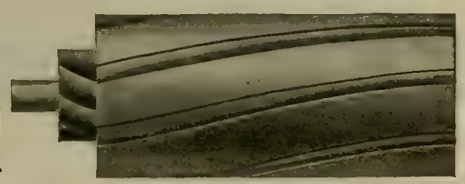

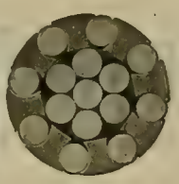

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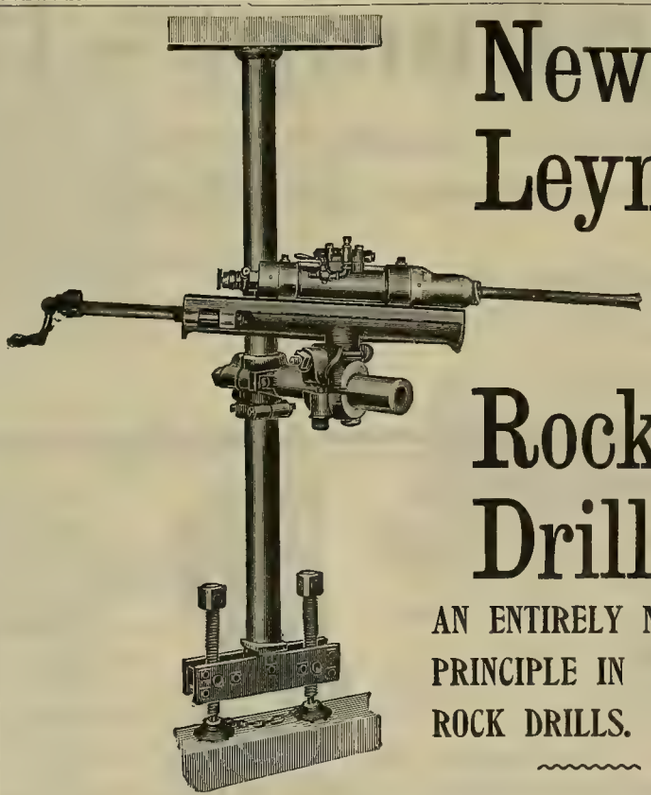

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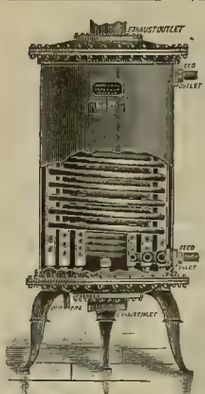

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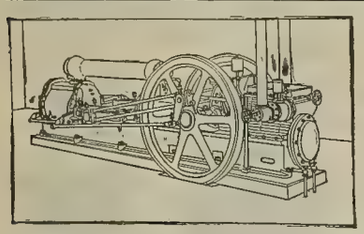

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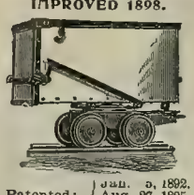

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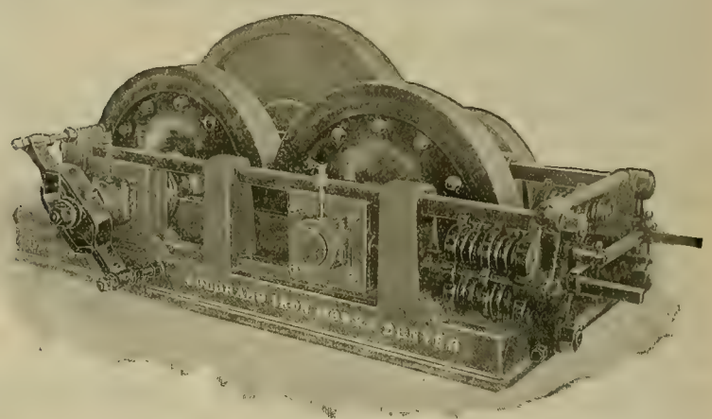

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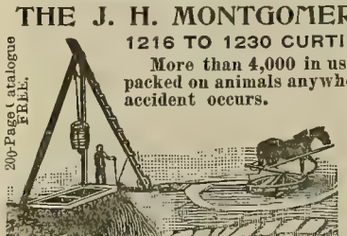

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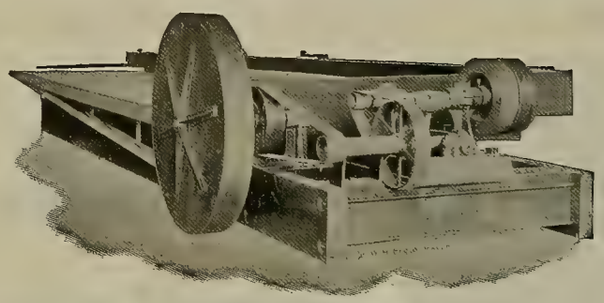

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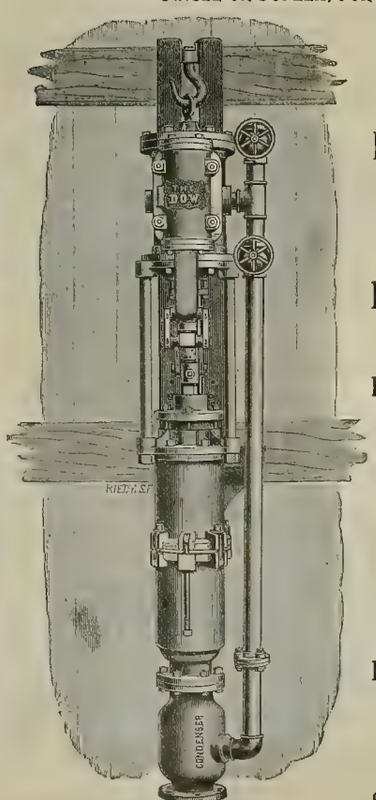

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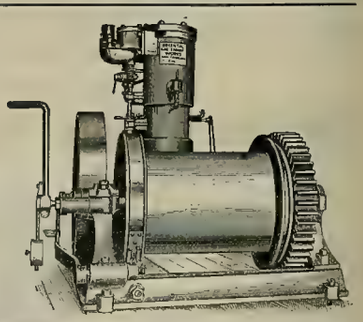

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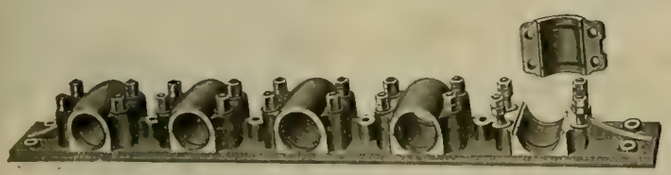

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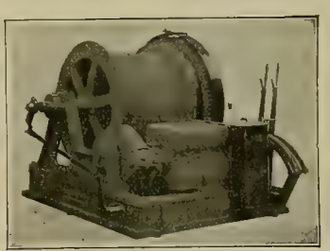

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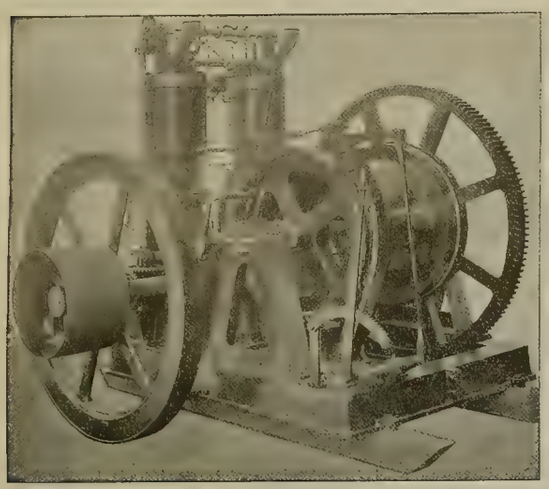

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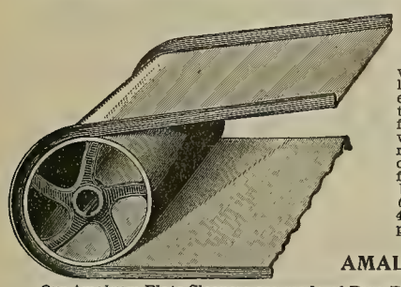
SPADONE'S CONCENTRATOR BELTS.

PATENTED.



This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

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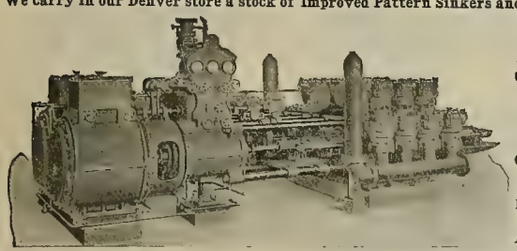

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Denver, Colo.
Telephone 2298 A.
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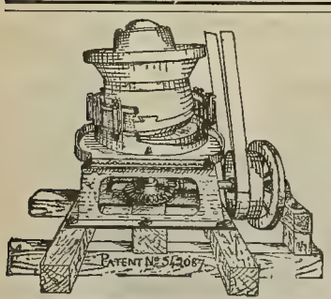

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W. H. Birch & Co.

No. 127 to 135 First St., San Francisco, Cal
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LIGHTNER QUARTZ MILLS.

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No. 1 works 3	tons per day with	1½	H. P.;	$225
No. 2 " 4 to 7	" "	2½	"	$425
No. 3 " 10 to 15	" "	3½	"	$600

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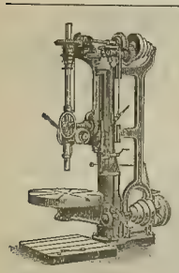
"Birch" Two-Stamp Mills, McGlew Concentrators, And All Kinds of Mining Machinery.



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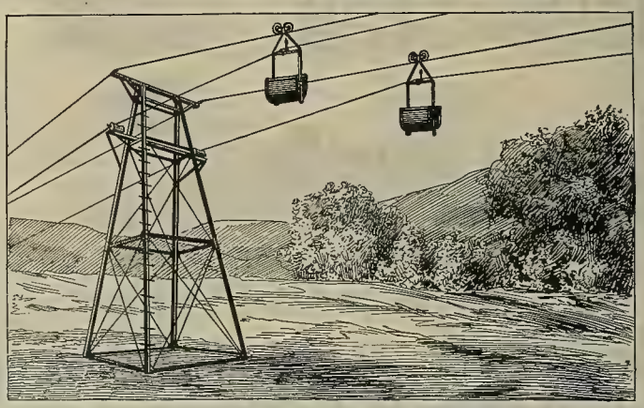
VULCAN ROPEWAYS (SINGLE ROPE SYSTEM).

AUTOMATIC LOADING AND DUMPING APPLIANCES



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ROOFING is to a building what clothing is to the body. It must protect and it must wear well. To put money in an interior and to save it on the roof of a building is poor economy.
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CANDA Improved Self-Locking CAMS.

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EVERY BELT GUARANTEED.
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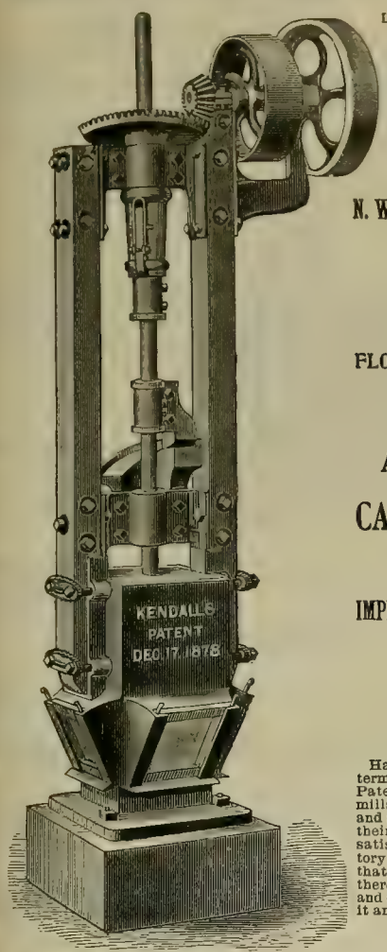

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Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

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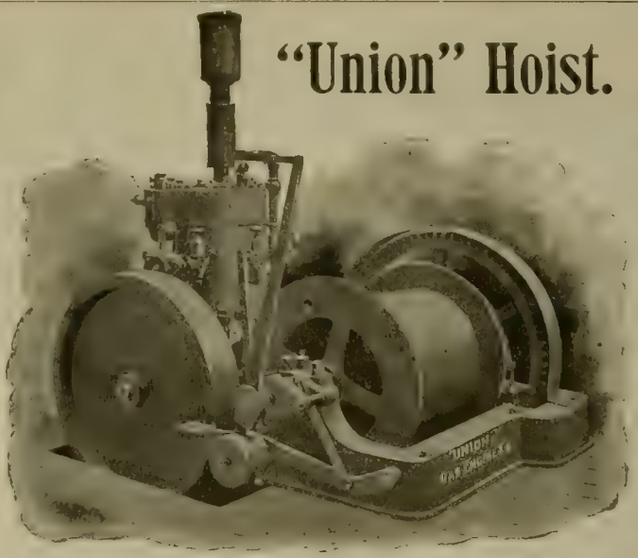
"Union" Hoist.



The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton 125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 300 h. p.
"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.
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HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
TEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

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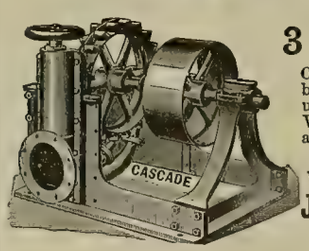
TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from



3 Feet to 2000 Feet.

Our experience of **33 YEARS** building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.

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MALLEABLE IRON BUCKETS, Electric Coal Mining and Haulage Machinery, Luhrig Patent Machinery for Washing and Classifying Coal, Shafting, Pulleys, Bearing Rope Sheaves, Clutches, Etc.

Machinery designed and erected to suit existing conditions and available space.

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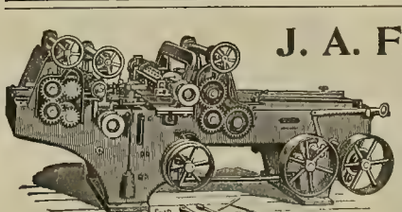

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Box Factories, Planing Mills,
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Carriage, Wagon and
Agricultural Shops.

HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.

Market Reports.

SAN FRANCISCO, May 4, 1899.

SILVER.—London, 28⅜d; New York, 61⅞; San Francisco, 61; Mexican Dollars, 48½. New York exchange, sight, 5; telegraphic, 7½ cents premium.

LEAD.—New York reports steady, $4.37½ bid, $4.42½ asked; brokers' price, $4.10.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 7c; bar, 7¼c.

COPPER.—New York reports Lake firm at $19.25; brokers' price, $19@19.12½.

The market price of copper continues to go higher and has nearly reached the 20c mark set some weeks ago. As the situation now appears it will not be a surprise to see it reach several points above 20 cents in the very near future. The demand still continues and the output has not yet shown that it can keep pace with the increasing demand.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Pig, 31c per lb.; Bar, 35c. New York reports firmer, $25.30 bid, $25.40 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $42; export, $38.50; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

RED LEAD AND LITHARGE.—One ton and over, at one purchase, 6¼c; 500 lbs. and less than one ton, 6½c; less than 500 lbs., 7c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7½c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17¼c; Eocene, 19¼c; Extra Star, 21¼c; Elaine, 22½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 4, 1899.

9:30 A. M. SESSION.

200 Best & Belcher	57c	50 Gould & Curry	36c
200 Bullion	02c	100 H. & N.	26c
100 Caledonia	34c	100 Ophir	$1 80
100 Challenge Con	36c	300 Sierra Nevada	$1 00
100 Chollar	31c	200 Utah	11c
300 C. Cal. & Va	$1 75	500 Yellow Jacket	45c

2:30 P. M. SESSION.

400 Mexican	53c	100 Confidence	80c
100 Con. Cal. & Va.	$1 70	200 Sierra Nevada	96c
200 Savage	26c	100 Caledonia	35c
100 Potosi	25c	300 Challenge	35c
600 H. & N.	26c	500 Andes	11c
100 Yellow Jacket	43c	100 Chollar	31c
200 Belcher	36c		

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

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Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
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FOR SALE IN LOTS TO SUIT.

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BOUGHT and SOLD.

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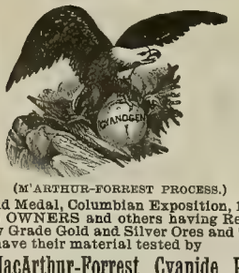
For May and June, 1899, only, **Drs. Mansfield & Porterfield, at 838 Market St., San Francisco,** are issuing certificates entitling the holder to free examination for **Rupture** or **Piles,** with treatment till cured, for $30. Send for one.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.
CAPITAL, - $550,000.

The Original Cyanide Process.
SIMPLE. RELIABLE. ECONOMICAL.

TRADE MARK.



(MACARTHUR-FORREST PROCESS.)

Gold Medal, Columbian Exposition, 1893.

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The MacArthur-Forrest Cyanide Process.

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Samples assayed and fully reported upon. Particulars upon application.

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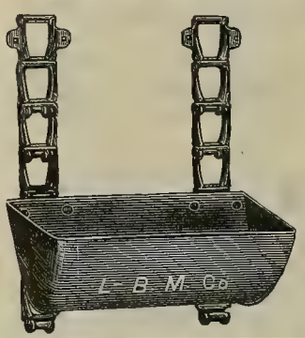
PATENT AGENTS, 330 Market St., S. F.

Small Portable Saw Mills and DRAG SAWING MACHINES
FOR RANCHES AND MINES.



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LINK BELTING, SPROCKET WHEELS, ELEVATOR BUCKETS & BOOTS, TAKEUPS, FRICTION CLUTCH PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

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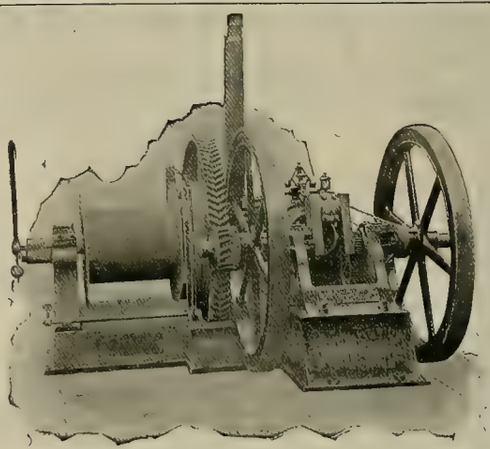

FRESNO, June 25, 1898

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Assessment Notices.

CONSOLIDATED CALIFORNIA & VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the nineteenth day of April, 1899, an assessment (No. 13) of twenty-five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the twenty-fourth day of May, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the fourteenth day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3rd day of April, 1899, an assessment (No. 24) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 106 Leidesdorff street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of May, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 29th day of May, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of April, 1899, an assessment (No. 18) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 17th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

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DELINQUENT SALE NOTICE.

HEAD CENTRE CONSOLIDATED MINING COMPANY.—Location of principal place of business San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. R. Parsons, Trustee	108	100	$20 00
H. B. Parsons, Trustee	112	100	20 00
H. B. Parsons, Trustee	116	100	20 00
H. B. Parsons, Trustee	145	100	20 00
H. B. Parsons, Trustee	152	100	20 00
J. W. Pew, Trustee	348	500	100 00
S. B. Wakefield	361	3	60
J. W. Pew, Trustee	384	100	20 00
J. W. Pew, Trustee	389	100	20 00
J. W. Pew, Trustee	390	50	10 00
J. W. Pew, Trustee	463	100	20 00
J. W. Pew, Trustee	504	5	1 00
J. W. Pew, Trustee	536	50	10 00
G. B. Root, Trustee	564	20	4 00
G. B. Bayley, Trustee	674	50	10 00
J. W. Pew, Trustee	710	100	20 00
J. W. Pew, Trustee	711	100	20 00
J. W. Pew, Trustee	712	100	20 00
E. B. Deane, Trustee	717	105	20 60
S. Iglauer, Trustee	820	100	20 00
H. H. Shinn, Trustee	873	700	140 00
F. A. Benjamin	875	5	1 00
W. Steele, Trustee	890	500	100 00
J. W. Pew, Trustee	896	50	10 00
J. W. Pew, Trustee	905	100	20 00
H. W. Hasselgren	908	100	20 00
H. W. Hasselgren	909	100	20 00
Peter Lane	910	630	126 00
M. Rehfisch, Trustee	917	1,250	250 00
M. Rehfisch, Trustee	918	1,250	250 00
M. Rehfisch, Trustee	922	300	60 00
M. Rehfisch, Trustee	923	200	40 00
M. Rehfisch, Trustee	924	400	80 00
J. W. Pew	946	1,333	266 60
John Sinclair	951	500	100 00
A. W. Foster	957	8 000	160 00
A. W. Foster	958	4,000	80 00
Rehfisch & Co., Trustees	960	100	20 00
Jas. Roloh, Trustee	968	500	100 00
S. B. Wakefield & Co., Trust's	969	1,500	300 00
S. B. Wakefield & Co., Trust's	971	3 833	766 60
J. W. Pew, Trustee	975	400	80 00
J. W. Pew, Trustee	989	40	8 00
A. W. Foster	1010	3,000	600 00

And in accordance with law, and an order of the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 16 and 17, San Francisco, California.

NOTICE.

SALE OF THE BUNKER HILL AND MAYflower Mines, Amador, Amador County, Cal., by the Receiver of the Spring Garden National Bank of Philadelphia, Pa.

Public notice is hereby given that the mining properties known as the Bunker Hill and Mayflower Gold Mines, situated near Amador, in the County of Amador, State of California, on what is known as the "mother lode," belonging to this trust, will be sold at public auction, together with all water rights and privileges, mill sites, hoisting works, railroads and rolling stock, buildings, machinery and appurtenances belonging thereto, at the United States Custom House, San Francisco, California, THURSDAY, June 8, 1899, at 11 o'clock A. M.

Circulars containing general description of the property and particulars as to conditions of sale, etc., furnished on application to

J. FRANK ALDRICH, Receiver,
Room 33, Wyatt Building,
Washington, D. C.

MEETING NOTICE.

NOTICE OF ANNUAL MEETING OF STOCKholders of Jamison Mining Company. Principal place of business, 120 Sutter Street, San Francisco. Works on Jamison Creek, near Johnsville, Plumas County, California.

In accordance with the by-laws of said company, the annual meeting of the stockholders of said Jamison Mining Company will be held at the office of the company, Rooms 50 and 54, 120 Sutter Street, San Francisco, California, at 2:30 o'clock P. M. on MONDAY, the 15th day of May, 1899. By order of the Board of Directors.

SAM. W. CHEYNEY, Secretary.

Dated April 14th, 1899.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from E. H. Adams in the Gold Bug Mine, near Clipper Mills, Butte Co., to deposit tailings in Grizzly Creek; from John McCollum in the Santa Rosa Placer Mine, in Mohawk Valley, Plumas Co., to deposit tailings in Sulphur Creek; and from the Plumas Development Co. in the Yankee Hill Mine, near La Porte, Plumas Co., to deposit tailings in St. Louis Ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on May 15, 1899, at 1:30 P. M.

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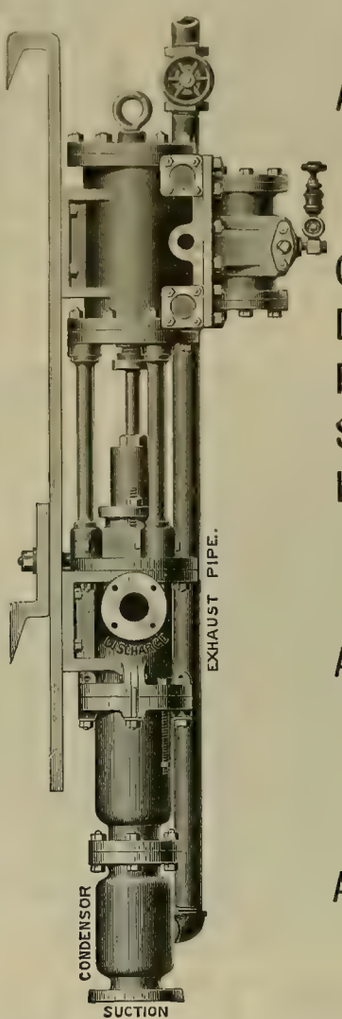

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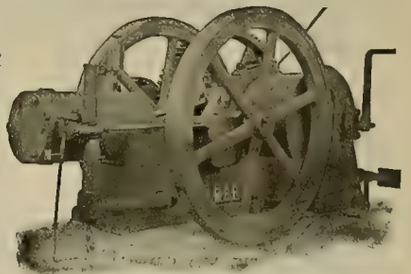

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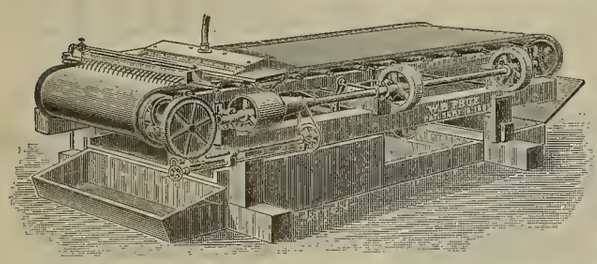

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When a Concentrator like the Frue Vanner has been on the market nearly two decades, and the sales have constantly increased, it is safe to say it is the "Standard Machine of the World." More Frue Vanners have been sold during the last twelve months than for the same period at any time during the history of the machine. Practical mining men in all parts of the world where mining is carried on will testify as to its merits. It is the "standard" which all competitors are trying to imitate.

The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

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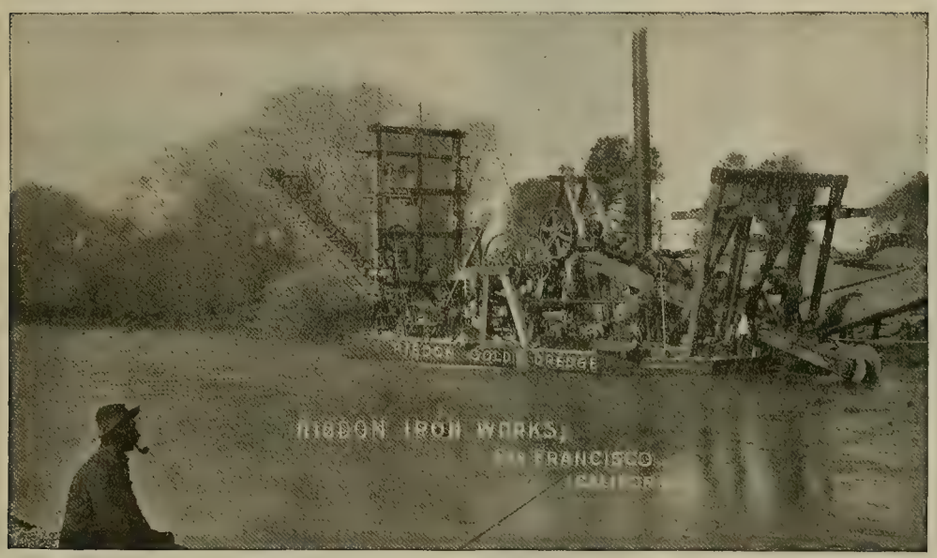

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We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

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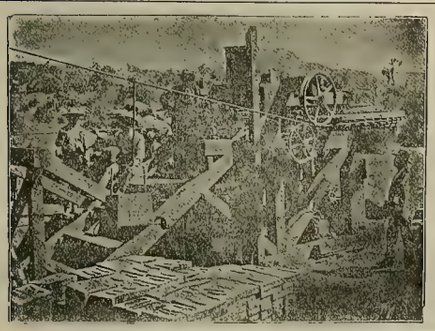

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Gives THREE CONCENTRATES on the one Machine at the same operation.

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WEIGHT.....1000 Lbs.

CAPACITY.....10 to 30 tons per 24 hours.

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THREE CLASSES OF MACHINES ARE MADE.

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Table C, 12 into 1 to 32 into 1.

Parties desiring tests made can send 500 lbs. or more, charges prepaid, and a run will be made and reports forwarded of the results, free of all charges, except for the assays, which will not exceed $10.00.

Price of the Table $300 Complete, f. o. b. Cars, San Francisco, Cal.

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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2027.—VOLUME LXXVIII. Number 19. SAN FRANCISCO, SATURDAY, MAY 13, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Hydraulic Mining in Northern California.

Among the largest and most successful hydraulic mines operating in California are those of Trinity county. The mines there work without restriction, the streams of the region not being tributary to the Sacramento river and being unnavigable throughout their length. The scenes depicted on this page are typical of hydraulic mining, not only in Trinity county, but elsewhere in California, where this class of mining has reached the highest development, and is carried on either without restraint or under the conditions of permits issued by the United States Debris Commission.

Originally the mines of Trinity were operated in a small way by the owners, who, having limited means, were unable to work to the best advantage; but capital was introduced from abroad, and there are now in that section some of the largest hydraulic mining operations in the State. In Trinity county a great many of the gravel deposits occupy bars or terraces along the hillsides of the streams, and are evidently the remnants of the channels of these streams at an earlier period, and in this respect are somewhat unlike the ancient river channels found farther south in the State.

Hydraulicking is a very interesting as well as a very profitable business in California, and had this great industry not been inhibited for years and later required to work under certain restrictions, doubtless radical changes would have taken place in methods and appliances and it can only be surmised to what extent operations might have advanced.

CHAPMAN & FISHER MINE, NEAR JUNCTION CITY, TRINITY COUNTY, CAL.

MONITOR AND DERRICK, CHAPMAN & FISHER MINE, TRINITY COUNTY, CAL.

GIANTS AT WORK, LA GRANGE MINE, TRINITY COUNTY, CAL.

HYDRAULIC PIT OF RED HILL MINE, JUNCTION CITY, TRINITY COUNTY, CAL.

The Act repealing all local mining laws passed at the last session of the California Legislature took effect immediately upon its passage, and those who have located claims since the passage of that Act in conformity with the old Act of '97, which was repealed, should take steps to relocate under the Federal statutes, it appearing that some litigation has already resulted from the change. It is a well-known axiom that ignorance of the law is not an excuse, and those who have proceeded under the old law, not knowing of the passage of the new, would have a poor case in the event of litigation.

As to the future of copper there is a diversity of opinion. A prominent electrical engineer says that, in his opinion, the future of copper largely depends upon the uses to be made of electricity. He believes that a period of fifteen years will have seen all other means of locomotion and power supplanted by electricity, and the future of copper in consequence is plain. Doubtless copper will continue to be a very important factor in the electrical world, but the necessities of the case will demand naturally that copper shall be used in as small quantities as possible, and there will undoubtedly be an endeavor to reduce the weight of wire employed to conduct electric currents to the smallest practicable dimensions, as well as to find a cheaper and satisfactory substitute for copper. The large number of new prospects and old mines being reopened have, with few exceptions, not commenced production of metallic copper as yet, but in a few months, if the price of the metal remains at its present high figure, or near it, a great many of these new concerns will add their quota to the general output, which will be swelled beyond that of any period of the past.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Largest Circulation of any Mining Journal on the American Continent.

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J. F. HALLORAN.....Publisher

San Francisco, May 13, 1899.

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THE gases generated in blast furnaces are being utilized in Europe for running gas engines with complete success.

NEARLY 50% of the miners at Leadville now work but eight hours, but the mine managers demand the best men they can employ. The wages paid are $3 per day.

THE offices of the American Institute of Mining Engineers, which for years have been at 13 Burling slip, New York City, have been moved to 99 John street, corner of Cliff, in New York.

MORE money is being invested in the copper mining industry this year than in any half dozen previous years. Zinc also is attracting a large amount of attention, it, like copper, having risen in price to a point which makes it an object of unusual interest.

THE recent lawless acts of the Miners' Union in Idaho, at the Bunker Hill & Sullivan mine, cannot fail to have a depressing influence on the investment of capital in that State for a time. The authorities, both State and Federal, have taken a firm stand, however, and there is little probability of the recurrence of such a scene as was enacted at Wardner on the 30th ult.

THE Eastern financial journals state that when the $75,000,000 stock of the Amalgamated Copper Co. was offered on the market more than $400,000,000 was offered. The stock is now changing hands at a premium, ranging from 103 to 110. This simply means that the subscribers to the stock are not only willing, but anxious, to buy into a pool controlling some of the largest copper mines, paying for the privilege at a higher valuation than has ever before been placed on the mines. The present capitalization is for $75,000,000, with the privilege of increasing this capitalization indefinitely.

TWO VENTURESOME PROSPECTORS "jumped" the townsite of Keswick a few days since ostensibly for mining claims. It is asserted that the property in question was originally located as a mining claim, and patent applied for, the applicant having the receipt of the receiver of the Land Office for money paid into the United States treasury. When an applicant for a patent has the receiver's receipt, it is equivalent to a patent, and in this case the jumpers will have a poor case in court. They base their claim, it is reported, on the fact that assessment work has not been kept up as required by law on unpatented claims.

Another Important Mining Decision by Judge Hallett.

The following is the full text of a decision in the case of Cone vs. Roxana Gold Mining & Tunnel Company, at Cripple Creek, Colo., and is the most recent of Judge Hallett's notable decisions:

By Judge Hallett (orally).

James J. Cone and Lyman Robinson against the Roxana Gold Mining & Tunnel Co. is a bill for injunction.

Complainants have patent title to two claims in the Cripple Creek mining district, parallel and adjacent, which are called Doctor and Chief. They were located in the months of August and September, 1891.

Respondent owns the Gold Standard tunnel, which was located by Eli G. Bettis in the month of March, 1892. Respondent has driven his tunnel through and across the Doctor claim, and is now about to enter the Chief claim in the further prosecution of its work. It is averred in the bill that the purpose of respondent in driving the tunnel is to take ore from the Doctor and Chief claims and to make locations in those claims; but this is denied in the answer. Respondent says that no ore has been discovered in the tunnel, and none will be taken from the complainant's territory under any circumstances. It seems only a right of way for its tunnel through and across the Doctor and Chief claims, with a view to develop property owned by it further on in the course of the tunnel.

The case is not the same as Stratton vs. Gold Sovereign Co., 1 Legal Adviser, 350, in that the respondents in that case were attempting to take ore from complainant's location. It must be said, however, that the principle upon which that case was decided is applicable to any entry upon the premises of another without right, or for a purpose not recognized in the law. If, as was said in the Stratton case, complainants are the owners of the Doctor and Chief claims, as against a junior location of a tunnel site, respondent must justify its invasion of these claims whatever the object of its entry may be.

Accordingly an early statute of 1861 (Sec. 3141 of Mills' statutes) and a recent Act of 1897 (11th session 181) are cited in support of respondent's right to prosecute the work. These Acts are in nearly the same terms, and the latter declares that a tunnel owner "shall have the right to drive and continue the same through and across any located or patented claims in front of the mouth of such tunnel." No provision is made in either Act for ascertaining the need of the tunnel owner for right of way through the serviant estate in order to work his own claim beneficially or for compensating the damage done to the estate appropriated to the use of the tunnel.

In the absence of such provisions the Acts would seem to be in conflict with Secs. 14 and 15, Art. 2 of the Constitution of the State. Sec. 14 declares that private property shall not be taken for private use except for certain purposes and Sec. 15 declares that it shall not be taken without just compensation to the owner.

Respondent's counsel believes that the Acts of Assembly are supported by Sec. 2338 of the Revised Statutes of the United States, which is incorporated in complainant's patent. He maintains that complainant's estate in the Doctor and Chief claims is subservient to all local legislation, regulating the use of the claims by the owners thereof, and by others who may own property in the vicinity. In this, however, he is not supported by the course of judicial opinion when the statute has come under the observation of the courts. In a general way, it has been understood that the Act was intended to signify the assent of Congress to those wholesome regulations which have been found necessary in the business of mining to insure the safety of workmen and a proper course of administration in conducting the business. Woodruff vs. North Bloomfield Gravel M. Co., 18 Fed. Rep. 753; People vs. District Court, 11 Colo. 148; Amador Queen M. Co. vs. Dewitt, 73 Cal. 482.

It is reasonably clear that the statute refers only to such rules and regulations as may be made before the Government has conveyed its title; because it says, "In the absence of necessary legislation by Congress" rules may be made; and Congress would have no power to legislate after the Government has conveyed its title. The last clause of the section provides that the conditions of sale "shall be fully expressed in the patent," and this may mean that only such things as are particularly described are reserved from the grant. The right to follow a vein from adjacent territory is usually so described in the patent.

It is not necessary to consider at length the meaning of the section. It is enough that we are enabled to say that it cannot displace the Constitution of the State, and the case cited from 11 Colo. supports that conclusion. The Legislative Assembly of the State of Colorado has attempted to give to tunnel owners a right of way under ground through locations properly made, of earlier date than the tunnel site, without compensation to such owners. An Act of that kind is of no force or effect under the Constitution of the State, and respondent will not be able to justify its entry upon complainant's property under its provisions.

Objection is also made to the bill, on the ground that it discloses nothing more than a trespass which cannot be a subject for relief in equity; and that the damages suffered by complainants from the completion of the tunnel cannot amount to $2000.

We have often held that a naked trespass will not be restrained when nothing of value can be taken from the property; and if respondent's work in the property in controversy appeared to be of that character the writ would be refused. There is, however, something more than a trespass involved in the case. Respondent seeks to establish a right of way for its tunnel in the premises, and the tunnel when completed may be used for all time. Whether this is an injury to complainants' property exceeding $2000, we are unable to ascertain on this motion. A matter of that kind can be better considered at the final hearing upon full testimony taken in the usual way.

The injunction will be allowed according to the prayer of the bill.

March 31st, 1899.

THE recent discovery of gold near Cape Nome, in Alaska, throws some interesting light on the distribution of gold in that Arctic region. At the time the Klondike first gained prominence as a mining field of great possibilities, it was thought that the gold fields would extend northerly or in a northwesterly direction. Looking at a map of British Columbia, Northwest Territory and Alaska, some very interesting facts are observable. The mineral belt extending northward from California, Oregon, Washington, Idaho and Montana passes in a northwesterly direction into and through British Columbia toward the Northwest Territory; but it is noticeable that, as it passes northward, it bends constantly to the westward, passing through Cariboo, Cassiar and on to the Klondike region, where its trend is well to the westward. Still westward, it passes through the Circle City region, beyond which it appears to strike nearly due west toward Cape Nome. It should be remembered that there are numerous gold discoveries lying outside of the belt described, but thus far none of them have proved important, unless the Atlin lake country be excepted, and that is as yet undeveloped. These facts are of interest, but Alaska is as yet too superficially developed and too little known to make it safe to lay down arbitrary lines. To the northwestward of Klondike, where it was formerly presumed the gold belt would be found to extend, very little gold has been found. I. C. Russell, for the United States Geological Survey, made an investigation of considerable territory in that region and does not report having observed gold anywhere. The development of the newly-found field will be watched with unusual interest.

THE miners of Tuolumne county, at a convention held recently at Sonora, reorganized the Tuolumne mining district. Among other rules and regulations of the district, is one requiring that the locator of a mining claim within the district shall post a notice at each end of his claim at the center stake. The United States statutes require a notice to be posted at the point of discovery as well, so that locators in the district of Tuolumne will be required to post three notices. Another section of the rules requires that a locator file his location notice for record with the district recorder within thirty days of the date of location, or the claim shall be regarded as abandoned and shall be open to location by another.

THE miners in various parts of California are reorganizing mining districts for the purpose of providing local rules and regulations to govern the location and development of claims. Unless some step be taken at once by the Executive Committee of the California State Miners' Association to issue a uniform location blank, as previously suggested, it will soon be too late to hope for anything like uniformity, as each district will adopt a form of its own.

THE second hydraulic elevator at the C. & C. shaft of the Comstock lode has been placed in position and was ready to start Thursday evening. At that time the water in the 1750 level winze was 41 feet 8 inches below the station level. The first elevator was working steadily and holding the water. The progress of this work is watched with great interest by mining men everywhere.

Concentrates.

CENTIMETERS multiplied by .3937 equal inches.

LITERS multiplied by 61.022 equal cubic inches.

ONE cubic inch of water weighs 0.036118 pound.

CUBIC METERS multiplied by 35.315 equal cubic feet.

CUBIC CENTIMETERS divided by 16.383 equal cubic inches.

ONE pound pressure per square inch equals 2.3091 feet head.

THE French millimeter multiplied by the decimal fraction .03937 equals 1 inch.

MELACONITE is a black earthy oxide of copper; not uncommon in copper regions.

THE new gold discoveries at Nome, in Alaska, are within 150 miles of the Arctic circle.

A METER is equal to 39.37 inches. Meters may be reduced to feet by multiplying by 3.281.

THE density of water is greatest at 39° F., at which density one cubic centimeter weighs one gramme.

THE Minister of Mines of British Columbia classes the ores of Rossland as gold and those of Nelson as copper-silver ores.

EMBOLITE is a chloro-bromide of silver, resembling bragyrite (horn silver). Its color is yellowish green. It contains 51% silver.

WATER is composed of two volumes of hydrogen and one of oxygen (H_2O). By weight, one part of hydrogen and eight parts of oxygen.

THE present price of sheet copper for amalgamating plates at San Francisco is 23½ cents per pound, but the price is changing almost daily.

CHALCOPYRITE is copper pyrite, and is sometimes called yellow copper ore. It is a sulphide of copper and iron containing copper 34.5%, sulphur 35% and iron 30.5%.

METACINNABARITE, which occurs in several California quicksilver mines, has the same composition as cinnabar, but differs in crystallization. It has a brownish, iron-black color.

THE variety of mica called hydrous-mica, which forms an important constituent of some schists, has been found on careful investigation to contain little if any more water than other ordinary muscovite micas.

GALENA requires 4.34 cubic feet to make a ton of 2000 pounds. Pyrite (iron sulphide) requires 6.41 cubic feet to make a ton. A ton of limestone contains 11.50 cubic feet. Granite requires 11.77 cubic feet to weigh one ton.

PUMICE is a porous, vesicular, volcanic glass, the cavities vesicles being usually elongated. It varies considerably in chemical composition. It occurs on the surface of obsidian streams, and is really a frothy condition of the obsidian itself.

SEA WATER contains 3.5% of salts, of which 2.7% is chloride of sodium (common salt) and the balance sundry other salts. It is also said to contain a small amount of gold per ton, all effort to recover which has up to the present time proved abortive.

BORAX and boracic acid have been made at various times for some years past at Calico by prospectors owning claims there. This borax was not manufactured from colemanite, but from a clay shale containing a large amount of calcium borate in fine crystals.

MANGANESE ORE (pyrolusite containing 60% to 65% black oxide manganese) is salable in San Francisco at $8.50 to $9 per ton. It sells retail when ground for use at about $20 per ton. It is used chiefly in California in the manufacture of chlorine gas at the various chlorination works.

THE statement has been published that fluorspar occurs in the United States only in Crittenden Co., Kentucky, and Hardin Co., Illinois. Fluorspar occurs in abundance at Bastie Dome, Arizona, in more limited quantity in other portions of Arizona, and in Los Angeles Co., Cal., near Glendora.

EXPERIMENTS are being made with various kinds of wood other than pine for mining purposes. Redwood, while not as strong as pine, is more durable, and acacia is also said to give satisfactory results. The New Almaden quicksilver mine, in Santa Clara county, Cal., is timbered largely with redwood.

BORNITE is purple copper ore, variegated copper ore, also called peacock copper, a copper-iron sulphide in which the proportions of the elements vary, copper usually about 55%. Chalcopyrite also shows the iridescent colors peculiar to bornite, but is due to tarnish, and is not peacock ore.

WHEN the total amount of assessment work required by law ($500) to secure patent to a mining claim has been performed, and application for patent has been made and received and a receipt issued to the claim holder, the law does not require that he shall do any further assessment work on the property.

AZURITE is the blue carbonate of copper containing carbon dioxide 25.6%, cupric oxide 69.2%, water 5.2%. It is very similar to malachite, but contains less copper; is of a beautiful dark blue color. Both malachite and azurite effervesce with acids. Linarite is a deep blue mineral greatly resembling azurite. It is a basic sulphate of lead and copper.

TO MEASURE a stream by velocity and cross-section measure the depth of the water at 6 to 12 points across the stream at equal distances. Add all these depths together and divide by the number of measurements made to find the average depth. Multiply this by the velocity of the stream per minute, which gives the number of cubic feet flowing per minute.

ALABANDITE is a sulphide of manganese. It has a iron black color and sub-metallic luster, with a dirty green-ish streak. It is not a common mineral. Two important localities are Summit county, Colorado, and near Tombstone, Arizona. It is often accompanied by rhodochrosite (manganese carbonate), and sometimes, also, by rhodonite (manganese silicate).

CHRYSOCOLLA is a silicate of copper, of bluish green color. The luster is sometimes shiny to vitreous, and sometimes earthy; occurs filling cracks and seams and often as a coating on rocks in copper regions, also in masses, constituting a valuable ore of copper; is decomposed by acids, but does not effervesce like the carbonates. It is infusible before the blowpipe.

TETRAHEDRITE (gray copper) occurs crystallized, granular, and massive; the color and luster often splendent, between flint gray and iron black, sometimes slightly brown or red; a combination of copper 52.1%, antimony 24.8% and sulphur 23.1%. It graduates into other varieties containing silver and gold. It is commonly associated with copper and zinc ores in many districts.

IN the issue of the 29th ult. in "Concentrates" appeared the statement that the Homestake, South Dakota, mine occurred in granite. This was an error. The formation inclosing the Homestake mine and forming a portion of the pay shoots is mica schist of fine texture. Associated with the great ore deposits are intrusive masses of felsite, which is near granite in composition.

THE lead-silver mines of Resting Springs and other localities in Inyo county, Cal., were worked to some extent about '70, the ore being hauled more than 250 miles by teams across the desert to San Bernardino and thence to San Pedro, from which port it was shipped. Smelters were also built at some of the mines, but the high price of fuel and other supplies made the business unprofitable.

MALACHITE (green carbonate of copper) is of a beautiful bright green color, brittle but soft. The fibrous varieties have a silky luster, the more massive dull and earthy; contains carbon dioxide 19.9, cupric oxide 71.9. This is one of the most common of copper ores and is often seen staining and incrusting rocks on the surface in copper regions. It also forms large veins and masses of great value in mines.

AT works recently erected near Daggett for the treatment of rock containing calcium borate, obtained from mines in the vicinity, it is stated that the rock is first crushed, then roasted. It is then pulverized dry and boiled in chemicals. The solution being run into settling vats, the impurities settle to the bottom, after which the vat is decanted, allowing the borate solution to run into the crystallizing vats.

SERPENTINE is a hydrous-magnesium silicate, like talc, but containing more water and less silica. Chrysotile is fibrous serpentine. The latter often occurs as veins in massive serpentine, the fibers lying transversely in the vein. Chrysolite (olivine) is evidently an important original constituent of the rocks from which serpentine is formed. Peridotite, consisting largely of chrysolite, is often found altered into serpentine.

THE quantity of heat required to raise the temperature of one gramme of water for 1° centigrade is called one calorie. It takes as much heat (calories) to melt one gramme of ice as it takes to raise the temperature of seventy-nine grammes of water 1° C., or to raise the temperature of one gramme of water 79° C. It requires 536.5 calories to change one gramme of water of the temperature of 100° C. into steam having the same temperature.

CUPRITE is red oxide of copper. When crystallized it is found most commonly in octahedrons, though also in cubes and dodecahedrons much modified in form. It is massive and earthy. The luster is adamantine or sub-metallic to earthy; color red of various shades, particularly bright crimson, sometimes nearly black. It may be distinguished from iron oxide by inferior hardness, though harder than cinnabar. Contains copper 88.8%.

DANAITE, the rare cobalt-bearing sulpharsenide, is found in the Pine Tree-Josephine mine in Mariposa county, Cal., accompanied by a pink efflorescence, erythrite (cobalt bloom), a hydrous cobalt arsenate, which is a secondary product due to oxidation of the danaite. The mineral is gold-bearing. Erythrite also occurs in the Kelsy and Mint silver mines in the San Gabriel canyon in Los Angeles county, Cal., associated with native silver in a gangue of baryta.

THERE are no extralateral rights to the mineral deposits of the Leadville, Colo., district. In each instance the juries who tried the numerous cases where companies undertook to claim extralateral rights found that there was no vein or lode. This was an unwritten law of the district. The deposits, while being lodes or veins within the definition of the court, they were not such, in fact, when left to the determination of local juries, and, as a consequence, no extralateral rights were obtainable.

THE right to the use of running water flowing in a river or stream down a canyon or ravine in California may be acquired by appropriation; but the appropriation must be for some useful purpose, and when the appropriator or his successor in interest ceases to use it for such purpose, the right ceases. The place of diversion of such water may be changed, if no person is injured by such change, and the water may be conveyed in pipes, flumes, ditches or otherwise beyond the place where it was first used.

NO MINING CLAIM can be legally taken which does not include within its boundaries the apex or top of a discovered vein. This is the theory of the law, but a condition may exist, as at Leadville, where an ore deposit may pass entirely through a claim lying at a low angle and not have an apex within the vertical planes drawn downward through the boundary lines. The deposit may have its apex in an adjoining claim or in some other claim in the neighborhood. A shaft sunk from the surface and reaching a flat ore deposit of this description constitutes a legal discovery.

THE occurrence of native gold in the following rocks has been noted: In quartz, almost universally in mining regions; in calcite, Alvord mine and Carbonate mine, San Bernardino county, Cal.; in diabase, Bear Valley, Mariposa county, Cal.; in diorite, near Big Oak Flat, Tuolumne county, Cal.; in andesite, Bodie, Cal.; in trachite, Black Hills, South Dakota; in phonolite, Black Hills, South Dakota, and Cripple Creek district, Colo.; in granite, at Soulsbyville, Tuolumne county, Cal.; in ankenite, Rawhide mine, Tuolumne county, Cal.; in mica schist, Old Bill mine, Potter ridge, Madera county, Cal.; in quartzite, Gold Chief mine and Gold Mountain mine, San Bernardino county, Cal., and at Red Cliff, Colo.; in limestone, at Black Hawk mines, San Bernardino county, Cal.; in feldspar, El Dorado county, Cal.; in felsite, Hexahedron mine, Colorado desert, Riverside county, Cal.; in sandstone, at Woodlawn, Colo.; in chlorite schist, Caledonia mine, Black Hills, and in Amador county, Cal.; in talc, Amador and Calaveras counties, Cal.; in quartz porphyry, Lava Beds district, San Bernardino county, Cal.

OVERMAN'S METALLURGY, published in 1852, calls attention to the fact that aluminum mixed with "iron" has a toughening influence, and that certain East Indian steel contained this metal as alloy. He adds that iron smelted from clay ores is stronger than any other kind. Of nickel as an alloy with iron, he says: "Nickel is found native and alloyed with meteoric iron. This alloy has been little examined, and is to all appearance of slight practical value." In the case of aluminum, he was evidently correct, while concerning nickel he was as evidently wrong, as the manufacture of Harveyized steel has shown.

A PERSON claiming a location cannot hold the same without complying with the laws in regard to assessment work. The simple fact of posting a notice, informing "whom it may concern" that the claim is not open to location for the reason that work has been resumed, will not hold in law, for, in the advent of an adverse claim, he must bring proofs of having done the assessment work as required by law. In a case where a claim holder has neglected to perform the required assessment work, he may at the last moment resume work and continue it until the required $100 worth has been completed, and thus hold his claim; but should he fail to accomplish the full amount required, he cannot hold the claim as against another.

THERE has been considerable talk about the rise in the Colorado river the coming summer. Owing to the unusual quantity of snow in the mountains of Colorado and Wyoming and on all the headwaters of the tributaries forming the Colorado river, it is thought the river will be very high in May and June of this year. When the Gila also rises at the same time the river gets unusually high. There has been much speculation as to the probable overflow of the river into the Salton basin, formerly an arm of the Gulf of California. In '92 this did occur and a large quantity of water ran into the basin, reaching the lowest portion of the depression at Salton. There is not the least probability of the river filling the basin for the reason that the volume of water flowing in the river is not sufficient to accomplish it in a single year. The superficial area of the basin is nearly 2000 square miles; its average depth probably 100 feet, the greatest depth being 275 feet at Salton Salt Works. The volume of water in the Colorado river at Yuma at flood time varies considerably, but assuming a mean depth at time of high water to be 15 feet, and if the entire system flowed through a crevasse in its bank, it would require more than three years of continuous flow to fill the basin to sea level, making no allowance for evaporation, which in that dry, heated atmosphere is enormous. As the point at which the river would flow into the basin is considerably above sea level, it is obvious that the area and consequently the capacity of the basin would be greatly enlarged.

Auriferous Zones in the Hanging Wall of the Mother Lode of California.

Written for the MINING AND SCIENTIFIC PRESS.

Along the Mother Lode of California are found great, massive outcrops of quartz forming in many places striking features of the landscape. The croppings are often seen 10 to 80 feet in height and sometimes several hundred feet in length. In width these great masses of quartz vary from 10 feet to upwards of 100 feet. Some of the most prominent and important of these quartz masses are the May Rock in Bear valley and at the Pine Tree-Josephine mine; at several mines near Coulterville and on Pinon Blanco in Mariposa county; in Tuolumne county at the Shawmut and Eagle mines at Quartz mountain and northward, at the Crystalline and Alabama mines, and again at and near the Rawhide mine. In Calaveras county the massive outcrops appear on Carson Hill and northward on Chaparral Hill and Bald Hill, also near Angels. Again these large croppings are seen north of San Andreas. In Amador county they are less pronounced, though some large outcrops do occur near Drytown. Several large outcrops also occur in El Dorado county.

These heavy, massive croppings of quartz have been called by miners since early days the boulder vein. This does not seem to be the proper term, for in some localities there are several veins, nearly parallel, outcropping as described, and it then becomes a matter of choice which is the boulder vein. The large amount of work done on the mines of that portion of the gold belt known as the Mother Lode has demonstrated that in many cases these large, bold outcrops were almost destitute of gold. Many of the largest and richest pay shoots are found in slaty zones lying east of these massive outcrops. Particularly is this the case in the counties of Calaveras, Tuolumne and Mariposa.

In Tuolumne county several miners have been exploring the hanging wall country and have found zones of pay rock lying east of the massive quartz veins heretofore recognized as the principal fissures of this portion of the gold belt. At the Shawmut–Eagle mines north of Jacksonville a broad zone of gold-bearing silicious schistose rock has been found, containing an unusual percentage of auriferous pyrite. Recently John D. E. Nelson, who is developing the Blue Lead mine on Moccasin creek, about two miles south of the Shawmut–Eagle mine, has discovered a broad slaty zone of rock to be gold-bearing which formerly was considered worthless. A crosscut tunnel is being driven toward this zone, which will cut it more than 100 feet from the surface. In this case the large massive quartz cropping lying west of this auriferous slaty zone was found so low grade in gold as to be almost worthless. The crosscutting of the slaty zone by the tunnel will give much valuable information on this interesting matter.

Still farther south, on the Grant mine, is a large dyke-like mass of felsitic rock impregnated with auriferous pyrite. The rock is quite silicious, but not at all like the massive quartz so characteristic of veins in this portion of the gold belt.

These several occurrences are but a few of a number of important instances of similar character. The Utica-Stickle mine at Angels, in Calaveras county, is is the hanging wall country of the so-called boulder vein, which in this camp is generally recognized as lying in the Madison-Gold Cliff groups, nearly half a mile west of the Utica-Sticle ore channel. In Tuolumne county a number of important gold-bearing deposits have been worked, and are still paying, which lie east of the "boulder vein" and are distinctly of schistose rock —a gold-bearing greenstone schist, more or less silicious.

The Diamond Drill in Prospecting.

Written for the MINING AND SCIENTIFIC PRESS.

The usefulness of the diamond drill for the purpose of prospecting new mineral regions and for exploring the ground beyond the limits of the workings of operating mines has long since been recognized, and that this excellent method of obtaining valuable and necessary information at a minimum of cost is not more commonly applied is strange. The field of usefulness of the diamond drill is broad, but there are many places where its employment in the hands of inexperienced operators would be of no material benfit. The driller may handle the machine skillfully and accomplish all that could be desired from a mechanical standpoint, but a knowledge of geology is a great aid, if not an absolute necessity, in successfully prosecuting investigations along this line. The diamond drill is usually employed for the purpose of locating the position of ore shoots on a vein which has already more or less development; but it may also be used in prospecting for veins and deposits, of the absolute existence of which there is no positive knowledge, and as preliminary to permanent development.

When, from the appearance of float rock on the surface, or in the soil overlying the bedrock, or the existence of a vein on adjoining property, make prospecting advisable, the diamond drill may be successfully employed in determining the fact of the existence or non-existence of such supposed vein, its size, strike and dip determined, ore shoots located and their value ascertained at the very minimum of expense. To obtain the best results, holes must be located systematically and a careful record kept, not only of the distance from the top of the bore to a vein which may be discovered, but of every change in the formation. Should the bit cut through a vein, the first hole only conveys the information that a vein exists at that certain point, but its strike, dip and size still remain to be determined. The drill may strike pay rock and continue in it for a considerable distance, indicating a large deposit, but when a shaft is sunk later it is discovered that the vein is really small, the diamond drill having penetrated it at an angle approximating its dip. A series of holes may be bored from a single standpoint with best results. Three or four holes bored on a common vertical plane at varying angles, each bore reaching the vein, will determine approximately the dip of the vein. Assuming the first hole to be bored from

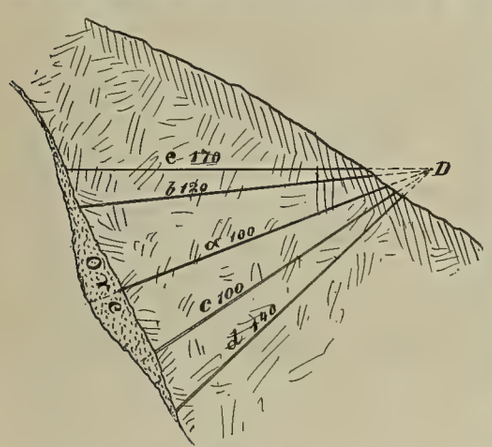


FIG. 1.

D (Fig. 1) at an angle of, say, 30° below the horizontal, and in this hole a vein is encountered at a depth of 100 feet. The bore is continued and reaches the opposite wall of the vein at a distance of 20 feet. A plat is then made, drawn to scale, on which should be shown the profile of the surface, and a line drawn from the position of the drilling machine at *D* in the direction of the bore along *a* and the point at which the vein was first encountered indicated, as also the point at which the drill passed out of the vein into barren rock. A second bore, *b*, may be made at an angle of 15°. This advances 120 feet before any sign of a vein is encountered. At this point the drill enters the vein and continues in it for 3 feet. These results should also be carefully indicated on the plat. The third bore, *C*, is made at an angle of 40° and imdiately below and in the same plane as the first two. This reaches the vein at 100 feet and passes through it in 4 feet. The fourth hole, *d*, may be bored at 50° and reaches the vein in 140 feet, passing through it in 1 foot. Thus far the plat indicates the existence of a vein dipping from the surface toward and underneath the drilling machine at approximately an angle of 50°. It being desirable, perhaps, to determine its position nearer the surface, presuming that no croppings are visible, a fifth bore, *e*, is made from the same position at a low angle, which reaches the vein at 170 feet and passes through it in 6 inches. The indications now are that the vein is persistent in its dip, but varies greatly in size. The hanging wall is seemingly regular, but No. 1 bore apparently passed through the ore body where a swell occurs in the footwall. Two additional holes should now be bored, one to the right and one to the left of the first series. They should be bored at or near a right angle to the plane of the dip. This angle, explorations thus far indicates, should be downward at about 45°, or approximately on the plane of No. 1 bore (*a*, Fig. 1), but they should also diverge 45° to either side of

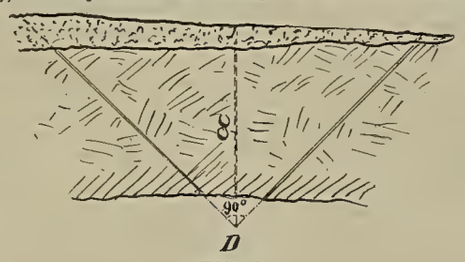


FIG. 2.

a. It is found that No. 6 hole reaches the vein in 120 feet, passing through it in 5 feet. No. 7 reaches the vein in 130 feet, and passes through it in 20 feet. Sufficient information has now been obtained upon which to base a reliable calculation. There has been demonstrated the existence of a vein having an approximate dip of 50°. The side holes determine its strike. A large ore body has been located, but not fully outlined, though enough has been proven to indicate what next should be done to develop the mine. The machine should be moved along the strike of the vein and another series of holes may be intelligently located and bored, to determine still further the extent and value of the ore shoot.

All this work has been preliminary to the development of the mine by actual workings, but in this manner not only the strike and dip of the vein, but the trend of the ore shoot, its size and value, are ascertained, and the permanent working shaft may then be located with reference to the future economical working of the mine, and the danger of making an error in this direction overcome. Possibly the values in the vein may justify no shaft at all; ; but, rich or poor, the position of the vein is positively determined and a complete knowledge of all its economcal features has been attained.

The example chosen is a very simple one, but it illustrates how any irregularity of whatever nature may be determined.

Where large veins or mineral-bearing zones are to be explored, there is less likelihood of missing the deposit entirely; but even in these cases great care is necessary, and a carefully made plan of the bore holes is indispensible.

A certain large gold mine in California at one period of its history, not more than six years ago, was considered worked out, and it was all but abandoned. Under new management, the diamond drill was employed, and in a few months it was demonstrated that there were immense ore bodies, wholly unsuspected, lying within the limits of the property. Additional ground was purchased, and now a large vertical shaft is being sunk, and this property has been given a new lease of life that will successfully endure many years.

Mining Industry in Mexico.

The secretary of the embassy at Mexico, Mr. McCreery, sends, under date of April 3rd, '99, a copy of the message of President Diaz on the opening of Congress, from which the following paragraphs in regard to mining matters are taken:

"The mining industry is that which affords most evidences of rapid progress, as in the period covered by this report 1040 title deeds, covering 11,408 pertenencias of 1 hectare (2.471 acres) each, have been issued. The total number of title deeds issued, subject to the new legislation of June, 1892, is 9353, covering 77,774 pertenencias of 1 hectare each.

"The exportation of ore has also increased to a noteworthy degree. Taking the figures recently published by the Department of Finance for the seven months—July to January—of the present fiscal year, it appears that the value of the exportation of mineral products, metallic and non-metallic, was $54,311,000 in round figures, showing an increase of $1,043,000 over the value of the same products exported in the corresponding period of the previous year.

"As an important event in the mining industry, I will state that the Adventurer tunnel at Batopilas, which is nearly 3 kilometers (1.86 miles) in length, which has been fifteen years under construction and has cost millions of dollars, has just struck the principal lodes of the camp."

THE following wise advice is offered by an exchange: "The time for investors to sell copper stocks is the year 1899, with Lake copper above 19c and going higher. The time for investors to buy copper stocks will be when the metal is under 8c and copper mines are closing down all over the world."

Some Experiences of a Working Miner.

NUMBER XIII.

Written for the MINING AND SCIENTIFIC PRESS.

I was talking not long since with Mr. D——, a wealthy merchant of a New England city, about mines and the present activity in mining generally. He put his hands deep into his pockets, as though he thought I might attempt to relieve him of their contents, and remarked in a very positive manner:

"Don't want any more mining in mine."

"Oh," said I, "you have had some experience in mining, have you? I did not know of it."

"Yes, I have been there and am satisfied," said he. "I don't want any more. It's a disgraceful business."

I wondered what sort of a snag he had struck in his mining operations and inquired sympathetically as to his difficulties with the mining industry. He related his experience as follows:

"About five years a man came to P——, where I was in business. He represented that he had a gold mine in M—— county, California, and showed some rock in which the gold could be seen in big chunks. He got a number of merchants of my city to organize a corporation and subscribe for stock, and all that sort of thing, and I went in and put up $5000 along with several others."

Here he stopped short and I inquired, "Now, how about the rest of it?"

"There was no rest to it," said he. "That's the last I ever saw of my $5000, and I don't want any more mines."

"Where is the mine?" I know a great many mines in California and perhaps I can put you on the tract of what became of your money."

"I don't know. Up in M—— county, somewhere."

"And you, nor your friends, never saw the mine?" I inquired.

"No," was the reply. "I never did, nor any of us. I don't know, in fact, that there is any such a mine at all. I have forgotten the name of it."

"Do you really mean to tell me," I asked, "that yourself and several other business men actually put up $5000 apiece on a mine located in M—— county, California, without ever investigating the matter at all? Who was this fellow who got you into the scheme?"

"I don't know who he was," said Mr. D——, thoughtfully. "I should know him if I saw him again, I think. He was a nice appearing fellow, dressed well, a good talker, and seemed to have plenty of money, and he had good letters."

I was obliged to laugh at his earnestness, particularly when he said he thought he would know him if he should meet again.

I said: "Now, Mr. D——, for this unfortunate and, I must say, foolish investment you condemn the mining business as an industry—an honest, legitimate business, as much so as yours, more so than yours, and without which, if you only knew it, you could not get along. Would you be willing to take the word of a perfect stranger as to the value of a stock of goods in your line in an establishment in a distant State, and buy them for spot cash without an investigation, even though you wanted such goods at that place?"

"No, most assuredly not," was the prompt response. "I wouldn't think of such a thing, but this was such a plausible fellow, and he had the rock with the gold in it."

I feel sorry for O——. He has so many locations, and it costs him so much for assessment work every year. In fact, he is obliged to relocate a number of his claims annually in order to hold on to them. Among his numerous locations are several copper mines (?), on which he places great value. He has a string of assay certificates pasted together, making a strip nearly 50 feet long. For a long time O—— spoke with pride of his rich copper mines at O——. "They carry 18° to 25%," said he, "every ton of the ore—and there's a mountain of it."

Some mining men went out to the property and made an examination, taking fifty or more samples. They commenced assaying and on the first ten tests the results ran from 1.6% to 2.1%. O—— came in and inquired how they were getting along, and was told "All right," but that the results were somewhat lower than had been represented. They showed him the results they had obtained and O—— was angry. O—— hastened out of the assay office and soon returned with his roll of assays, which he unrolled with some energy, and said: "Look at these—the men who made these assays understand their business. Here—20%, 19%, 16%, 21%. See it?" "Yes," replied the assayer, "I see it, but I also see a decimal point in each of these figures. They read 2.0%, 1.9%, 1.6%, 2.1%, which all agree, approximately with the results we are now obtaining."

O—— put on his glasses and gazed long and intently at his certificates and in each case found he had neglected to notice the decimal point. He left the place a somewhat wiser, sadder and madder man. It is doubtful if these mines are absorbed by the copper combine.

This instance brings to mind the case of the man

who sent his rock for assay and got the following returns: Gold $6.00, sulphurets 2%.

He immediately figured it out as follows: If 1 ton contains 2%, 100 tons will contain 2 tons of sulphurets, worth $600, or $300 per ton. To some extent this was the fault of the assayer in not distinctly stating that the sulphurets constituted 2% of the rock and assayed $6 per ton.

Increase in Price of Zinc Bringing American Zinc Properties into Prominence.

New England people are beginning to take considerable interest in lead and zinc mining in western Missouri and eastern Kansas.

Natural gas has been found in southeastern Kansas, and three smelting plants there are now being operated entirely by natural gas.

The recent rise in the price of zinc ore, which has been greater than the advance in ingot copper, has brought American zinc properties before the public as never before.

Zinc ores sold recently at $52 per ton for 60% ore, which is the standard, the price paid by the smelters' agents at the mines varying above or below this price according to the increase or decrease of the percentage of zinc in the ore. The previous highest price was $48.50 per ton. A year ago the price was $26 per ton, or one-half the present extreme price, and a few years ago the price was well below $20.

The advance in zinc has been due to the exhaustion of important mines abroad, especially in Belgium, where they have been worked below the sea level and flooded, also to the increased consumption of brass, which is made of zinc and copper, and the expansion of the electric field and the development of the cyanide process for gold extraction. South Africa alone is said to consume 40,000 tons of zinc in the extraction of gold through the cyanide process. There is no such thing as zinc scrap. Zinc is eaten up or vaporized, and is more distinctly consumed than any other metal. It is estimated that, in the production of $40,000 in gold by the cyanide process, two tons of zinc are eaten up. In the electric field it is the only negative metal, and there is as yet no substitute for it. It is very volatile, and in the ore-smelting process it is first vaporized and then condensed. It requires three tons of coal to smelt one ton of zinc, and therefore zinc ores are carried to the coal fields or to the natural gas wells.

A few years ago we exported no zinc in ore or pig. The Government reports show for the calender years the following as the zinc exports of the United States the past four years:

Year.	*Ore, Lbs.*	*Pig Metal, Lbs.*
1895	48,000	3,060,805
1896	4,150,000	20,260,169
1897	16,520,000	28,490,662
1898	21,040,000	20,998,413

The world's production of zinc is said to be about 400,000 tons of zinc ore, of which the United States is now producing 265,000 tons per annum. Last year the United States produced 235,000 tons of zinc ore, an increase over '97 of 53,000 tons. As three-quarters of the American supply comes from the Missouri-Kansas district, which will run above 50% of metallic zinc in the ore, the American production of zinc can be safely set down as now about 270,000,000 pounds, which was the American production of copper but a very few years ago.

As in copper, the positive metal in the electric field, so in zinc America now controls the markets of the world. It would appear that America had only the telegraph and telephone development of the world, but the electric railway development, the electric machinery development, and the control of both the positive and negative metals essential in the production and distribution of electricity. The following comparison of the present annual American production of copper, zinc and lead is made with that of ten years ago and '80:

	1880.	*1889.*	*1899.*
Copper, lbs	60,480,000	231,246,214	560,000,000
Zinc, lbs.	46,478,000	117,720,000	270,000,000
Lead, lbs.	195,650,000	383,934,000	450,000,000

The great zinc field of America is at Joplin, Mo., and a radius of fifteen miles from the center of Joplin embraces the entire territory of zinc production in this region so far as is now known. Smelting profits and mining profits here have been something astonishing, and miners who cannot read or write have been made millionaires from a few hundred acres of land. Leases are more common than in other mining operations as production on this basis is simple and easy for both land owner and miner. A miner can take lease of about one acre of ground, or what is known as a miner's lot, 200 feet square, drill through the soil and limestone from 200 feet to 500 feet, and if he opens out a zinc chamber he can sink a shaft and begin operations with a hand hoist until he gets enough ore to warrant a steam hoist. Then about $6000 will provide a milling and washing plant, which will crush and wash out 250 tons of ore per week ready for sale to the agents of the smelter who buy at the mines, and make payment every Saturday night. All the stores and banks of Joplin and the country round about are open until late Saturday evening, and everything is settled upon a weekly basis. It takes twelve tons of water to wash out one ton of ore. Leases range from 5% to 40% of the gross output as rental. At the present high price for zinc ores the miners are getting the best of it, but when zinc is low the land owner may hold the advantage.

It is said that the present high price of zinc ore is stimulated by the increased smelting capacity of the district, as smelters once started can close down only at considerable loss; but as the foreign markets lead us in the advances in zinc or spelter, as the pure metal is called, the present industrial prosperity and the electrical development may be looked to as the mainspring of all other causes for advancing prices. It is said that there are thirty-two pounds of brass in the car bearings under each of the 1,500,000 cars of the United States, which have to be replaced four times a year and this uses up a tremendous amount of both zinc and copper. Zinc is coming into use very largely for step coverings. It has the clinging quality for the foothold, wears well and is not affected by the weather, but under a strong heat it vaporizes and leaves no residuum as do other metals. Probably the largest use for zinc is in coating iron through the manufacture of galvanized iron. Galvanized nails are rapidly supplanting all other iron nails.

The Miocene Gravel Mine of Cariboo, B. C.

The new shaft at the Miocene gravel mine near Harper Camp, B. C., is well under way. It has three compartments, 4x5 feet each, timbered with sawed sets. It is down 140 feet in blue gravel, but it is estimated that 300 feet more will be necessary to reach bedrock. A former shaft on this property failed to reach bedrock at 400 feet. The new shaft house, an illustration of which is herewith given, is

MIOCENE GRAVEL MINE, CARIBOO, B. C.

60x100 feet, lighted by electricity. The plant comprises two boilers, the hoisting engine, four large steam pumps, sawmill, electric machinery, etc.

The ancient river channels of Cariboo are very extensive in the Quesnelle and Horsefly, but as yet are little known, though as far as development has proceeded are rich. Unlike the most of those of California, they lie low and require heavy machinery and large capital to develop them.

Aluminum in England.

E. Ristori recently read a paper on aluminum before the British Institution of Mechanical Engineers at Derby, England, in which he gave an account of the present state of the aluminum industry in England, and in connection therewith made some interesting comments on the applications of the pure metal and its alloys.

Mr. Ristori stated that aluminum could be forged hot or cold and in comparison with other metals it ranks third in order for malleability and sixth for ductility.

Sheets have been hammered as thin as $\frac{1}{10000}$ inch.

One casting alloy having a specific gravity of 2.9 is now largely used, but its composition is still kept secret. It has been found to produce remarkably clean castings which required very little machining to finish up and takes a high polish. Another valuable alloy contains aluminum and a small proportion of copper. The two alloys particularly recommended as among the best yet made are both ternary alloys and next to the aluminum, tungsten is the leading ingredient in each. In one of them copper is present to a small extent, and in the other nickel, and both have given astonishing results as regards strength and elongation. Samples of rolled sheets or rods made of these alloys show as much as twenty to twenty-two tons tensile strength per square inch with 5% to 10% elongation in 4 inches. Aluminum bronzes are undoubtedly superior in strength and they are especially suitable for marine engineering. Aluminum or one of its light alloys should to a large extent replace copper, tin and nickel, and its use in shipbuilding is growing rapidly on account of its great saving of weight.

Tungsten and Its Uses *

By A. C. Ross, Sydney, C. B.

There is very little literature on the occurrence of this metal. It is found in an ore known as wolfram or wolframite and is usually associated with tin, as, for instance, the tin mines of Cornwall.

The uses of this metal are numerous. It is especially valuable as an alloy for steel and is useful in the manufacture of tool steel, armor plate, guns and projectiles on account of its hardening, toughening and self-tempering qualities. It has been found to be almost impossible to get a uniform temper in the manufacture of large guns with the ordinary alloy used with steel. In the recent war between the United States and Spain the large guns were found to be practically useless after being fired from 60 to 100 times. The chambers, not being of uniform hardness, became scored. A small percentage of tungsten as an alloy will give the uniform hardness and temper required to any mass of steel. Nine per cent of tungsten alloyed with steel will give a self-tempered tool steel for lathe and other work which will stand great wear. It is also used in making dies and stamps. What is known to-day in commerce as "mushet" steel, which is manufactured in Sheffield, contains 9% of tungsten. This steel sells to-day (small quantities being imported as ordered for special lathe work) for seven times as much as the highest priced ordinary tool steel. It is a self-tempering steel and is conceded to be the best steel made for lathe, planing, boring and slotting tools, milling and nail cutters, counter-sink and twist drills, taps and dies and hot punches. It does not twist in hardening, is easy to forge, file or tool, and machines may and should be driven at a speed far in excess of any that can be used with any other steel. Tungsten steel has a great capacity for retaining magnetism, a German specimen showing a remanent magnetic moment of 62 units as against 37 units for "diamond steel," 5 units for "Martin steel" and only 3 units for "Bessemer steel."

The annual production of the metal in the world does not exceed 1000 tons. The demand greatly exceeds the supply even with the existing high prices. If it proves to be in this country in sufficient quantity to enable its being put on the market at say half its present value, its consumption would increase a thousand fold.

All miners will appreciate the great advantage it would be to have rock drills that would not soften in work no matter at what speed they might be driven, but remain tempered and ready for work on being ground or hammered to the required shape. A tool of tungsten steel can be pointed on an emery wheel, or with a hammer after being heated to a cherry red, and used on the hardest cast steel without being tempered by emersion in oil or water. The ore concentrates well on account of its high specific gravity.

*Condensed from a paper read before the April meeting of the Mining Society of Nova Scotia.

THE Anaconda Copper M. Co. is well known. The purchase, equipment and development of its mines represent an expenditure of $72,000,000, every dollar of which was taken from the mines. The company produces nearly one-fifth of the world's annual copper product. It employs 5000 men and owns ninety-one mining claims. Its great smelters and refinery at Anaconda cost $9,000,000; 200 cars, or 6000 tons, of ore are taken from the mines daily. The veins of the Anaconda vary from 10 to 100 feet in width and are all but inexhaustible. Hamilton Smith, the London expert, when he recommended to the London Exploration Co. the purchase of a half interest in the Anaconda mines, said there was sufficient ore then exposed to ensure a continuous output for fifty years. It produced during '98 122,000,000 pounds of copper besides several millions of dollars in gold and silver.

THE Calumet & Hecla M. Co. is one of the greatest in the world. It owns practically the whole village of Calumet; owns the water works, smelting works, its docks, railroads, churches twenty-six in number, eight schools, hospitals and almost everything else. Since it was organized in '71 it has paid over $60,000,000 in dividends, and there are now $7,000,000 in the company's treasury. The stamping mills are on the banks of Torch lake and crush annually over 2,000,000 tons of copper conglomerate. The copper-bearing bed or vein is 35 feet in width and has been worked to a depth of more than a mile. This distance is travelled by the cages in about two and a half minutes.

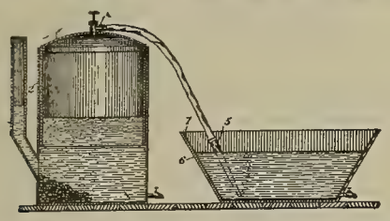
THE first practical demonstration of the value of wireless telegraphy at sea was given recently when a steamer collided with the East Goodwin lightship on Goodwin Sand off Kent coast in a fog. Both vessels had wireless instruments on board by which they learned their proximity and slackened speed. The damage sustained in the collision was inconsiderable.

Latest Mining and Metallurgical Patents.

Patents Issued May 2, 1899.

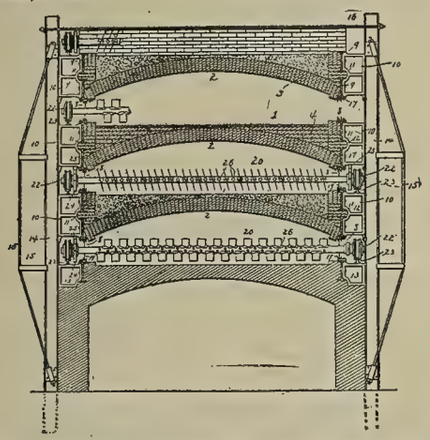
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

PROCESS OF REDUCING METALS FROM THEIR SOLUTIONS.—No. 624,040; C. B. Jacobs, East Orange, N. J.



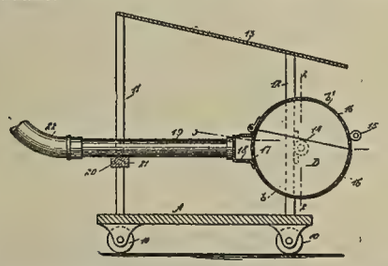
A process of reducing metals from their solutions consisting in subjecting to the action of gaseous phosphide of hydrogen in the presence of an alkaline material thereby precipitating the noble metals in a metallic state and the base metals as phosphides, and then separating the latter from the noble metals.

ROASTING FURNACE.—No, 624,048; H. A. Keller, Butte, Mont.



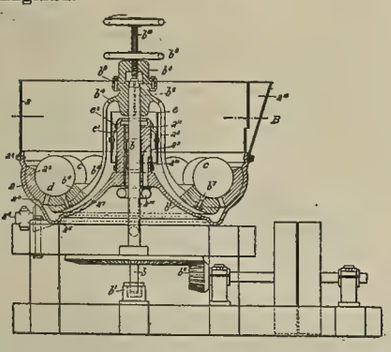
A roasting furnace having a hearth made of loose silicious material.

MINING DEVICE.—No. 624,281; C. Wright, Salmon City, Idaho.



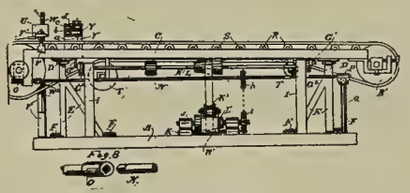
A thawing device comprising a movable frame, a cylindrical fuel chamber mounted upon said frame by axial journals, said chamber having a fuel-charging door and also a series of gas-discharge openings on one side, and air-supply chamber extending along one side of the fuel chamber and connected with its interior by holes through the wall between, an air-supply pipe connected to air chamber and serving also as a handle to control position of chamber, and a shield or cover supported from frame and extending over fuel chamber.

GRINDING MILL.—No. 624,139; A. G. Wells, London, England.



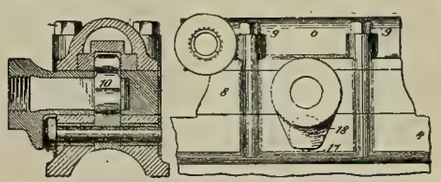
A grinding and amalgamating mill for treating auriferous and argentiferous ores in combination; a stationary pan and a revoluble overhanging yoke fitted with annular concaved grinding rings forming a channel adapted to support a series of crushing balls and a continuous annular opening leading to the pan bottom, the revoluble yoke being formed with openings for the circulation of the pulp and adjustably supported on a shaft rotated by gearing, and the pan being formed with an annular mercury trough, an upwardly inclined bottom and an upraised central part adapted to serve as a guide to the shaft supporting the revoluble yoke, and having an outlet a^9 for pulp leading to a discharging pipe below the pan bottom; a shutter adjustably applied to the upraised center part of the pan and serving to regulate the overflow level of the inlets to the pulp outlets; a cylindrical shield adjustably applied to the upraised central part of the pan around the pulp outlets thereof, and a series of crushing balls adapted to roll around within the channel formed by the grinding rings and to be actuated by the rotation of one of such rings.

ENDLESS BELT CONCENTRATOR.—No. 624,215; J. Jacobs, Henley, Cal.



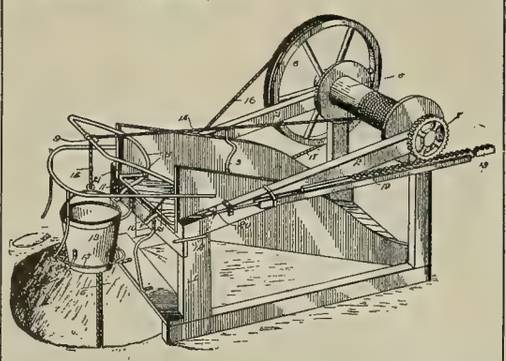
An endless traveling belt concentrator, the main frame or base, a shaking frame having drums or rollers at opposite ends over which the endless belt passes, an eccentric shaft journaled essentially parallel with the side of the shaking frame with eccentrics fixed thereon and connections between the eccentrics and the ends of the shaking frame, standards having their upper ends fitting in concaved boxes on the lower side of the skaking frame, the lower ends divergent and journaled longitudinally in boxes upon the main frame, said boxes having slotted bolt holes and bolts by which they are secured and adjustable transversely upon the main frame and with relation to the upper ends of the standards; a pulp distributing box positioned between the water box and the lower end of the belt, said box having holes in the bottom at one side, a horizontal diaphragm above said bottom and extending the full length of the interior of the box, with an open slot in the side opposite to the holes, and a vertically disposed distributing rib fixed parallel thereto upon its upper surface, and a removable cover with a supply opening leading to the side of the rib opposite to the slots in the diaphragm.

ROCK DRILL.—No. 624,181; H. V. Conrad, North Tarrytown, N. Y.



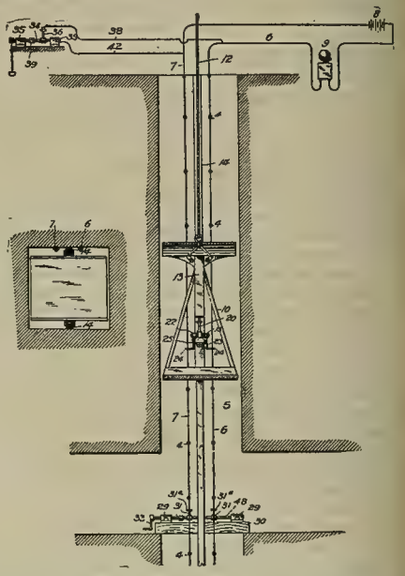
In a rock drill, the combination, with the cylinder and the piston arranged to reciprocate therein, a valve chest and a valve for controlling the supply and exhaust of the motive fluid to and from the cylinder, of a rocker mounted in the cylinder casting, a cylindrical pivot pin upon which said rocker is mounted, a head or shouldered portion of the said pivot pin for preventing longitudinal movement of the pin in one direction, an intermediate chamber between the cylinder casting and the valve chamber, a lug or overhanging ear upon the said intermediate chamber adapted to prevent the longitudinal movement of the pin in the other direction, and a means for securing the valve chest, intermediate chamber, and cylinder together.

HOISTING AND DUMPING MACHINE.—No. 624,288; G. H. Bowers, Salida, Colo.



An apparatus for hoisting substances from shafts or wells, the combination of a hoisting bucket, a hoisting rope connected with the bucket, a pulley for leading the rope to and from well or shaft, a vibrating frame carrying a guide pulley, a windlass comprising a drum and an operating wheel, and an operating cord leading into shaft or well for operating windlass drum in either direction; the combination of an elevator bucket provided with a hoop or band, a hoisting rope connected with bucket, a tilting frame provided with talons or hooks adapted to engage the hoop or band on bucket, a guide pulley mounted on tilting frame, means for operating hoisting rope or cable to raise bucket and tilt frame, and means for reversing movement and throwing tilting frame back to normal position.

ELECTRIC SIGNALING SYSTEM.—No. 624,390; E. S. Simms, Denver, Colo.



An electric signaling system for mining shafts, the combination of a normally open electrical circuit having conductors supported in shaft, a signaling device located in circuit, circuit-closing mechanism located in proximity to said conductors, and comprising a shaft suitably journaled, contact arms mounted on shaft and arranged to engage conductors when shaft is actuated, the contact arms being electrically connected, and means for automatically returning shaft to its normal position, whereby the circuit is opened; and distinct circuit-closing devices located at one or more stations in the shaft, whereby the circuit may be closed and the signal given from the cage or station as desired; circuit-closing means also located at the top of the shaft, whereby the circuit may be closed and the signal given from the cage, from any station and also from the top of the shaft, as may be desired.

Blue Asbestos.*

By H. E. OLDS.

Blue asbestos is a variety of that mineral found only in South Africa. It occurs in Griqualand West, and is mined over an area of 30,000 acres. It differs from the other varieties of asbestos, such as the Italian, Canadian, or Russian, not only in that it is blue in color, but in being considerably lighter. The asbestos is found in veins, seldom less than 2, or more often 4 to 5 inches wide, formed of closely compacted parallel fibers, which run from wall to wall of the vein without break or fault. The grain is very fine, and even in the rough state the fibers are singularly distinct. Several veins are found, always in regular extent, and the fiber always lies at right angles to the sides of the deposit. The enclosing rock is a hard brown shale. The fibers are somewhat elastic, and easily separable by the fingers. The character of the rock varies considerably; some places are soft and some hard; the better quality asbestos occurs in the hard rock. Its color is a peculiar lavender-blue, and is caused by the large proportion of protoxide of iron it contains.

*Condensed from a paper read before the English Institution of Mining and Metallurgy.

REPORTS of a new discovery of gold in Alaska are in circulation. They are of the most sensational character, and, if these reports are confirmed later, another rush will undoubtedly result. The new gold field is near Cape Nome, a point of land projecting into Behring's sea between Norton and Kotzebue sounds. The camp already established lies on the seashore and is called Nome. Those who are already in Alaska will be the first to reach the new El Dorado, and their numbers will be swelled by the tide from the Pacific coast States and British Columbia, and it would not be surprising to see a larger town spring up than at Skaguay or Dawson. The place is said to be easy of access, the gravel shallow and the pay good.

Railroads in China.

China's first railroad was opened in 1876 between Shanghai, the New York of China, and Wusung, fourteen miles distant, lying more directly upon the seacoast on an estuary of the Yangtze, with which Shanghai is connected by Wusung river. Its existence, however, was very brief, for native prejudice and superstition were so strong that the local authorities bought up the line, which had been constructed by British enterprise, tore up the rails, and abandoned it. Five years later, an English engineer, who had been placed in charge of some coal mines near Tientsin, found in existence a tramway over which coal was transported on cars pushed by Chinese workmen, and gradually extending it north and south, finally placed a steam engine upon it for use in transporting coal. Chinese prejudice, after finding that the use of the engines did not bring the disaster anticipated, gave way and the roadway developed into one general traffic, and extended little by little until it reached Tientsin at the south and the treaty port of Shanhai-kwan on the north, and, proving successful and popular, was further extended from Tientsin to within a short distance of Pekin, with which it was connected by an electric road, the entire system proving so popular that it soon became necessary to enlarge its facilities, its patronage being gathered from native as well as foreign interests and individuals. From Pekin it has been extended southwestwardly to Paoting, and thence is expected to penetrate the important coal and iron regions lying within easy reach.

This comparatively short system of 350 miles, connecting the capital of the Empire with two of the important treaty ports on the coast and with Paoting, the capital of the province in the interior, is the germ from which has sprung a prospective railway system of more than ten times its former length.

The Sources of Atmospheric Electricity.

M. H. Pellat has been conducting some experiments to investigate the sources of atmospheric electricity. It was formerly supposed that the evaporation of the moisture of the earth's surface was the cause of the electric charge of the atmosphere, but it had not been proved that highly charged water when evaporated lost any of its charge with the vapor. It has been shown that, with a potential of 25,000 volts, the liquid lost some of its charge, but in this case the liquid was pulverized, and was widely removed from the ordinary condition of water. M. Pellat negatively charged to 116 volts water in a very shallow dish and connected it with a quadrant electrometer, and after an hour's evaporation it showed a loss of from 40% to 60%. He thinks that the negative charge of the earth must suffer a loss, and the air must gain in negative charge during the first warm hours of the day, and that the reverse process sets in after sunset.—Electricity.

Massachusetts Institute of Technology.

At the last meeting of the Society of Arts of the Massachusetts Institute of Technology, T. B. Kinraide presented a unique form of induction coil of great power. This has been especially applied to the study of discharges by the aid of photographic processes, the plate being balanced on the point of discharge in a dark room and being developed after exposure. It reveals in a striking manner the marked difference that exists between the positive and negative discharges. The apparatus was exhibited in operation and photographic plates shown with the lantern. The figures thus produced by the electric discharge were of extraordinary beauty and size, the delicacy of detail being brought out by means of the lantern. It is thought they may be suggestive of forms useful to designers and decorators.

The Situation at Wardner.

The following proclamation has been issued by State Auditor Sinclair, acting for the Governor of Idaho, at Wardner:

To the Mine Owners of Shoshone County: Certain organizations or combinations existing in Shoshone county have shown themselves to be criminal in purposely procuring property to be destroyed and murder to be committed, by reason whereof it has been twice necessary to declare martial law in Shoshone county.

You are therefore notified that the employment of men belonging to said or other criminal organizations during the continuance of martial law must cease. In case this direction is not obeyed your mines will be closed.

Therefore, in order to carry into effect the spirit of the foregoing notice and restore the industries of the district as far as possible it becomes necessary to establish a system by which miners may obtain work.

The following is promulgated for the guidance of all mine owners and employes in the affected district:

All parties applying for underground work in any of the mines will be required to obtain from Dr. Hugh France a permit authorizing said person so applying to seek for and obtain employment. Mine owners must refuse employment to all applicants for underground work without presentation by parties seeking employment of a duly signed certificate authorizing the same. All parties now under employment by any of the mines above named will be required to procure within ten days from this date the certificates above referred to as a condition of their remaining in the service of their respective companies.

By order of the Governor and commander in chief.

BARTLETT SINCLAIR,
State Auditor.

Thawing Frozen Ground.

The *Engineering News* reports an expedient adopted by a contractor at Decatur, Mich., for making holes for electric light poles in frozen ground. Dynamite had proved unsuccessful, but the method explained in the following lines proved satisfactory: A vertical jet pipe was connected by a tee to a horizontal pipe 24 inches long, capped at one end and connected at the other by nipples and four elbows, with a pipe leading to the boiler of the traction engine, the nipples and elbows allowed the necessary play in handling the appliance. To protect the workmen from the steam and to enable them to manipulate the jet pipe, two wooden handles, 2x4 inches and 10 feet long, were connected by stirrups to the two ends of the short horizontal pipe. This jet pipe was forced down by two men pressing on the handles; and, as the earth thawed out, the steam would carry the particles out alongside the pipe; and as the depth increased more steam would be condensed in the bore-hole, until finally no steam escaped and the overflow was liquid mud. We are told that by the adoption of this plan thirty holes for electric light poles were thawed out in a day of ten hours. Mr. Pearl says that while a large percentage of all the water service pipes throughout the town were frozen, though laid at a depth of 4 to 5 feet below the surface, the really hard frozen ground was seldom over 30 inches deep, and generally only 24 inches deep. Below this depth the earth seemed to lack the moisture necessary to make it very hard when frozen.

Industrial Notes.

—An $800,000,000 steel trust is reported to be forming in the East.

—London reports the visible supply of copper May 1 to have been 26,529 tons, a decrease of 111 tons since April 15.

—It is stated that 46% of the traffic of the Mexican Central Railroad is in the transportation of ores.

—The U. S. Rubber Co. announce an advance of 10% on the price of rubber boots and shoes the coming season.

Personal.

W. A. FARRISH has returned to Colorado from Salt Lake, Utah.

O. P. POSEY of Colorado has been inspecting mines at Bingham, Utah.

S. T. LANGLEY, a mining operator of Rossland, B. C., is in San Francisco, Cal.

C. D. LANE of Angels, Cal., has returned from a trip to the mines of Arizona and Mexico.

C. HALL has been placed in charge of the Fortune placer mines at Tarryall, Park county, Colo.

W. H. BROWN, Supt. Mountain Lion mine of Republic, Wash., has returned from Portland, Or., to the mine.

E. R. ABADIE, formerly of Grass Valley, Cal., and more recently of Minas Prietas, Mexico, has engaged to go to South Africa.

CHARLES M. BECKER of Central City, Colo., has taken a position with the Smuggler-Union M. Co. at Telluride, and will have charge of the underground work.

F. F. THOMAS, E. M., Supt. Gwin mine, Calaveras county, Cal., who has been ill for several months, has recovered sufficiently to return to the mine.

CLARENCE KING, Dr. R. W. Raymond, Louis Janin and W. Lindgren have left Rossland, B. C., for their homes, the Iron Mask-Center Star trial having ended, as far as they are concerned.

R. J. CORY, Western manager of the Edward P. Allis Co., has returned to Denver from Butte, Mont., Spokane, Wash., the Cœur d'Alenes in Idaho, and other points in the Northwest.

T. B. BASSETT, recently Supt. of the cyanide department of the American Girl mine, in the Cargo Muchacho mountains, near Hedges, Cal., will install and take charge of a cyanide plant at the Kenton mine, Sierra county, Cal.

PROF. J. C. BRANNER, Vice-Pres. Stanford University, has left with Harold Havens, A. W. Greeley, C. E. Gilman, Ray Collins and Bert Collins, students at Stanford, on a scientific expedition to the coast of Brazil. They propose to investigate the coral and sand storm formations on the coast from Rio Janeiro 1400 miles north to near Cape St. Roque, with a view to settling a controversy of long standing regarding such formations.

H. W. FAIRBANKS leaves San Francisco in a few days on a three months' trip accompanied by a number of students of Berkeley and Stanford Universities. The party will explore the region east of the Sierra Nevadas from Inyo county, Cal., northward into Oregon, including western Nevada. A study will be made of the geology, mineralogy and physical geography of that portion of the great basin. They will visit Crater lake and the lakes of Oregon which have been formed by a series of faults.

Recent Mining Incorporations.

Nob Hill Oil & Development Co., Los Angeles, Cal.; capital stock, $150,000; subscribed, $76,000; W. E. de Groot, C. R. Lockwood, A. de Groot, C. J. Lehman, W. I. Lockwood.

Independent M. Co., Ltd., San Francisco; capital stock, $100,000; subscribed, $5; S. Kampe, R. W. Schultze, W. J. Smale, W. F. Schultze.

Alaska Development & Exploration Co., San Francisco; capital stock, $25,000; subscribed, $5; S. Kampe, C. H. Greene, M. J. Lee, J. A. Clover, C. F. Humphrey.

Globe Oil Co., Fresno, Cal.; capital stock, $250,000—all subscribed; F. Bader, K. H. Sim, W. Ross, C. K. Puskhaber, E. Schwartz, O. Nestle, E. J. Weimar, C. Hegard.

The Occidental Exploration Co. has been organized by S. J. Hendy, H. Zadig, F. H. Hansman, H. Eptein and W. S. Sutherland for the purpose of developing mines in California, Montana and Idaho.

Commercial Paragraphs.

THE Truax Ore Car Manufacturing Co. of San Francisco has received 45,000 pounds sheet steel, cut to order, from Pennsylvania, to be used in the manufacture of their ore cars. They report a large demand for cars.

THE Edward P. Allis Co. of Milwaukee, Wis., recently secured a contract to supply the machinery to double the capacity of the Le Roi smelter at Northport, Wash. This will give that plant a daily capacity of 800 tons.

THE large compound, condensing mine pump, built by the Jeanesville Iron Works Co. at Jeanesville, Pa., for the Ibex mine at Leadville, Colo., was shipped from Jeanesville last Saturday. It required two cars. It is the first steam mine pump having a 36-inch stroke in the Leadville district. The specification was made up by the mechanical engineer of the Ibex Company.

Books Received.

"*Practical Notes on the Cyanide Process;*" octavo, 202 pp., illustrated; Francis L. Bosqui. This volume treats the cyanide process in a thoroughly practical and comprehensive manner, giving many illustrations and details of construction, which must be of value to all engaged or interested in cyaniding of ores. Considerable space is devoted to South Africa and New Zealand, but the greatest amount is given to the operations in the United States. The history of the process is given and also its practical application, with the method of making laboratory tests. The design of works is fully treated, as well as details of construction. All the various operations of the process are described with its many modifications. Scientific Publishing Co., New York and London. Price $2.50.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MAY 2, 1899.

624,424.—CAN LABELING MACHINE—W. D. Ayers, Alameda, Cal.
624,303.—FEED WATER HEATER—L. D. Copeland, Phœnix, A. T.
624,306.—ELECTRIC WATER BOILER—J. C. Cramer, Los Angeles, Cal.
624,309.—BANJO TAILPIECE—C. S. DeLano, Los Angeles, Cal.
624,313.—THREAD BOX—Mattie J. Edwards, Los Angeles, Cal.
624,013.—PLAITING MACHINE—T. F. Hagerty, S. F.
624,014.—PLAITING MACHINE—T. F. Hagerty, S. F.
624,033.—VEHICLE SPRING—S. C. Hitchcock, Tacoma, Wash.
624,215.—CONCENTRATOR—J. Jacobs, Henley, Cal.
624,355.—VAPOR ENGINE—E. L. Lowe, Astoria, Ogn.
624,070.—WATER HEATER—J. McCartney, Oakland, Cal.
624,071.—GAS HEATER—J. McCartney, Oakland, Cal.
624,064.—VEHICLE BRAKE—Miller & McDonough, Ferndale, Cal.
624,362.—LEVELING ROD—Milliken & Bowen, Ontario, Ogn.
624,069.—SAFETY POCKET—M. M. Murray, Baxter, Cal.
624,378.—THRESHER—H. A. Rands, Forest Grove, Cal.
624,097.—BOTTLE WASHING MACHINE—J. R. Robb, S. F.
624,102.—JOURNAL OILER—A. C. Rumble, Oakland, Cal.
624,103.—SAFETY AIR BRAKE—A. C. Rumble, Oakland, Cal.
624,409.—ELEVATOR CONTROLLER—B. C. Von Emon, S. F.
624,416.—BOTTLE—E. West, Vallejo, Cal.
30,651.—DESIGN FOR SPOON—J. E. Schmitt, Tacoma, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BOTTLE WASHING MACHINE.—J. R. Robb, San Francisco, Cal. No. 624,097. Dated May 2, 1899. This invention relates to a device which is designed for the rapid and complete cleansing of bottles. It consists of a conical vessel containing a jet nozzle, means for controlling the supply of water to the nozzle, a tube disposed in line with the nozzle so that the water and scouring material are directed into the bottle when the latter is inverted for the tube, means whereby the tube is adjustable to and from the nozzle and a plurality of cones of decreasing sizes are arranged within the outer vessel so as to prevent the packing of the scouring material at any one point. These cones have overflow passages connecting one with the other, and the sand or other scouring material sliding down the inner surfaces of the cones is brought into line with the upwardly moving jet of water so as to be carried with it up into the bottle and be discharged through openings at the top of the tube against the bottom and sides of the bottle, thence falling down the exterior of the tube into the cones, it is again brought into the circulation.

ENDLESS BELT CONCENTRATOR.—Jehu Jacobs, Henley, Cal. No. 624,215. Dated May 2, 1899. This invention relates to improvements in concentrators of that class in which an endless belt is caused to travel over drums or rollers supported in a frame that stands at a slight inclination. It consists of a main frame, an endless belt-carrying frame with drums about which the belt is movable, hinged supporting standards for this supplemental frame and mechanism by which the belt and frame are oscillated transversely to the line of travel of the belt. A worm gear is provided through which motion is transmitted to drive the belt and the standards upon which the shaking frame is supported and have their lower ends journaled in boxes which are adjustable with relation to the frames so as to at all times regulate the level of the belt transversely. The speed at which the parts of the belt travel is regulated by means of cone pulleys, with intermediate belts, and the material is distributed upon the belt by means of boxes having holes in the bottom at one side and a horizontal diaphragm disposed with relation to said holes, the vertically disposed distributing rib fixed parallel to it upon its upper surface and a supply opening leading to the side of the rib opposite the slots in the diaphragm.

VEHICLE BRAKE.—Leah J. Miller and Wm. McDonough, Ferndale, Cal. No. 624,064. Dated May 2, 1899. This invention relates to improvements in the construction of wagons, carriages and similar vehicles. It consists essentially in the pivoting of both front and rear axles, so that they are turnable about their independent pivots or king-bolts, and in combining therewith a reach formed in two sections, so united that the turning of one pair of wheels in one direction will turn the other pair equally in the opposite direction. A rock shaft is journaled upon the fixed rear bolster and its arm is connected with the front brake lever, a central arm extending downwardly from the rock shaft and a yoke fulcrumed transversely and turnable in the lower end of said arm. The brake beam is carried by the rear portion of the jointed reach and the shoes are adapted to press against the rear wheels, and divergent rods connect the turnable rod with the brake beam.

The Grand Canyon of the Colorado as a Mining Field.

Written for the MINING AND SCIENTIFIC PRESS.

The Grand Canyon of the Colorado river, in Arizona, is one of the grandest of nature's works. Those who have never visited it can form no conception of its solemn beauty and majesty; but it possesses other attractions than those of scenic beauty. The ceaseless scouring of the Colorado river through thousands of feet of sedimentary beds and deep into the underlying crystalline rocks, has exposed to view mineral-bearing veins in the Archæan and ore-bearing horizons in the lower members of the sedimentary beds of unknown extent. The possibilities of this region can only be surmised. The Archæan rocks in certain portions of the canyon are known to contain veins carrying iron and copper, and the natural inference is that gold and other metals are there also. Lying upon these upturned schists, granite and other rocks common to the Archæan, are the nearly horizontal beds of the Silurian, and, higher, the Devonian and Carboniferous formatious. The rocks of these three geological ages are well known throughout the West—in Colorado, Utah and Nevada particularly—to be the repositories of large and valuable ore deposits. The limestones and quartzites are most frequently ore-bearing. In the States referred to ores occur associated with sheets and dykes of intrusive rocks and also in massive eruptive rocks, as at Cripple Creek and in San Juan county, in Colorado. In the Grand Canyon are exposed hundreds of feet of limestones and quartzites, and in some localities these are intercalated by sheets of eruptive rock and cut by vertical dykes. Lead carbonate ores have been found in several localities, one not far from the Little Colorado. Only the difficulties of transportation to be overcome are a drawback to prospecting in this region. Since lead-silver ores are known to exist there, it is not unreasonable to think that gold as well may be found where the geological conditions are so favorable. The lead-silver ore thus far found is of very good grade; it is chiefly carbonate of lead, carrying chloride of silver—a smelting ore. Aerial tramways, operated by water power furnished by the Colorado river, may be a means of solving the transportation problem. The bottom of the canyon can be reached at several places, but the cost of packing ore out on rugged trails to a height of 5000 or 6000 feet is too costly an undertaking for any ordinary ores to stand.

New Carbide Plant.

The great new carbide plant that is being erected at Niagara Falls on the lands of the Niagara Falls Power Co. will have greater floor space than any other manufacturing plant at Niagara. In all, there will be three buildings, two for manufacturing carbide and one to be used as an office structure. The first of the factory buildings is now well along in construction. This building is of brick, and has a total length of 864 feet. Its companion structure has been started. The front portion of the first building is three stories in height. This section is to be known as the grinding department, and occupies a space 75x132 feet. Next comes a two-story section, 30x75 feet, the lower floor of which is to be the dust collector room, and the upper floor will be used as a wash room and a clothes room by the employes, provision being made that they may change their clothes before going out on the street from their work. The furnace room will have a width of 75 feet and a length of 395 feet, and there will be installed no less than seventy-five furnaces. These furnaces will be of the continuous type, and are new being manufactured at Niagara Falls. In the rear of the furnace room will be the shipping room, its dimensions to be 75x300 feet. Through the center of this will be run railroad tracks, and along these tracks platforms 100 feet long will be built in order to facilitate entrance to the cars and aid in the shipment of the product of the plant. The output capacity of the works will be fifteen carloads of calcium carbide every day, and it is a noticeable fact that nothing is said in the plans for the buildings about a storage department. In other words the demand for carbide has become so great that this plant, working night and day, barely expects to keep up with its orders.—Iron and Steel.

Aluminum as a Medium of Electrical Transmission.

Until recently the only metal employed commercially for transmitting currents of electricity for lighting, street railway and power purposes was copper. This, as is well known, was due to the fact that copper offers less resistance, bulk for bulk, to the passage of a current of electricity than any other metal, if we except possibly one or two of the precious metals whose cost would naturally prohibit their being used on anything like an extensive scale. The amount of copper produced annually in this country and utilized principally in the electrical industry is something enormous, representing in '98 an investment of over $85,000,000. Possibly a better idea of this demand for copper in electrical enterprises may be gotten when it is stated that the electrical street railways alone built last year in the United States required for their operation, in line conductors and feeders, over 5000 gross tons of this metal, representing an investment of more than $2,000,000. The outlay for copper in electrical undertakings where it is necessary to transmit current to any considerable distance, as may readily be inferred from the above, is by no means insignificant, it being in fact one of the heaviest items of expense, and as the price of copper has for some time been steadily rising, electrical engineers have been seeking for a suitable and less costly substitute. This it is believed has now to a certain extent been found in aluminum, and although the resistance of an aluminum conductor to the passage of an electric current is between 60% and 75% greater than the resistance offered by a copper conductor of the same cross section, the difference in the weight of the two metals more than makes up for the difference in conductivity as well as the difference in the cost, leaving a balance of between one and three cents to the pound in favor of aluminum, everything else being equal. An electrical engineer in charge of a large lighting plant in the South, who has examined into the matter very thoroughly and is about to make use of aluminum conductors, recently summed up the matter as follows:

"Copper has a specific gravity of 8.93, whereas aluminum has 2.68, these being the relative weights per unit. Yet it takes a larger volume, or a wire of greater sectional area, of aluminum for a given amount of current than copper. The difference being: copper 100, aluminum 160. Aluminum has some disadvantages, one being the difficulty of soldering it together. On the other hand, its advantage is its great tensile strength, having 26,000 pounds per square inch, while the tensile strength of soft copper, the kind most generally used, is only 16,500 pounds per square inch. With the sectional area of aluminum for equal conductivity with that of copper as 160 is to 100, you can readily see that the tensile strength of an aluminum conductor is more than twice the strength of copper, yet the weight is not half as great as copper, being only 48% of that of copper for a conductor of equal conductivity. It having greater ductility makes it more desirable for the reason that it does not break or fracture so easily on bending."

From this it will be seen that owing to the greater tensile strength of an aluminum conductor over one of copper, considerably longer spans could be constructed between poles were the former metal made use of, thus effecting a material saving in expense in line work. What however will probably have a greater effect than anything else in making aluminum conductors popular is, that the cost of producing this metal is gradually becoming less each year, as more improved methods of reduction are being adopted, while the price of copper is rising. At the present day, everything else being equal, owing to the excessive price of copper, the balance from a financial standpoint would seem to be slightly in favor of aluminum for conductors, and judging the great reduction in the price of aluminum that has occurred from time to time in the past it should not be very long before that metal will be by far the most economical for transmission lines. That it is already in the field as a competitor of copper may be inferred from the fact that many miles of aluminum wires are in operation throughout the country, and it is said that an aluminum transmission line thirty miles in length will shortly be constructed in California.—Electricity.

Barbed Wire Telephone.

N. A. Dorn writes that the Salinas Valley, Cal., Land Co. has a telephone system in which a barbed-wire fence is the connecting medium. The line consists of the ordinary barbed wire that was already on the fences along the road from Salinas City to one of the company's ranches. It is about ten miles long the way it runs. We use a good telephone instrument. The requisites to success are to see that all the connections are made very close, that no wire is connected with the ground in any way, either by hanging down or by touching any other wire that does reach the ground.

In crossing roads and gates, we use two methods. The preferable one is to have posts high enough to carry an overhead wire, but in this country a great many high derricks are used with threshing outfits, so we took ⅝-inch iron water pipe and laid under the gates and most of the roads and then ran a rubber covered wire through them to connect with the barbed wire on each side. This is out of the way and never noticed at all, though it is more apt to get broken than an overhead wire. It is cheaper than poles, though. We bent the ends of the pipe up at the sides of the gates or roads and then filled the ends up with putty to keep water out of the pipes and prevent rotting the rubber on the wire. One of the chief requisites for success is to have a 'phone with a good, strong electro-magnetic call tube.

This character of telephone line will work just as well as any insulated line in dry weather, but it will not work at all when it is raining, because the current runs in the ground as soon as the posts are wet, and the line is then of no practical value. Our line has worked well every day since it was built last July, excepting seven days and parts of five or six. As soon as the posts have time to dry off after a rain it is all right again and is a very great convenience. To us it is almost worth five men's wages all the time. In dry countries like many of our Western States and Territories such lines will work for any reasonable distance, say 1 to 100 miles, and will seldom be disturbed by rains, but in States where it often rains it will not do well.

Liquid Air.

The *Engineer*, speaking of the remarkable properties claimed for liquid air, asks, "Will history repeat itself?" and continues:

"From the paper read by Prof. Rice and the remarks of C. E. Tripler on liquid air at the last meeting of the Junior Members of the American Society of Mechanical Engineers, it is very evident that there is little foundation in experiment or theory for the marvelous economy in power production claimed for liquid air. The old, inexorable law that nature cannot be cheated still holds good.

"The gross energy expended primarily is the extreme limit that can be realized in any transformation of mechanical power, and to secure 100 per cent it is necessary to eliminate all losses from friction, condensation, etc.

"The active exploitation of air-power devices of late, coming at a time of feverish speculation, is indicative of a purpose to work the public. The average man knows as little of the science of pneumatics as of electricity. In the earlier development of the electrical industries the belief was common that electricity, like the hand of Midas, had the magical power of turning into gold everything it touched. The lesson that electrical enterprises are amenable to the same laws of economics as those of every other sort had to be learned. Many came out of electrical ventures sadder and wiser men. Unscrupulous men took advantage of the public's ignorant confidence in the mysterious force. This was not so long ago, either, but people forget quickly, and the time is ripe for a repetition of history by the exploitation of air power, though not on so large a scale. Croker and Leiter have opened the ball. Tripler's conversion of air into liquid, the astonishing things he has done with the stuff, and the still more astonishing things he promises to do—marvels that rival Jules Verne and the Arabian Nights — have brought the public to a state of open-mouthed wonderment. The sympathy between the mouth and the pocket has probably not escaped the notice of the astute promoters of air-power enterprises.

"Compressed air has a wide and legitimate field. A number of reputable concerns are developing it rapidly and creditably. It will be a misfortune to that branch of engineering if it is made the means of further inculcating the old lesson."

Transmission of Power for Underground Pumping.

A paper was recently read by Paul Habets before the Association des Ingenieurs de Liege, in which he says that underground pumping engines, whether worked by steam, hydraulic power, or electricity, are nearly equivalent as regards the consumption of steam. Methods with gearing are, however, more economical whenever a pumping engine is laid down of greater power than that actually required under ordinary circumstances, in order to provide for an increase in the quantity of water, in which case the pump does not work continuously, and if it be driven directly by a steam engine, its rate of consumption will increase in inverse proportion to the actual time it is at work. The advantage of reduced consumption, with suppression of the disadvantages caused by underground steam pipes, often compensates for the higher first cost of geared pumping engines. Hydraulic transmission has the advantage of great simplicity in the plant and its maintenance. The steam consumption of slow running compression engines, which may be fitted with very perfect valve-gear, may be reduced below 16½ pounds per H. P. per hour; and with compression engines not consuming more than 14½ pounds per indicated H. P., the consumption by the hydraulic pumping engines will be less than 22 pounds per H. P. in water raised. Electricity requires motors of high speed, or of moderate speed if the generating dynamo be driven directly, while they are of short stroke and often less perfect as regards their valve-gear; but otherwise the generating dynamo should be driven by belt or rope, which is not, however, so favorable as regards the general useful effect. The management of dynamos would appear to be more delicate than that of hydraulic engines; but, on the other hand, the transmission of current in the cables is more economical than that of hydraulic engines and more economical than that of water under pressure in the pipes, while cables are more easily laid than rigid pipes. Electricity, therefore, is better suited for long distances, while more readily lending itself to working appliances of all kinds; but the special conditions of each case will decide which means for transmitting power should be adopted.

Mining Summary.

ALASKA.

It is reported a strike has been made within five miles of Skaguay on Minnie creek by Mayor John Stanley and party. They found gold in gravel 2 feet from the surface and staked every claim and divided twenty-six claims among six.

Reports continue to come from Alaska of rich strikes near Cape Nome. This strike was made, it is claimed, last fall. A brief mention of it was made in the issue of April 22nd. The strike is on Snake river and its tributaries, twenty miles back from Cape Nome and 120 miles from St. Michael—just outside the St. Michael military reservation of the United States Government. There are great shoals caused by the discharge of detritus by the Yukon near the mouth of Snake river which extend far out into the Behring sea. The cape projects into the sea from the peninsula lying between the sea and the Arctic ocean. The new district will be comparatively easy of access as soon as the ice breaks up. Vessels of all kinds can reach a point off the coast, though the bluffs are sheer and the anchorage dangerous. Fuel is scarce, the supply being drawn from the driftwood which the Yukon carries down with its ice and distributes along the Bering shore. The discovery is wholly within American territory. The gravel is said to be rich, and it is reported that the diggings are shallow.

ARIZONA.

In a well driven to find a water supply for the King of Arizona mine near Yuma, a heavy flow was encountered in a gravel bed at a depth of 485 feet. Another well is being sunk nearer the mine.

Yuma *Sun*: The Plomosa placer district is attracting attention and the miners there are doing well. Mr. Martinez made a strike and has since been taking out $8 per day with a dry washer. Varcia & Martinez sunk a shaft 25 feet on the Catarina, near Tyson's Well, and got $50 in coarse gold on bedrock. C. Manuel picked up a nugget worth $20. Nuggets ranging between $3 and $10 are found every day. There are thirty men in camp.——A cooperative company of miners are working the Wickler mine on the Hassayampa, in Yavapai county, and making a success. Arrangements are being made for a mill and concentrator. The mine is well developed.

Florence *Tribune*: J. Miller has three claims immediately on the bank of the Gila, twenty-five miles east of Florence. They are prospects, one having a shaft 60 feet and the other two shafts 25 feet each. The rock is free milling, carrying $8 per ton gold.

Prescott *Courier*: The Gold Bug mine, Chaparral district, has improved with depth. On the surface the vein was 4 inches wide and carried $130 per ton gold; at 85 feet the vein is 12 inches wide and carries $225 gold. Water is also increasing with depth, which necessitates a hoist.

Arizona *Star*: It is reported that the Vulture mine will be reopened. The mine has been stocked for $190,000. A 100-stamp mill is to be erected and a force put in the mine.——The Sampson & Bent wolframite ores are to be worked by concentration. The final payment of $25,000 will be made in a few days. The camp is located in the Guija mountains, not far from Arivaca.

CALIFORNIA.

Amador.

Sutter Creek *Record*: At the South Spring Hill mines, Amador city district, Supt. Tregloan is having the ditches cleaned out preparatory to resuming active operations about the mines. —— The shaft is below the 1350-foot level at the Central-Eureka mine. A station will be put in and a crosscut run to the vein at the 1350. Sinking in the shaft will continue.

Amador *Ledger*: The Defender mine, near the Mokelumne river, at the left of the West Point road, is being developed, and the owner has bought the interest of T. B. Atkinson in a mine which joins the Defender on the east. The shaft on the Defender is 100 feet in depth, and a drift on the pay chute is in 279 feet. The rock pays $20 a ton free, the sulphurets are shipped to San Francisco and pay from $90 to $300 per ton.

Calaveras.

It is reported that sinking is to be resumed at the Esperanza mine, near Mokelumne Hill, and a new hoist erected. The shaft is 1000 feet deep and it will be sunk to 1500.

Near Albany Flat, south of Angels Camp, L. Tullock has run a lot of waste rock that was on the dump of his mine through the mill, and the rock yielded $5 to the ton. This led F. Brunner to work waste rock at his mine, which he found to be as good as in the mine. He has 1000 tons of this rock on the dump.

El Dorado.

(Special Correspondence).—It is reported that an Eastern firm has purchased the interest of E. A. Head in the Blue Gouge mine on Camp creek, and the new company will commence operations on the property. A new tunnel will be run considerably lower and farther north than the old one. A 5-stamp mill for prospecting purposes will be built. E. Bind is Supt. The mine consists of a zone of mineralized schist 400 feet in width in which occurs large veins of quartz separated by the schistose rock. This formation lies between the Calaveras clay slates on the east and grano-diorite on the west. It is claimed to be auriferous throughout.

Placerville, May 2nd, '99.

The miners in the vicinity of Volcanoville held a meeting recently and organized a mining district to be known as the Volcanoville mining district. J. W. Edmondson was elected recorder of the district.

Placerville *Democrat*: The Dench & Craddock 2-stamp mill at Placerville was started up last week. They have 100 tons of ore on the dump.

Inyo.

The P. D. Q. Cyanide Co. expect to get through at Montgomery's in ten days. They will move to the Reward mine and locate about ten miles east of Independence, where they have 10,000 tons of tailings and will put up a 50-ton plant. They have also 2000 tons in the Beverage district, sixteen miles from the Reward, which they have bought and which are good but difficult to work. There is no wagon road to this place and everything must be packed in on animals.

Kern.

The Kinyon mine has recently cleaned up $5000 from low-grade ore.

Randsburg *Miner*: Collins of the Black Hawk has cleaned up $800 from a run of thirty-two tons of ore, and from another run of forty-seven tons $930 was cleaned up.

Mariposa.

Hirschfield, Graves & Meade have bought the old Mexican mine near Hornitos and will put a force of men to work. This mine has been idle for several years.

The Washington mine, two and one-half miles northeast of Hornitos is credited with a production of over $1,500,000. It has two shafts and has been worked to a depth of 1500 feet. It has been idle for a long time.

The Quail M. & M. Co. has been incorporated by Sonora men to operate the Quail mine, ten miles east of Coultervile.

Nevada.

At the Texas mine in Willow Valley district a new plant has been built recently. Drifting on three ledges is in progress, and recently a fourth has been cut. These ledges range from 2 to 6 feet in width and are close together. A vertical shaft has been sunk 250 feet and a level established. A 10-inch plunger pump raises the water to a drain tunnel which taps the shaft at a depth of 90 feet. A smaller pump, which can be run by steam or air, is kept in reserve. In the two-compartment shaft a cage is used. Water is the motive power. The company recently purchased the Manzanita M. Co.'s property for their water rights. A line of 22 and 15-inch pipe runs 2400 feet from the ditch to the mine, giving a pressure of 300 feet. Steam power is kept in reserve. Four machine drills are in use. An exhaust fan is placed at the mouth of the drain tunnel, operated by the waste water from the hoisting works. The mill has ten stamps. Mill and hoist are lighted by electricity from a 30-light dynamo.

Grass Valley *Union*: An unusual amount of water in the Reddik mine has resulted in a temporary suspension.

Riverside.

At the O. K. mine, Virginia Dale district, a 50-foot drift has been run at the 200 level, and a 4-foot vein opened, assays running $45 per ton. The mine is owned by C. F. McNutt, E. K. Alpaugh of Los Angeles, J. Ingersoll of San Bernardino, and others.

It is reported that a gold-bearing vein has been discovered near the city of Riverside. The formation is granite similar to that at Gavilan and near the Good Hope and Santa Rosa mines.

San Bernardino.

(Special Correspondence).—Marcus Pluth, formerly mining boss at the Odessa and Occidental mines near Calico, with D. D. Connell has leased the Waterloo mine, two miles west of Calico, and also the 15-stamp Oriental mill near Daggett. The ore is shipped six miles by narrow gauge road from mine to mill. The Waterloo is one of the largest silver mines in California, and in its earlier history was worked extensively. The ore is a rhyolite breccia, in which the silver occurs as chloride. There is in the mine also a band of gray jasper that in some parts is rich in silver. The mine was closed several years ago on the fall in the price of silver.

Calico, May 1st, '99.

A company has been organized at San Bernardino to work the placer deposits of Lytle creek, several miles northwest of that city. A large amount of work has been done in this canyon in past years and considerable gold produced. There are numerous quartz veins in the district.

Sierra.

A strike was made recently at the York mine near Downieville. W. W. York and his sons are reported to have taken out $9000 from one carload of quartz, one of the pieces yielding $500.

Downieville *Messenger*: A mill will be constructed at the Alta mine, near Alleghany, formerly the Idaho, as soon as the season is opened. —— W. Williams and others have leased the Lucky Dog mine, near Forest City, owned by the North Fork Co., and have commenced work.—— W. York has taken from his mine in Slug canyon a number of pieces of quartz which weighed forty-seven ounces, containing twenty-five ounces gold.——G. M. Pinney of the Mountain mine, near Sierra City, has the foundation for one-half of the mill completed. Twenty stamps are dropping and three tons of ore to the stamp is milled daily, which averages $6 to $8 per ton. Forty stamps will be running in three weeks.

Nevada City *Herald*: Mgr. Dunlap has completed his survey of the Alaska mine, at Pike City, and has begun reopening the mine. A tunnel has been started in Oregon Creek canyon, to tap the lower workings and drain the water. It is wide enough for two tracks, and will run nearly 4000 feet.

Shasta.

Redding *Searchlight*: Supt. Dakin of the Uncle Sam G. M. Co. states that preparations are making for adding fifteen stamps to the mill, doubling the capacity. The company will also put in a cyanide plant, that having been decided since the strike of high-grade ore in the new ground. The full value of the ore can not be secured by amalgamation. Two concentrators will be added.

Redding *Mineral Wealth*: The Colorado Con. group of mines join the Old Spanish property on the southeast and are owned by a company of which G. Turner of Vancouver, B. C., is the head. They are sinking a double compartment shaft near the crossing of the Colorado and Gipsy veins. The shaft is timbered and covered with a shafthouse and shop. It is down 60 feet, at 100 feet crosscutting will begin. The Gipsy is down 50 feet and has a 3-foot vein carrying free gold and sulphurets. M. T. Howell is Supt. ——Work on the Argentum mine in Harrison Gulch district, owned by J. L. Johnson and W. A. Boswell of Shasta, is showing bodies of quartz.——A. Ludwig and S. Price have bonded two claims in Muletown district owned by Herzinger & Bauter. Supplies have been shipped and work will begin May 1st. Mr. Ludwig with Mr. Price will work the property.——Meier's camp on the summit between Shasta and the Mt. Shasta mine is now called Oro Vista, after one of the mines in the group.——Three hundred feet of tramway is being built by Stolberg & Maurer to connect their claim on Shurtleff hill with the Keswick road.——The Mountain Copper Co. is reported to have an improvement fund of $375,000 to be expended this year. The output of the mines is to be increased.——Dr. Lees and W. A. Pryor have sold a quartz claim on Clear Creek to J. Meier of Oro Vista.——A half ton of ore was taken from a seam in the claim owned by Apple Bros. & Shields of Keswick, that paid $6000. The property is within half a mile of Keswick on the Copely road.——The Mt. Shasta quartz mine is producing two grades of ore from the 300 level. Late smelter returns show that the low-grade ores run $65, $56 and $70 per ton for three shipments of seventy-five tons, and the high-grade ore $420 and $450 for two shipments of seventy-five tons. The Mt. Shasta from the surface has averaged $40 a ton.

Siskiyou.

Yreka *Journal*: Work continues in the New Klondike district on the Scott Valley road, between Yreka and the Forest House. The ledge is 40 feet wide. Several claims have been located.——The miners in the Golden Star or Spencer quartz mine at Humbug are running a tunnel on the ledge 185 feet. They will upraise to the works of the upper level. ——Parties have been among property owners along the western boundary line of the Yreka townsite, offering good prices for land for mining.——Copper ore has been found at the head of Dutch creek, above Honolulu, on Klamath river, bonded to Davenport & Co. a year ago. The rock assays 15% copper and $60 a ton in gold and silver.——Hutchinson, who bonded the Elliott mine at Cottage Grove, on Lower Klamath, is getting pay, having an abundance of water for the giants.

Etna *Advance*: Pay gravel continues to be taken from the Best Chance mine at Yreka. ——The Gumboot mine near Scott Bar is bonded for $20,000.——The arrastra at the Hathaway mine on Sugar creek is running day and night on high-grade ore.——At the Bouviere hydraulic mine on Slide creek new ground has been opened which is prospecting well.——A tunnel is to be run at La Flesch mine near Henley to reach, at a lower level, the body of ore recently struck.——A 12-stamp mill will be erected at A. P. Wagner's mine at Coffee creek. It is now at the Redding depot.——Welker Bros. have located a copper claim four and one-half miles above Callahan's. They have a prospect showing 20% copper.——Rich stringers have been found by M. Carrick at the head of Spring gulch on Yreka Flat.——The company preparing to dredge Yreka creek has paid land owners whose property they bonded $1000 each, the first installment.——Bolen & Rimmer have leased the lower part of the G. W. Smith drift mine at Sugar Hill, on the South Fork of Scott river.——The tunnel driven to the ledge below the present works at the Jillson & Roberts mine, near Henley, is in 250 feet. Thirty men are employed at the mine and mill.——A tunnel is being run at the Commodore Dewey claim at Schoolhouse Hill. The arrastra is run full time.——W. F. Short has contracted to drive a tunnel 400 feet at the Highland mine, near the Salmon summit at the head of the South Fork of Scott river. It will give a depth of 300 feet vertically.——At the Blue Gravel mine on Greenhorn creek, near Yreka, the force has been working on the north drift; $12,000 has been taken out since changing from the south drift.——Ward & Co. have men at work putting up the mill at the Cape mine on the North Fork of Greenhorn. ——F. Boudria is working his hydraulic mine on Wildcat creek. The first cleanup of the season was made last week. One giant is being run.——The Sheba M. Co. received $10,000 from a twenty-six day run on their Patterson Creek mill during March from 700 tons of ore. Since last July $30,000 has been extracted. The company is considering the advisability of doubling the capacity of the mill.

Yreka *Journal*: T. Austin & Co. have found a gravel deposit 60 feet across in their claim on Yreka Flats, which yields good returns. They are getting more water at bedrock. Their claim extends 50 feet farther north to the next claims of McNulty and Butler, when work will stop, unless favorable arrangements can be made with adjoining claimants to continue operations.——The Yreka Creek quartz mill this week crushed five tons of quartz from the Casey quartz ledge in Greenhorn gulch, near the Myers ranch, which paid well.——The Yreka M. Co., successor to the Greenhorn Blue Gravel Co., are realizing good pay at the mine in Greenhorn creek, a mile south of Yreka, and employ forty men.——The Commodore quartz mine at Barkhouse is a good producer and employs a large force in mill and mine. The ledge varies as the work progresses, but holds its usual average in gold.——A number of miners talk of organizing a miners' union in this county.——Mr. Souther, the manager for the company bonding Yreka creek north of Yreka townsite, is endeavoring to secure an option on the Parks place on Gold street, along the west side of Yreka, for prospecting.——J. G. Waugh discovered good prospects in working his claim on Beaver creek, Siskiyou mountain. A man named Knapp is working a claim in the same district on Hungry creek, and several more claims will be opened this season on Beaver, Hungry and Grouse creeks.——Spengler Bros. at the mouth of Humbug have finished ground sluicing and are washing the bedrock gravel.

Trinity.

A quartz mine near Carrville was recently bonded for $20,000, with ten days option.

Etna *Advance*: It is reported that a smelter will soon be erected at Carrville.

Tuolumne.

The miners of Sonora and vicinity have reorganized the Tuolumne mining district, with William Sharwood as president and Richard Inch recorder. A code of rules and regulations was adopted and a form of location certificate blank drawn up for use within the district. One feature of the local law is the requirement of two notices of location, one posted at each end of the claim.

The Mount Jefferson mine at Groveland is being extensively developed. It had remained idle for many years until recently. The old workings were 250 feet deep.

The shipment of sixteen tons of ore sent to Selby's last week from the Vine Spring mine near Columbia returned $43 per ton.

Sonora *Union-Democrat*: At the Mazeppa mine near Stent the main shaft is down 260 feet. A station will be put in at 300 feet, the vein crosscut and drifts started. On the 200 level machines are in use drifting. In the south drift at the 200 level work has been discontinued. The vein ranges in width from 12 to 28 feet. The mine is to be equipped with a 20-stamp mill.

COLORADO.

BOULDER COUNTY.

The Bailey mill at Eldora is completed. There are 600 tons of ore now in the mill.

The Mogul tunnel is still driving toward the Clara claim, on east of Spencer mountain, and new strikes have been made. Nothing is definitely known of the value of the latest strikes.

CHAFFEE COUNTY.

The Gold Bug mine at Turret City is to have a steam hoist, the holders of the bond and lease having secured an extension.

DOLORES COUNTY.

Rico *News-Sun*: The work of clearing the ground for the concentrating plant for the Enterprise group has been commenced.——The Golden Age, operated under lease by J. Haughton, is showing good ore. Twenty tons of ore were shipped last week.——J. T. Carnahan is working three 8-hour shifts on the tunnel being driven to open up the Union-Carbonate, one of the principal producers of the camp in the 90's.——The Pro Patria tunnel, driven for the Sawyer and Young properties is nearing the contact ore zone of Newman hill.

GUNNISON COUNTY.

The Kingsbury mines at Midland, four miles from Vulcan, are being developed.

At Spencer, six miles west from Vulcan, a strike is reported on the Gunnison lode. The ore is rich in gold.

The Doctor mine is being explored. The copper strike is proving better than at first.

The Venable, in a crosscut from the bottom of the 150-foot shaft, has a body of rich gold ore. Two sacks sent to Denver returned from $80 to $235 in value. The extent of the ore body has not been ascertained.

The strike in the Napolean mine, Pitkin district, is better than reported. The vein is 8 feet wide and the ore will run from 300 to 400 ounces of silver.

Pitkin *Miner*: A hundred tons of ore from the Maid of Athens mine will be sent to the smelter on the first train through Alpine tunnel.——Work is progressing on the eastern extension of the Maid of Athens under Supt. Osgood. Two shifts are employed. The shaft is down 85 feet.——Work will be resumed on the Leopard as soon as the road is open, some good ore having been struck.

HINSDALE COUNTY.

A winze has been started in the lower level of the Ute mine which will be sunk 200 feet. A crosscut will be driven from the bottom vein, which has a dip of 25°, making 230 feet of stoping ground. A tunnel at the mill level to cut the Ute vein is contemplated.

LAKE COUNTY.

The Penrose mine at Leadville is drained and the work now on hand is the cleaning and repairing of the workings. It is now a question of few days when the other mines will commence work.

Leadville *Miner*: The Mikado M. Co., of which W. R. Chadbourne of California is principal owner, has a large acreage on the northwest end of Iron hill, known as the Gallagher mine. It is one of the first mines discovered in Leadville and in early days was sold to the present owners by Gallagher Bros. The mine has produced high-grade silicious silver ore and iron sulphides. Up to October shipments of 100 tons per day of iron sulphides were maintained. The ore body was then exhausted and October 20 the working shaft was closed. In April, after four months' prospecting, a body of iron sulphides was opened and shipments will be started.

MINERAL COUNTY.

The Last Chance mine at Creede is to be drained through the Nelson tunnel. A station has been cut in the tunnel 7250 feet from its mouth. The surveys indicate that a distance of 50 feet separates the tunnel from the workings of the Last Chance on the 1200 level. The danger attending the work is fully realized.

OURAY COUNTY.

Ouray *Herald*: Buch & Grant have a year's lease on the Bright Diamond mill, and have put in a concentrator, which is giving good results. The plant is operating on Bright Diamond second-class ore.——The Bachelor No. 2 on Mt. Hayden, owned by Murphy & Sons, will resume operations; the product will be concentrated at the Beaumont

sampler. This property has a 2-foot vein of silver-lead ore.

PARK COUNTY.

A 100-foot contract has been let on the Mascotte tunnel to Lindell & Hancock.

Everett & Pasco will work the Bluebird placer, on the Platte, this season. Work will begin with sluicing; later a giant may be added.

Forty men are employed by the London, fifty by the Green Mountain Co., twenty-five by the Orphan Boy and fifty to one hundred by other mines at Alma.

SUMMIT COUNTY.

The Col. Sellers mine at Kokomo is shipping five to seven cars of low-grade ore daily.

Journal: The North American Gold Dredging Co., on the Swan river, last year built and operated two Risdon dredges, besides employing in another locality two Evans elevators for hoisting and washing gravel. Preparations are being made for the placer season. The Risdon Iron Works of San Francisco, Cal., has a man here for the purpose of putting in two more of these machines where Gold Run empties into the Swan.——At the Mountain Pride mine, near Breckenridge, work on the improvements has begun, including cottages for employes and a boarding-house. Mgr. H. C. Foote has plans and specifications for the new mill. The company will put in an electric motor at the mill.

SAN MIGUEL COUNTY.

The Silver Lip mine of Ophir district has 20 inches of rich free gold ore. As the trails are not yet opened no tests of the ore have been made.

The Marie Antoinette mine of Ophir, which opened a rich ore body last fall, has been leased and bonded to a company of Eastern men, which includes some of the stockholders of the Silver Pick on Mt. Wilson.

TELLER COUNTY.

Denver *Republican*: Mills treating the ore of Cripple Creek are taxed to their full capacity, and thousands of tons of ore are now on the sidings to these mills, waiting to be treated.——The Independence mine has increased its working force and a large production is to be made from that property from now on.——The Mary McKinney is producing and the Lucky Guss is commencing.——During the month of April the mines of Cripple Creek produced 37,700 tons of ore, which returned $1,439,200.——In the breast of the drift on the second level of the Jack Pot there is 5 feet of ore which Mgr. Davenport states assays over eighteen ounces to the ton. The output for the month of April was 1700 tons. The average grade of the ore is higher than formerly.

IDAHO.

At the Noonday mine, near Silverton, a crosscut tunnel has tapped the ore shoot, the ore assaying 130 ounces silver per ton. Two men are working on ore, who alone are mining, sorting and sacking a ton per day, running over 100 ounces in silver and 60% lead per ton. The management will divert the waters of Gold creek, which flows across the claim, and ground sluice off the top of the ledge, as there is known to be a large amount of float galena in the surface dirt.

At Wardner a proclamation has been issued by the State Auditor for the Governor commanding all mine owners and managers to refuse to employ union miners. Any mine failing to observe the proclamation will be shut down. All mines are closed except the Bunker Hill and Sullivan, where eighty non-union miners are working.

A. B. Campbell bought a half interest in the Sixteen-to-One mine of the Cœur d'Alenes for a quarter of a million, from J. W. Flitk and C. H. Linn. Campbell now owns eleven-sixteenths of the property.

Salt Lake *Tribune*: The force at the Humming Bird mine at Paris has been increased. It is understood that the Bear Lake Copper Co. will put in more machinery this summer.——Concentrators are to be added to the Washington mill in Wood river. It is the intention to work the silver ledge. Exploration will be pushed to locate the parallel gold ledge lost after the first ore body was worked out. The company owning the mine has been organized in Utah, by H. S. Woolley and K. P. Plowman of Idaho, and is known as the Harvest.

Wardner *News*: The management of the Bunker Hill & Sullivan has decided to rebuild and fifty men were put to work to remove the debris of the old mill. Others will work in the mine on first-class ore, and work on the tunnel will be resumed. The compressor at the mine will be used for this purpose.

Spokesman-Review: The Bimetallic group, on Lake Pen d'Oreille, sixteen miles from Hope, near the mouth of Granite creek, is to be developed. The claims are the Bimetallic, Free Coinage and Calumet, owned by a company of Chicago men. W. H. Mead of Spokane is Supt. and Gen. Mgr. The ledge is reported to be 4 to 16 feet wide, carrying galena, quartz and iron, running in silver and gold.

MICHIGAN.

Twelve pits sunk at different points on the Winona property showed copper as soon as rock was struck.

At the Wyandot copper was struck at one of the pits and at the other there was trouble with quicksand.

Specimens from the Meadow show rock well charged with copper. Shaft is down 100 feet.

It is expected that production will be begun at the Arcadian mine on July 1, with rock for three heads.

A contract for three stamps for the New Quincy mill has been let to the Edward P. Allis Co. of Milwaukee.

At the Baltic mine they are making preparations for regular production.

MISSOURI.

Boston *Statist*: Eighty acres of mineral land near Aurora have been sold to a Boston syndicate for $500,000. This land embraces the Tuttle mine and other zinc producers.

MONTANA.

Phillipsburg *Mail*: One hundred stamps are dropping at the mill of the Granite-Bimetallic Con. Co. at Clark. Three hundred and seventy men are employed in and about the works. The tramway is transporting more ore from the Bimetallic to the mill than ever before. Returning, the buckets are loaded with coal. The tramway between the Bimetallic and Granite hoists is nearing completion. Fifty-five bars of silver bullion represented last week's output, worth $74,498.50.——Work on the lower levels of the Hope mine has been discontinued and water is at the 300-foot level. A diamond drill has been operated at various points at the 550-foot level. The drills and machinery have been removed from the deep workings and the drill is operating above water level. A station pump having a capacity of 800 gallons per minute has been left at the 550-foot station, the water rising too rapidly to permit its removal.——Huffman & Butcher, who have been working mines owned by P. J. Brophy and others near Princeton under lease, have struck a body of ore which, it is said, will average over $100 per ton in gold, and forty-five tons are on the dump. Meacham & Clark will have charge of milling the ore. All the parties are interested in this mine and mill.

NEVADA.

The Dickey leaching plant at Unionville will not be moved to Como as previously reported.

Osceola, White Pine county, has a new 20-stamp mill in operation, it having been started on the 3rd inst. This new enterprise belongs to Scranton, Pa., people. The ore is from the Exchange, Eagle, Crescent and other mines near Osceola.

W. H. Bray has found a vein in San Juan canyon, thirty miles south of Austin. The ledge averages 100 feet in width and has been traced through three claims. Samples show assays in gold from $2.50 to $12 per ton and three ounces silver.

The Eastern men who bought the Reno reduction works of H. H. Beck have sent $10,000 from Boston, the first payment. Ore is being shipped to the works from mines at Oreana and the dynamos and other machinery have been shipped from the East.

Carson *News*: A 12-inch streak of ore in the Capitan mine in El Dorado canyon, Lincoln county, has widened to 3 feet carrying gold, silver and lead. The group of mines has been worked for years, the ore being crushed in a Huntington mill on the east bank of the Colorado river.

Carson *News*: A rich copper strike is reported from the vicinity of Genoa. Samples of the ore tested in a forge showed copper readily. Most of the copper ore in the western part of the State carries gold enough to pay for mining.

Silver State: Men are employed in prospecting the bonded copper mines near Golconda, and the discovery of placers has caused some excitement.——G. N. Shallenberger has discovered placers at Gold Run.——In the Adelaide mine discoveries of rich ore have been made on the 200 level.——Supt. Lindley has thirty men employed on his bonded mines on Granite creek.

NEW MEXICO.

The White Oak mine, at White Oaks, is under the management of J. Y. Hewitt. The mine has been worked for fifteen years. The new shaft has been sunk 1100 feet, nearly all in ore, the pay streak averaging over $100 to the ton in a vein 18 inches to 3 feet wide. The mine has a 20-stamp mill. Tailings go to a cyanide mill. The mine has produced $600,000

One mine in the Santa Rita district employs 350 men. One hundred new shafts have been sunk, the ore in which, it is reported, averages 20% copper.

The Santa Fe Copper Co., at San Pedro, are preparing to work. Their claims have been filed on. The old mill and smelter will be torn down and a new plant erected.

Discoveries of galena have been made at Kelley. A copper vein is being worked sixteen miles from there by Jenkins & Levy.

At Water canyon, fifteen miles from Socorro, the Buckeye has recently been reorganized with a capital of $150,000, employing fifteen men. On the Timber Peak property, near there, fifty men are employed.

The Graphic smelter, at Magdalena, employs thirty-five men; capacity, 100 tons. The ore is galena, with iron, lime, etc.

OREGON.

(Special Correspondence).—The Hall & Merit Improvement Co. of Duluth has extensive placers on Eagle creek, Union county, thirty miles from Baker City. They commenced operations in April, '98, by excavating eight miles of ditch 4 feet deep and 12 feet wide, with a half mile of 20-inch iron pipe, to which five giants are attached, with 200 feet pressure. The gravel is carried into a 30-inch sluice with block riffles. These mines are said to pay $10 per day to the man. They have started this season (May, '99) with a crew of ten men, to be increased to twenty-five by the 15th inst. The plant has cost the company $50,000.

Quartz mining in the vicinity of Baker City has of late taken quite an advance. The Bonanza, of which the Geiser family were owners, has changed hands at $1,000,000, and the Collateral, adjoining the Virtue, has been sold to Montreal parties for $60,000. Within the past four days the Union at Cornucopia has changed hands. It is reported that the price paid was $2,500,000. Other smaller properties in the same vicinity have lately been sold or bonded, prices ranging from $2000 to $10,000.

Salt Lake, Chicago, Denver and Spokane are represented here, with a few representatives from Europe.

Cornucopia, May 4th, '99.

The Rising Star mine, owned by McPhelim & Bowden, at the junction of Snake river and Pine creek, in Union county, is being developed by a shaft in which the vein is 4 feet wide. High-grade assays in silver and copper are reported as having been obtained.

It is reported that the Bonanza mine, near Baker City, has been sold for $2,000,000.

Sumpter *News*: The Success, owned by Cabell Bros. and Brattin, near Granite, is being developed.——It is reported that J. G. English of the Golconda has purchased the Buffalo mine, and as soon as the snow will permit will put men at work. This is an old mine, worked in the '70s.——The Red Boy mill has been running constantly since October, producing from $30,000 to $50,000 per month.——The May Queen is pushing development work. Their mill will go up as soon as roads are in shape to haul the machinery.——Waugh & Barrett have bonded the Gold Eagle, on Congo creek, an extension of the Blaine and Red Boy, to Utah men, who are running a 100-foot tunnel.——McAvoy & Sheridan of the Little Giant mine, on Spring creek, are driving a crosscut to tap the ledge at a greater depth. This property was bonded to W. L. Vinson of Seattle, Wash., last fall for $25,000, and he has had a force of men at work all winter.——The Benson & Thornburg mine at Granite is in 150 feet with the drift.

SOUTH DAKOTA.

The Wasp No. 2 Co. on Yellow creek is making arrangements to build a cyanide plant with twenty tons capacity.

Ragged Top ore is being treated at the Spearfish cyanide works.

It is reported that the old chlorination plant near Spearfish, which has never been in operation, is to be remodeled into a cyanide plant.

TENNESSEE.

The Ducktown mines, now owned by the Tennessee Copper Co., embraces 6000 acres, and has six miles on a low-grade copper vein of such width as to make it largely a quarrying proposition. The rock is copper sulphide, similar to that of the Rio Tinto mines of Spain, soft, and running 2% to 5% in copper. It is proposed to work 1000 tons of ore daily at a cost of less than 8 cents per pound. Fuel is $2.50 a ton and labor $1 a day. A near-by property, owing 600 acres, is the Ducktown Copper & Silver Co., largely owned in England. Connected with the Tennessee Copper Co. is an iron deposit, which the company proposes to work.

UTAH.

Park City *Record*: The Weber & Kearns mill has started up.——Rich ore has been found in the Comstock mine in a crosscut 100 feet from the main tunnel. At present it is 8 inches thick.——The orehouse at the Ontario mine is filled. Hauling has commenced.——The Daly leasers have made a clean-up on the upper levels, and ore extracted under the old lease was raised to the surface. Ore extracted on their new lease will be raised through the Ontario shaft.——Teams are hauling ore from the Silver King mine over the new road and all the miners were put in the mine. The new mill is nearly ready.——At the Daly-West ore is being piled up inside and outside awaiting shipment.

Mercur *Mercury*: A contract has been let to sink the shaft on the Elkhorn 50 feet.——The ore body recently struck in the West Mercur increases in size with depth.——It is reported that a silver strike has been made in the Eagle, also a copper strike. The working force has been increased.——Reports from the Malvern are encouraging. The incline is down 275 feet with a body of ore in sight which justifies the erection of a hoist and a mill as a possibility.——Sinking is to be resumed in the Snowstorm. The air pipes will be taken from the Gladstone and a blower put in.——Treatment of the tailings at the Mercur mill has commenced. A hoist is in place to raise the tailings to the level of the track, and the dumps, containing between 200,000 and 300,000 tons, will be put through the leaching process once more. They average $3 per ton.——The Bay State G. M. Co. has been incorporated to develop the Mishawka, Godiva, Mamie W. Riley, Silver Reef and Unexpected claims in Ophir district. The officers are C. H. Knox, Pres.; F. A. Foster, Vice-Pres.; E. S. Gatsch, Secy.; F. B. Mason, Treas.; with F. Hunt, J. T. Riley and M. Hawke as the other directors.——Work at the Mercur is going on steadily. Most of the ore is coming from open cuts in the gulch below the Sacramento, on the Mattie, Lulu and Nimrod, from which 200 tons of ore per day are taken. The same amount is being mined from the open cut above the main works. The ore bodies in the cuts are from 30 to 40 feet wide. Sinking 500 feet in the Lulu on the dip of the vein has shown no break. The incline on the north side of the hill is down below the deepest workings, and connections are being made with the Resolute and Ruby from this incline.

WASHINGTON.

The Mountain Lion mine of Republic is to have a three-compartment shaft, which is to be sunk 1000 feet.

The Golden Lily at Republic is sinking on a 5-foot vein, which assays from $2.06 near the surface up to $31 at 22 feet depth.——The new hoisting machinery on the Bodie is working successfully. The shaft is 115 feet deep, and will be sunk to 200 feet.

Spokane *Chronicle*: The Black Tail north and south lead has been found on the Lone Pine. At the point where the discovery was made the lead is 4 feet in width on the surface, but in the Black Tail it ranges from 6 to 8 feet.——The Belleville G. M. Co. of Spokane owns the Independent and Buffalo claims, on the north side of the east fork of the San Poil river, at Bodie camp, opposite the Gold Ledge of Gold hill. A shaft is down on the Independent. The vein is 15 or 16 feet wide. A pay shoot 3½ feet wide was discovered some time ago, but work was discontinued and transferred to the new shaft. The pay shoot produces a concentrating ore, carrying $6.10 in gold, thirteen ounces of silver and 2% lead.——Favorable reports come from the Mountain Lion. Twenty men will be added to the working force. The drift from the tunnel is in 153 feet, with ore in the face.——A 20-inch vein is exposed on the Flag Hill where the recent surface work was done. Work is now in progress on the crosscut tunnel, driven to cut all the leads on the property.——A ledge has been uncovered on the Stray Horse after two days' work by two men. The Stray Horse belongs to the Mountain Lion system.

WISCONSIN.

The New Deal Land & Zinc M. Co. has sold its mine west of Sullsburg for $45,000, the original owners retaining one-sixth interest. Options were also taken on the Raisbeck mine for $100,000 and on the Gritty Six mine for $75,000.

FOREIGN.

BRITISH COLUMBIA.

Men are working on the Alma, near Hosquoit, on the water front. It is copper ore and is from 50 to 160 feet in width.

Saunders, Waters & Foote are owners of a claim on Esperanza inlet, Nootka sound. The ledge, which is on the water front, is traceable for 3000 feet and varies in width from 20 to 25 feet, with a paystreak 8 feet assaying from $15 to $25 in gold, silver and copper.

At the Wonderful mine near Nelson a strike was recently made in an unusual manner. The request of a miner for a lease on a certain portion of the mine led Supt. Davis to investigate an old drift, in which was a large quantity of dirt and rubbish. This was cleaned out and a point was reached where the lagging along the drift was fastened with spikes. It was opened and it was found that ore had been stoped at the side of the drift three timber sets high and 13 feet wide. The sills rest on vein matter and ore. The stope had been partially filled with dirt, which had apparently been wheeled in. They have taken out two carloads of shipping ore which was found hidden in the stope. Average assays show it to carry 138 ounces silver and 76% lead.

The annual report of the Minister of Mines of British Columbia shows the total production for all years up to and including 1898 to have been:

Gold, placer	$ 59,960,819
Gold, lode	6,501,906
Silver	9,676,901
Lead	4,049,199
Copper	1,395,841
Coal and coke	40,3 6,160
Building stone, bricks, etc.	1,500,000
Other metals	26,500
Total	$123,417,326

Kaslo *Kootenaian*: At the Dundee, Ymir district, carpenters are repairing the damage done by fire. The hoisting plant was put into running order last week and both mine and mill will soon be in operation.——The Spotted Horse mine on Round mountain is being developed.——Rock has been brought into Ymir from the Bonanza and Council Bluffs claims on Hughes creek, seventeen miles from Ymir. The owners are W. Brenan et al.——The owners of the Wilcox and Bywater, seven miles up Wild Horse creek, will incorporate. The new company will be known as the Broken Hill Mines.——Work has been commenced on the Vermont, Rover creek. There is 6 feet of ore on this property.

Spokesman-Review: The tunnel on the Shannon-Dolphin group in Camp McKinney has cut the vein, showing 3½ feet of quartz, impregnated with galena and iron.

Rossland *Miner*: D. McIntosh, Pres. and Gen. Mgr. of the Winnipeg M. & S. Co., of Wellington camp, in the Boundary Creek country, says: As soon as the Canadian Pacific railway is ready to receive ore from the Boundary Creek section there will be a large tonnage available. There are ten mines in that section which will be ready to market ore. Among the mines that will ship is the Winnipeg. There is considerable ore on the dump, and we will have 5000 or 6000 tons of ore. A seven-drill compressor has been purchased for the Winnipeg. The plant includes an 80 H. P. boiler, a compressor and three drills.——The Iron Mask - Center Star case has come to an end for the time being, and the experts have left Rossland.

CANADA.

New England *Statist*: A syndicate of American and Canadian capitalists has been formed to erect works for the refinement of ores. The plan is to form a company with a capital of $2,000,000, with power to increase to $5,000,000. The company will build a smelter and refinery and will be prepared to treat the copper ores of British Columbia.

MEXICO.

Denver *Republican*: The Velardina M. Co. is operating the silver mine at Velardena, State of Durango, Mex., said to be one of the largest mines in that country. It is equipped with a smelter having six furnaces, and the daily output of the mine is 225 tons. The mine has paid dividends for several years.

NEW ZEALAND.

London *Mining Journal*: The quantity and value of gold entered for duty for export from New Zealand from April, '57, to Dec. 31st, '98, shows a total of 13,845,727 ounces, and a value of £54,453,325. The quantity entered for export during the quarter ended December, '98, was 77,502 ounces, valued at £299,142.——Work, after a lengthy period of suspension, has been resumed on the Waihi mine, and the machinery had no difficulty in unwatering it. Driving is in progress; £8000 is the working capital available. It will take an additional £30,000 to thoroughly explore the area of ground held by the company.

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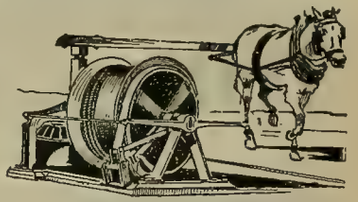

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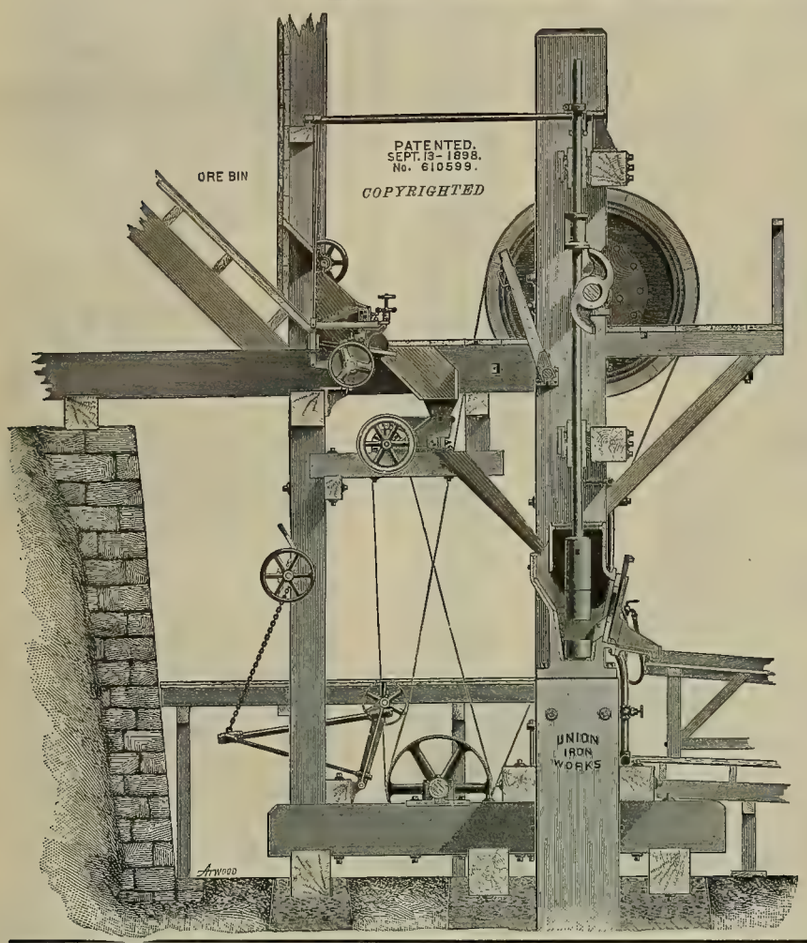

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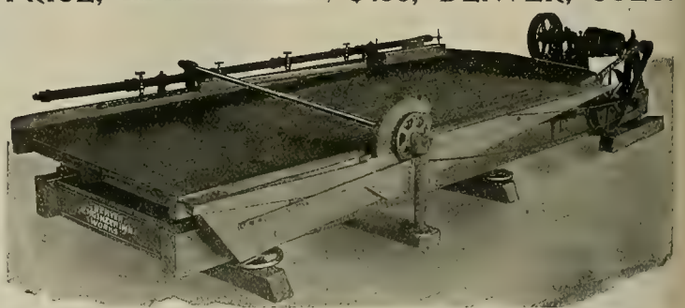

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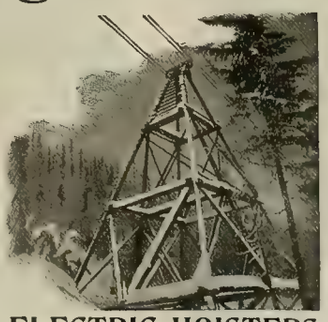

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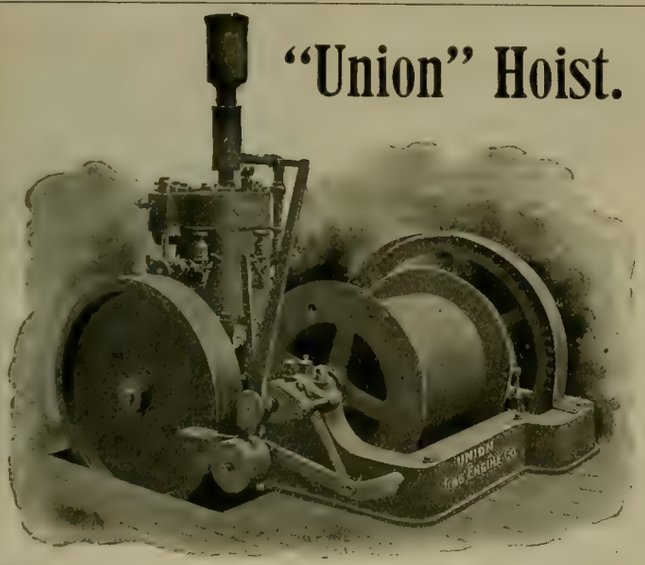

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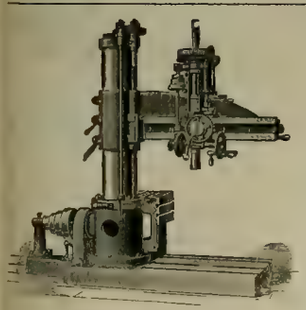

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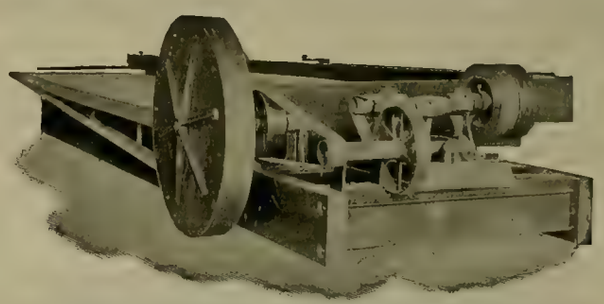

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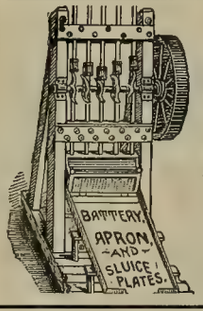

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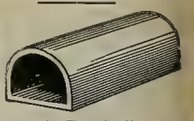

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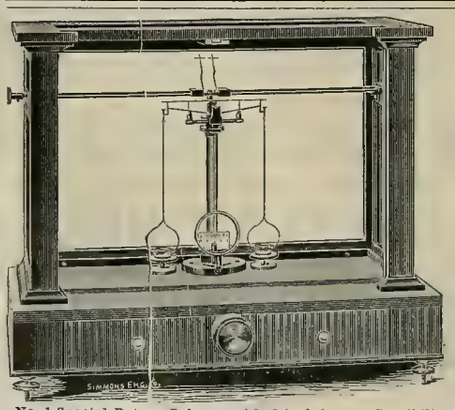

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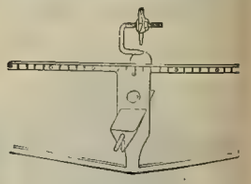

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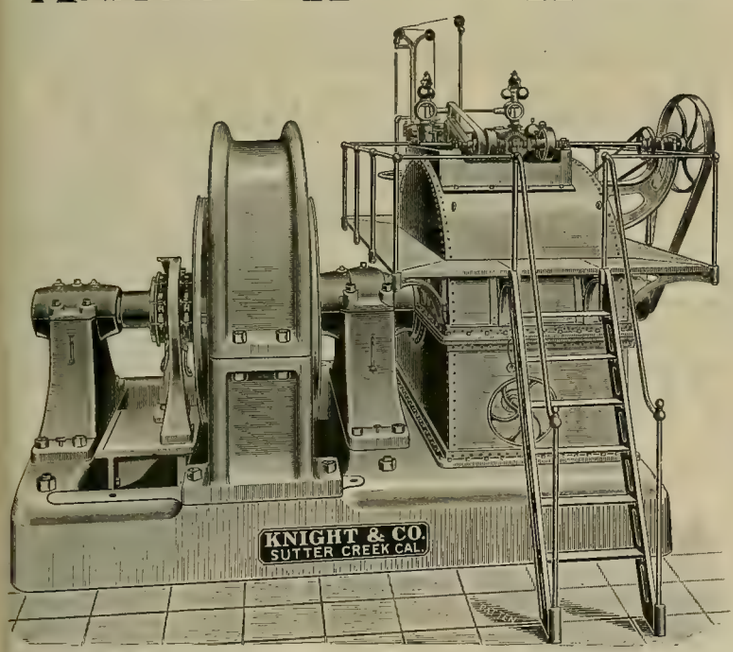

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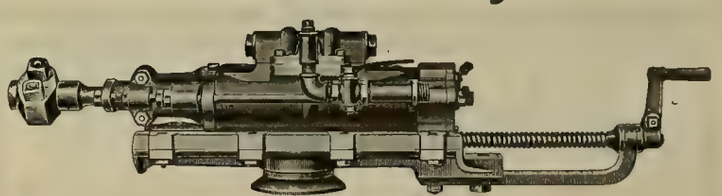

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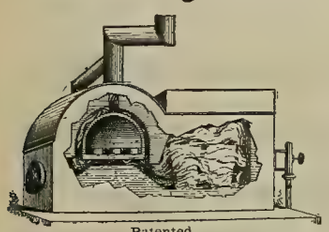

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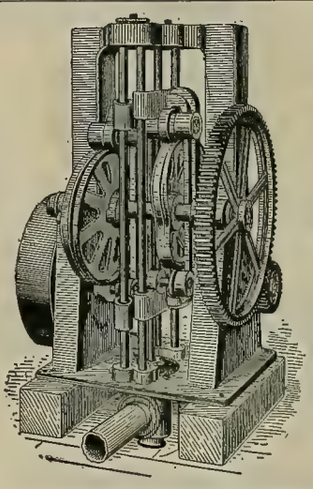

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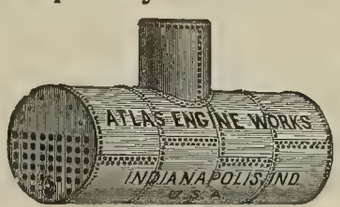

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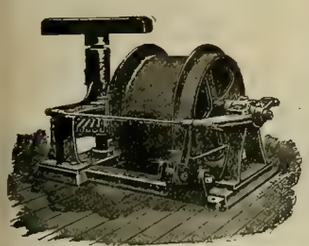

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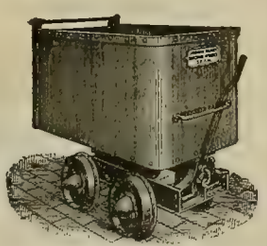

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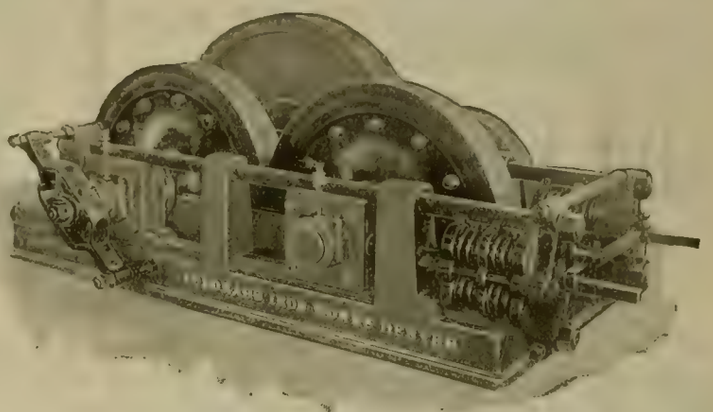

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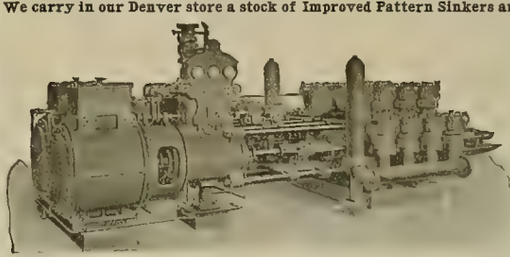

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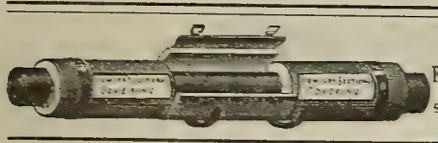

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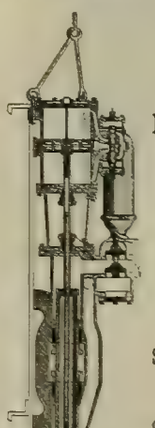

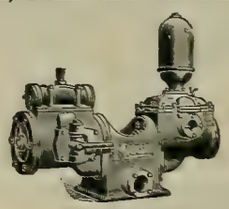

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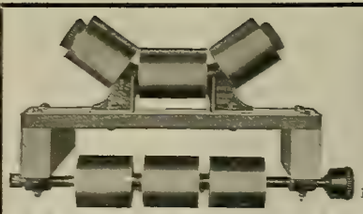

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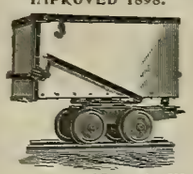

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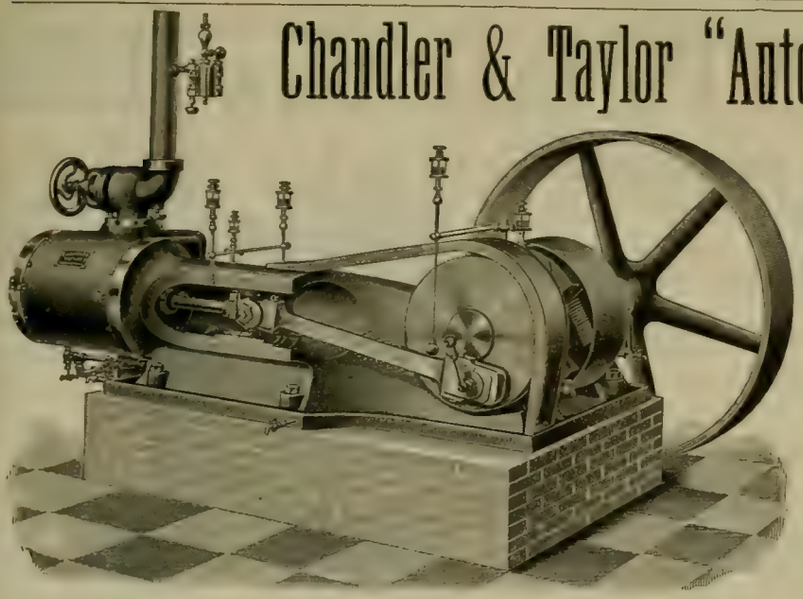

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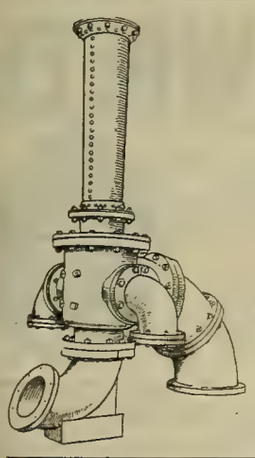

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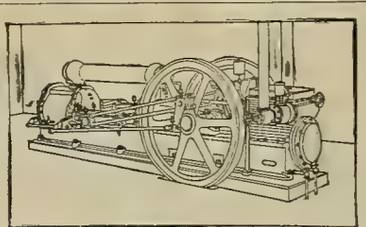

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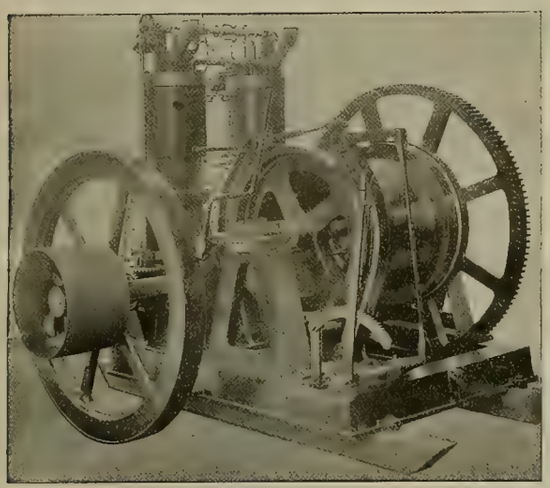

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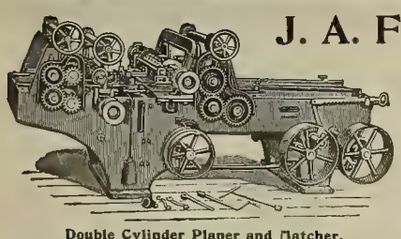

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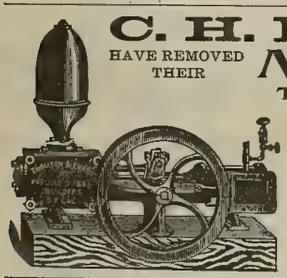

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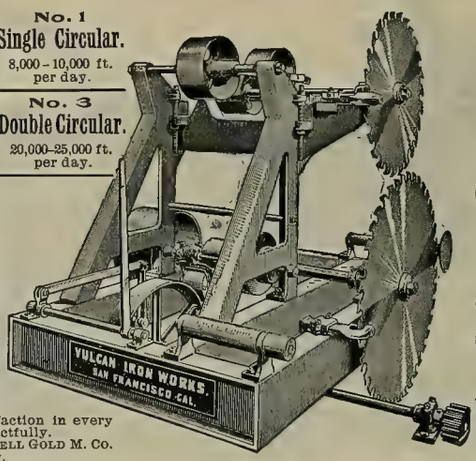

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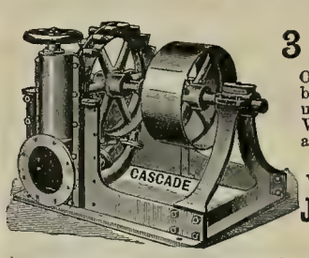

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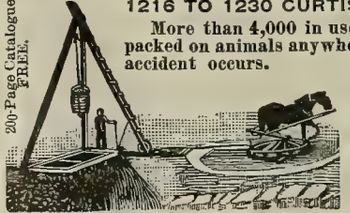

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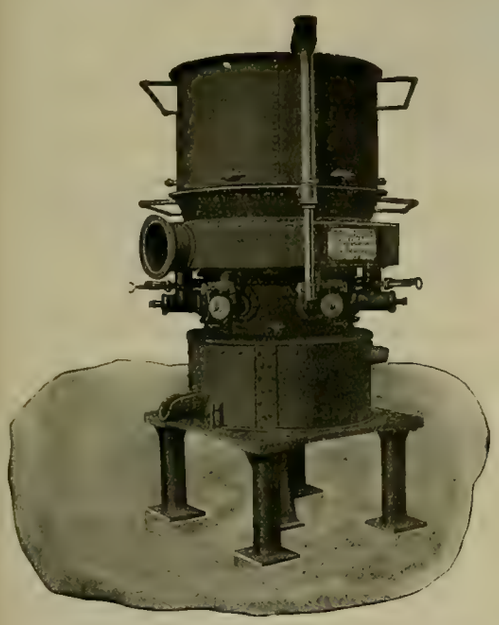

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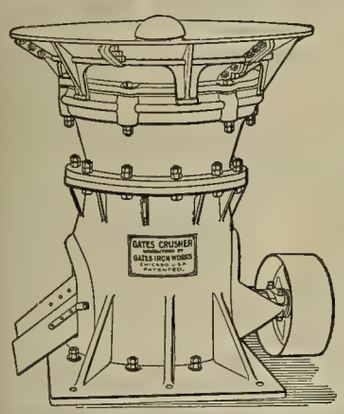

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Market Reports.

SAN FRANCISCO, May 11, 1899.

SILVER.—London, 28¾d; New York, 61⅞; San Francisco, 61; Mexican Dollars, 48¾. New York exchange, sight, 5; telegraphic, 7½ cents premium.

LEAD.—New York reports steady, $4.40 bid, $4.45 asked; brokers' price, $4.25.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 7c; bar, 7¼c.

COPPER.—New York reports Lake dull at $19.; brokers' price, $19; mill copper plates, 23¾c.

There is nothing of particular interest in copper this week. The price has fallen slightly, but the market is in practically the same condition as last week. Dealers are doubtless watching the effect the Amalgamated Copper Co. will have on the metal.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Pig, 31c per lb.; Bar, 35c. New York reports firmer, $25.30 bid, $25.40 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $42; export, $38.50 @39; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

RED LEAD AND LITHARGE.—One ton and over, at one purchase, 6¼c; 500 lbs. and less than one ton, 6½c; less than 500 lbs., 7c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¼@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5¼c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 11, 1899.

9:30 A. M. SESSION.

100 Best & Belcher	53c	200 Potosi	28c
100 Caledonia	35c	100 Savage	25c
100 Challenge Con	32c	200 Sierra Nevada	93c
550 Crown Point	16c	100 St. Louis	07c
600 H. & N.	25c	100 Union Con	43c
200 Ophir	$1 20	100 Yellow Jacket	39c

2:30 P. M. SESSION.

100 Ophir	$1 20	1000 Yellow Jacket	41c
600 Mexican	50c	100 Belcher	35c
100 Best & Belcher	55c	400 Union Con	44c
400 Chollar	32c	150 Sierra Nevada	95c
100 Potosi	27c	500 Caledonia	38c
500 H. & N.	25c	30 Standard	$2 90

Recently Declared Mining Dividends.

Anaconda M. Co., Butte, Montana; semi-annual; $1,500,000; May 3; total, $9,750,000.

Boston & Montana Co., $900,000; payable May 29; total, $10,750,000-

Gwin Mine and Development Co., Calaveras Co., Cal., $5000; May 10; total, $66,500.

Silver-Plated Amalgamating Plates for Saving Gold in Quartz or Placer Mining.

The superiority of silver-plated copper plates, for amalgamating in mills and sluices, is generally admitted, and in recent years there has been an ever-increasing demand for these plates, particularly where the fineness of the gold made its saving somewhat difficult on raw copper plates. The difficulty found in securing properly annealed copper plates for use on amalgamation tables is well understood by mill men, and the constant care necessary with the ordinary raw copper plate is also well known. The silver-plated plate requires much less attention and saves as closely, if not closer, than raw copper. The best amalgamating surface is undoubtedly that covered with gold amalgam and the next best is silver. As it is very expensive to have a copper plate coated with gold before use in the mill, silver-plated plates have been substituted in their stead and with the most satisfactory results. When cleaning up plates it is not the best plan to attempt to remove the last bit of amalgam, as that which is allowed to remain—the much-desired gold amalgam—will facilitate the saving of gold on the following run. One of the principal dealers in silver-plated copper plates for gold saving is E. G. Denniston of Denniston's San Francisco Plating Works, 653-655 Mission St., San Francisco. The silvered-copper plates for the large Alaska mills have been furnished by this establishment. In the manufacture and preparation of plates of this description only the best annealed Lake copper and refined silver are employed. They are made in any size, plain or corrugated. In addition to mill plates, the San Francisco Plating Works also manufacture gold, silver, platina, nickel, brass, copper and bronze plating of all descriptions.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.
EDW. N. BREITUNG, Marquette, Mich.
Cable address Edbec Codes, Lieber's Bedford, McNiel's, A B C Universal Commercial. U. S. A.

REPUBLIC and ROSSLAND
Mining Stocks
Bought and sold for non-residents. SOLID DIVIDEND PAYERS as an investment. Prospective producers as a speculation. Write for information.
H. P. PALMER & CO.,
Ecxhange Nat. Bank Bldg., SPOKANE, WASH.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.
GRAHAM, GARRETT & CO.,
211-212 Peyton Block, SPOKANE, WASH.
MINE PROMOTERS AND BROKERS.
Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough s.

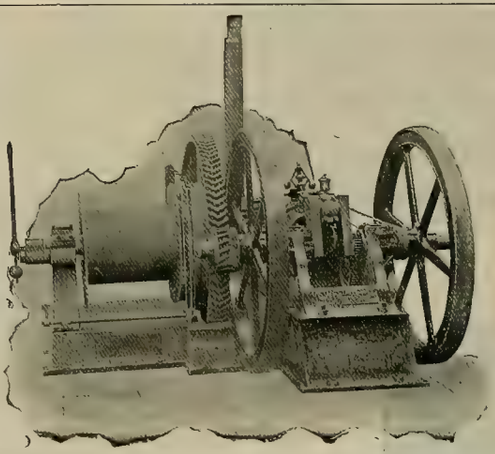
THE ROESSLER & HASSLACHER CHEMICAL CO.
100 William Street, New York.
CYANIDE
Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron
And other Chemicals for Mining Purposes.

PACIFIC EXPLORATION COMPANY
Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.
W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.
29-30 Chronicle Building, S. F.

Quicksilver
FOR SALE IN LOTS TO SUIT.
Agents for Redington Quicksilver Mine.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

TUBBS CORDAGE CO.
(A CORPORATION.)
Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. Extra sizes and lengths made to order on short notice
611 and 613 Front St., San Francisco, Cal.

DOBLE ROCK DRILLS AIR —AND— COMPRESSORS.
SIMPLEST. BEST.
Write for Catalogue.
Miners, Investigate!
ABNER DOBLE COMPANY, S. W. COR. FREMONT & HOWARD STS SAN FRANCISCO, CAL.



FRESNO, June 25, 1898

Hercules Gas Engine Works.
San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,
305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,
MANUFACTURERS OF DIRECT CURRENT MACHINERY
For Power and Lighting Purposes.
SPECIALTY
Direct Connected Electric Elevators.
Estimates Given on All Kinds of Mining Apparatus,
ALSO REPAIR AND JOB WORK OF ANY KIND.
Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.
509-511 Howard St., - San Francisco.

WEST COAST OF MEXICO.
WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.
Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

THE BUCYRUS COMPANY,
DESIGNERS AND BUILDERS OF
DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,
MACHINERY FOR PLACER MINING.
SOUTH MILWAUKEE, WISCONSIN.

MINING HOISTS.
Engines, Boilers,
Saw Mills, Hoe Saws,
Mill Supplies.
TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.

A Valve that Shuts Steam Off TIGHT.

Full particulars by addressing the manufacturers,

The Wm. Powell Co.,
CINCINNATI, O.

Puget Sound Machinery Depot, Seattle, Wash. Carry a stock.

Assessment Notices.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

CONSOLIDATED CALIFORNIA & VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the nineteenth day of April, 1899, an assessment (No. 13) of twenty-five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the twenty-fourth day of May, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the fourteenth day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

BADGER HILL AND CHEROKEE GRAVEL MINING Company.—Location of principal place of business, San Francisco, California; location of works, Cherokee, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of May, 1899, an assessment of Three Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 27th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of April, 1899, an assessment (No. 18) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 17th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of May, 1899, an assessment (No. 13) of Ten Cents (10c.) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of June, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California. The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

ROSE CREEK MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April 1899, an assessment (No 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

DELINQUENT SALE NOTICE.

HEAD CENTRE CONSOLIDATED MINING COMpany.—Location of principal place of business San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. B. Parsons, Trustee	108	160	$20 00
H. B. Parsons, Trustee	112	100	20 00
H. B. Parsons, Trustee	116	100	20 00
H. B. Parsons, Trustee	145	100	20 00
H. B. Parsons, Trustee	152	100	20 00
J. W. Pew, Trustee	348	500	100 00
S. B. Wakefield	361	3	60
J. W. Pew, Trustee	384	100	20 00
J. W. Pew, Trustee	389	100	20 00
J. W. Pew, Trustee	390	50	10 00
J. W. Pew, Trustee	463	100	20 00
J. W. Pew, Trustee	504	5	1 00
J. W. Pew, Trustee	536	50	10 00
G. B. Root, Trustee	564	20	4 00
G. B. Bayley, Trustee	674	50	10 00
J. W. Pew, Trustee	710	100	20 00
J. W. Pew, Trustee	711	100	20 00
J. W. Pew, Trustee	712	100	20 00
E. B. Deane, Trustee	717	100	20 00
S. Iglauer, Trustee	820	100	20 00
H. H. Shinn, Trustee	873	700	140 00
F. A. Benjamin	875	5	1 00
W. Steele, Trustee	890	500	100 00
J. W. Pew, Trustee	898	50	10 00
J. W. Pew, Trustee	905	100	20 00
H. W. Hasselgren	908	100	20 00
H. W. Hasselgren	909	100	20 00
Peter Lane	910	630	126 00
M. Rehfisch, Trustee	917	1,250	250 00
M. Rehfisch, Trustee	918	1,250	250 00
M. Rehfisch, Trustee	922	300	60 00
M. Rehfisch, Trustee	923	200	40 00
M. Rehfisch, Trustee	924	400	80 00
J. W. Pew	946	1,333	266 60
John Sinclair	951	500	100 00
A. W. Foster	957	8,000	160 00
A. W. Foster	958	4,000	80 00
Rehfisch & Co., Trustees	960	100	20 00
Jas. Rolph, Trustee	968	500	100 00
S. B. Wakefield & Co., Trust'e	969	1,500	300 00
S. B. Wakefield & Co., Trust'e	971	3,833	766 60
J. W. Pew, Trustee	975	400	80 00
J. W. Pew, Trustee	989	40	8 00
A. W. Foster	1010	3,000	600 00

And in accordance with law, and an order of the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

DELINQUENT SALE NOTICE.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 24) levied on the 3rd day of April, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. E. Howard	8	333	$10 00
H. S. Durden	7	2,000	80 00
J. W. Jesse	10	1,500	45 00
C. C. Duhain	80	125	3 75
C. C. Duhain	200	150	4 50
W. L. Watts	25	2,000	60 00
W. L. Watts	71	1,005	30 00
H. Sylvester, Trustee	165	1,000	30 00
F. C. Mathyas	173	250	7 50
E. H. Hamilton	70	2,000	60 00
J. H. Means	83	200	6 00
J. H. Means	91	500	15 00
Calvert Meade, Trustee	113	2,000	60 00
Calvert Meade, Trustee	115	2,000	60 00
Calvert Meade, Trustee	137	700	21 00
Calvert Meade, Trustee	196	200	6 00
Calvert Meade, Trustee	202	200	6 00
Joseph Adams	14	334	10 00
S. P. Adams	15	333	10 00
A. S. Weaver	17	150	4 50
J. A. Wiles	16	333	10 00
Wm. Wilson	18	600	18 00
John Lathrop	43	250	7 50
Van W. Jacobs	105	100	3 00
Van W. Jacobs	188	300	9 00
H. L. Barker	106	100	3 00
H. L. Barker	189	300	9 00
H. L. Barker	195	200	6 00
G. W. Schell	20.	1,000	30 00
L. V. Holmes	20.	1,000	30 00

And in accordance with law, and an order from the Board of Directors, made on the 3rd day of April, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 106 Leidesdorff street, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from E. H. Adams in the Gold Bug Mine, near Clipper Mills, Butte Co., to deposit tailings in Grizzly Creek; from John McCollum in the Santa Rosa Placer Mine, in Mohawk Valley, Plumas Co., to deposit tailings in Sulphur Creek; and from the Plumas Development Co. in the Yankee Hill Mine, near La Porte, Plumas Co., to deposit tailings in St. Louis Ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on May 15, 1899, at 1:30 P. M.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 6) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. Rehn, balance	77	1,000	$90 00
G. F. Volz	84	1,000	100 00
G. F. Volz	85	1,000	100 00
G. F. Volz	86	1,000	100 00
J. J. S. Fey	13	500	50 00
F. Baltz	123	500	50 00
F. Baltz	140	500	50 00
S. T. Bernhardt	182	500	50 00
G. F. Schwarz	151	66	6 60
C. Mayer	171	500	50 00
C. Mayer	172	500	50 00
C. Mayer	177	500	50 00
C. Mayer	178	150	15 00
C. Smyth	222	60	6 00

And in accordance with law, and an order from the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, 773 Mission St., San Francisco, California, on THURSDAY, the 1st day of June, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

MEETING NOTICE.

NOTICE OF ANNUAL MEETING OF STOCKholders of Jamison Mining Company. Principal place of business, 120 Sutter Street, San Francisco. Works on Jamison Creek, near Johnsville, Plumas County, California.

In accordance with the by-laws of said company, the annual meeting of the stockholders of said Jamison Mining Company will be held at the office of the company, Rooms 50 and 54, 120 Sutter Street, San Francisco, California, at 2:30 o'clock P. M. on MONDAY, the 15th day of May, 1899. By order of the Board of Directors.

SAM. W. CHEYNEY, Secretary.

Dated April 14th, 1899.

NOTICE.

SALE OF THE BUNKER HILL AND MAYflower Mines, Amador, Amador County, Cal., by the Receiver of the Spring Garden National Bank of Philadelphia, Pa.

Public notice is hereby given that the mining properties known as the Bunker Hill and Mayflower Gold Mines, situated near Amador, in the County of Amador, State of California, on what is known as the "mother lode," belonging to this trust, will be sold at public auction, together with all water rights and privileges, mill sites, hoisting works, railroads and rolling stock, buildings, machinery and appurtenances belonging thereto, at the United States Custom House, San Francisco, California, THURSDAY, June 8, 1899, at 11 o'clock A. M.

Circulars containing general description of the property and particulars as to conditions of sale etc., furnished on application to

J. FRANK ALDRICH, Receiver,
Room 33, Wyatt Building,
Washington, D. C.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the NATIONAL CON. MINING CO. will be held at the office of the Company, 773 Mission St., San Francisco, California, on MONDAY, the 5th day of June, 1899, at the hour of 8 P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET,
SAN FRANCISCO.

MICHIGAN COLLEGE OF MINES.

A State Technical School. Practical work. Elective System. Summer term. Every graduate employed. For catalogues, showing occupation of graduates, address *Michigan College of Mines*. Houghton, Mich.

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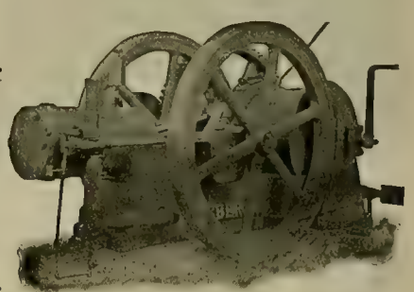

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All Latest Improvements.
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WEBER GAS ENGINE CO.,
430 S. W. Boulevard, Kansas City, Mo.

THE "Pneumatic" Cyanide Process.

(Patented in United States, South African Republic, New Zealand, Victoria, New South Wales, South Australia; other patents pending.)

Supplies the solution with the oxygen required for perfect extraction. Prevents settling, packing and channelling. Heats the solution and prevents freezing in winter. Doubles the capacity by requiring less than one-half the usual time. Saves the highest percentage of values at the lowest cost per ton. *"Mill rights" sold direct to users; no royalties.*

Send for pamphlet to THE PNEUMATIC CYANIDE PROCESS CO.,
306 BOSTON BUILDING, DENVER, COLO.

BYRON JACKSON MACHINE WORKS,

625 SIXTH STREET, SAN FRANCISCO, CAL.

—Manufacturers of—

"Whirlpool" Centrifugal Pumps

—FOR—

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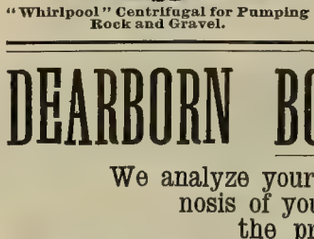

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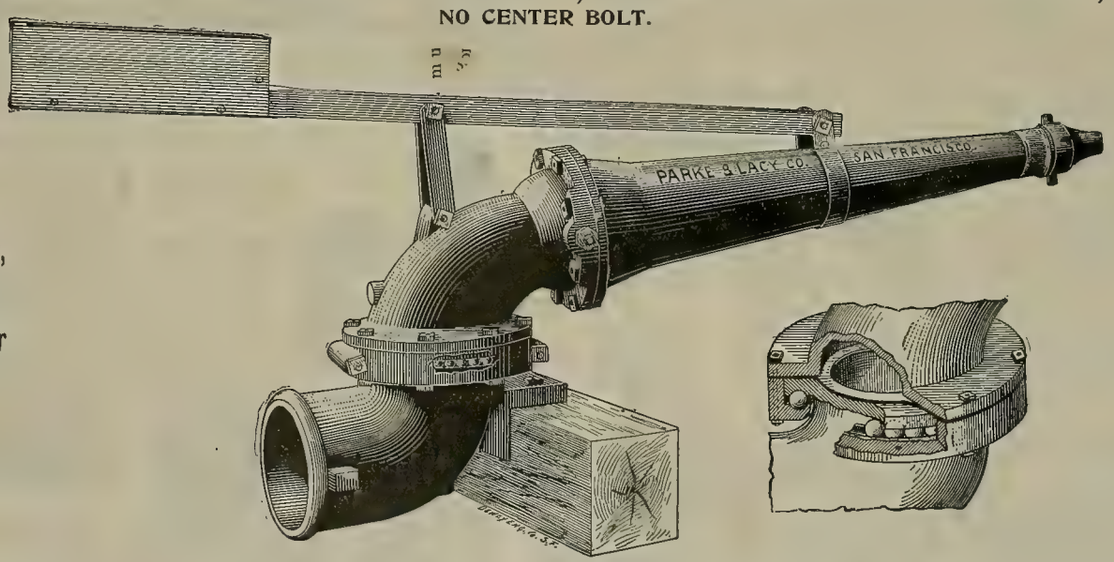

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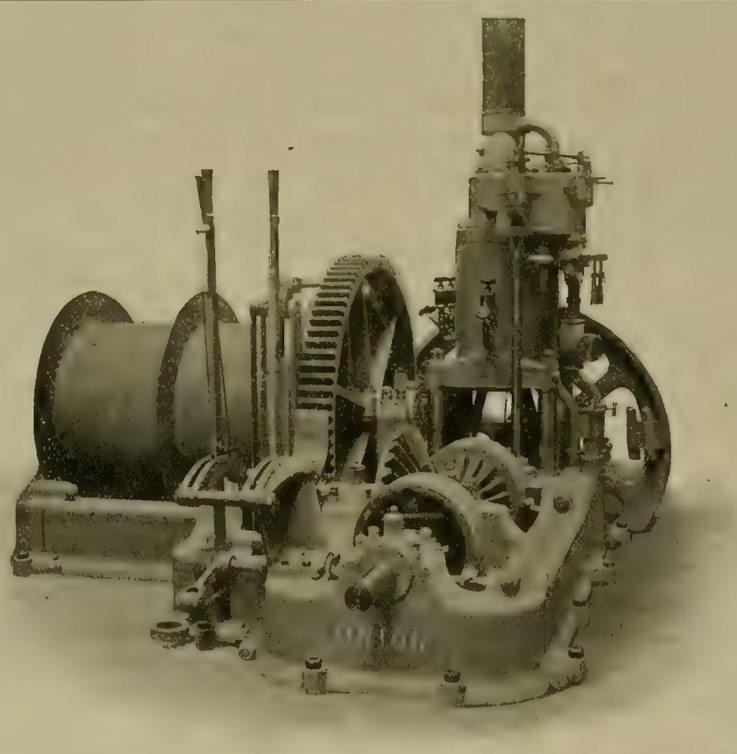
No. 2028.—VOLUME LXXVIII. Number 20. SAN FRANCISCO, SATURDAY, MAY 20, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A New "Union" Hoist.

The accompanying engraving illustrates the latest type of gasoline hoist, recently built by the Union Gas Engine Co. of San Francisco, Cal., for the Moctezuma Copper Co., to be used at Nicosari, State of Sonora, Mexico. In order to get a hoist of this size and power to the mine it was necessary to make it in sections, the weight of any section not to exceed 360 pounds.

The engine is of their latest design and has all the recent improvements. It is of the double cylinder vertical type and has a very sensitive governor and also a controller. This attachment, in conjunction with a double cylinder, enables the load to be hoisted very steadily, without any jerky motion. The drum is of the two-compartment type, so arranged as to be reversible. It is to be operated at a double compartment shaft, lifting from one side while lowering in the other, thus permitting continuous hoisting to be done—lowering is therefore done by power, not by brake, and the weights of cages are balanced.



GASOLINE HOIST BUILT FOR THE MOCTEZUMA COPPER CO., NICOSARI, MEXICO.

This hoist is 25 H. P. and its capacity is one and a half tons raised 165 feet per minute vertically. All levers are so situated as to enable the operator to have perfect control of the hoist without changing his position. An examination of the post brake shows it to be both reliable and powerful, and with such leverage as to fully control the load without the operator being obliged to use any extra exertion.

This company has been very successful in the manufacture of engines for hoisting purposes. They are now making plans for a double drum hoist of 130 H. P. to be used sinking 1000 feet, and another plant of about the same power to be used at a shaft that is expected to go down 2000 feet.

Mining men in all parts of the world are carefully watching the development of the gasoline engine for mining purposes, and judging from articles that have appeared in the various journals devoted to that industry it is the opinion of users of this power that it has come to stay.

Two Prominent Southern California Gold Mines.

The Good Hope mine and mill which are illustrated by the accompanying engraving are four miles southwest of Perris, in Riverside county, Cal. The mine has an interesting history and has had several owners. Originally worked successfully by Mexicans who crushed the quartz in arrastras with good profit, it later came into the hands of a New Mexican miner who worked it successfully, it was claimed, for several years. It then passed to a corporation, which inaugurated an active but extravagant policy, and the mine came into disrepute. After an idleness of several years and some litigation, the property is now being worked profitably by leasers, it is said. The tailings are being cyanided with good results.

The companion illustration is that of the Rose mine, situated in San Bernardino county, Cal., at an altitude of 7200 feet, and is one of the highest successful gold mines in the State. The high hill back of the works is composed almost wholly of limestone, and from its summit one may look down upon the broad, heated expanse of sand, rugged mountains and dry lakes called the Mojave desert. The Rose mine is seventy-five miles from the railroad, but this fact does not seem to have proven a detriment to its successful operation. The ore shoots occur in limestone and mica schist, the vein being accompanied by a granite dyke. The ore is hematite, sometimes massive, but usually disseminated in scales or in fine dust-like particles in the limestone.

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J. F. HALLORAN.....Publisher

San Francisco, May 20, 1899.

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THE Japanese are giving unusual attention to gold mining, and the silver mining industry is more active than ever before.

THE copper situation is practically unchanged. There are slight fluctuations in price, but the figure is substantially unchanged.

THE situation at Wardner, Idaho, is still quiet, under military rule. It is currently reported that the union miners will not take out permits, as required by the military regulations. It was not expected that they would.

ALL mines have a beginning, and all great mines are made—some faster than others, it is true; some require much more capital than others. The largest and most successful mines in the United States were small affairs in their early history.

A CONDITION of great unrest prevails in the Transvaal, South Africa. When the political affairs of that republic will become settled it is difficult to predict; but the present condition necessarily retards the more rapid advancement of the development of the country.

THERE have been reported recently an unusually large number of accidents in California mines. These accidents were from a variety of causes, and in some cases were fatal. There seems to be an insufficient safeguard for the protection of the men working underground.

THE rush to the new gold fields at Cape Nome will doubtless draw heavily on the surplus population of the Yukon river fields, whether there is sufficient gold in the Cape Nome country to justify a stampede or not. These reported "rich strikes" in various parts of the great Northwest will have the effect of gradually opening the country, and, whatever the result may be in gold, it will at least be the means of furnishing an extended knowledge of what has heretofore been a vast wilderness, the resources of which were practically unknown.

THE mine boomer is not an absolute necessity in the great industry, for it could exist without him. He does some harm, perhaps, and he also does some good. He tells extravagant stories about veins of enormous width and fabulous richness, indulging in the grossest exaggeration; but he probably does less harm than some others, for no one believes him—at least, very few do. Some of the prospectuses issued by newly-created mining companies are very interesting, as they frequently make statements of the most surprising character. One which was recently noticed asserted that the mine which the company proposed to develop was situated on a hill 1000 feet above the neighboring stream. A tunnel had been run in, gaining 7 feet in 3; the vein was 130 feet wide and the claim 3000 feet long. The ore was worth $18 per ton, and could be mined and milled for 80 cents per ton. The proposition was simple enough: The entire length of the claim 3000 feet, the vein 130 feet wide, and the depth to which it could be worked by tunnel, it was stated, showed in sight 30,000,000 tons of ore, worth, net, $17.20, or say $15. This latter was a liberal concession, cutting off a net revenue of more than $60,000,000 to which the stockholder is rightly entitled, and it suggests that in making such unreasonable discounts that some one was foresighted enough to make at this early stage of proceedings plans to absorb the $2.20 per ton. This is such a vast undertaking that people of ordinary means will probably be rather slow about taking stock in the enterprise.

WHEN the gold fever takes possession of a man there is little use to sound warning notes. That feverish unrest which comes with a desire for adventure unfettered by the chains of civilization, with a view of a possible sudden fortune—all in gold—to lure the victim on, takes such a firm hold upon him that, having made up his mind to go, he rarely gives it a sober, earnest thought, but rushes headlong for the new gold fields, fearful he may be too late. Thousands join the stampede, but the percentage of fortunate ones is always small. Many never return. Time after time the civilized races of the world have shown that no danger is too great, no hardship too severe, to deter them from venturing into a new gold field. The scorching sands of Australia have claimed thousands of victims; the beautiful valleys of California, too, are not without their share. The adventurers will go as high as they can work, and toil, and live, after gold. And now there is every reason to anticipate another rush to the very rim of the Arctic circle. The new discoveries at Cape Nome are, in some respects, somewhat more favorably situated than the Klondike region, being close to the coast and comparatively easy of access, and on this account the numbers going to that field will be greatly increased. The climate, however, is said to be far more rigorous than on the Yukon. There is no mountain range to break the force of the high winds which prevail, and their damp, penetrating force will be severely felt by the thousands of adventurers who tempt fortune in that icy land.

THE raise in the price of copper and zinc has done much to attract capital into the channels of mining. Men who heretofore looked upon mining as a speculative business, too risky for investment, are learning that the great success of the largest mining enterprises is due to careful, close business management—as careful and as conservative as that which characterizes successful industrial enterprises in this country. A thorough investigation of the possibilities of mining, with due regard for its uncertainties, will soon convince most men that legitimate mining is as much a safe business as other enterprises, and not a lottery at all.

THE question of the right of an original locator to relocate a mining claim upon which he has failed to perform the amount of assessment work, or to place an equivalent in improvements, as required by law, is an important one. This question came up before the Supreme Court of Utah and the court decided that an original locator had such right. It is a recognized fact that a prior locator may renew his location by resuming work. While the court in this instance recognized the right of the prior locator to relocate, it should be understood that it also requires that assessment work should not only be resumed but completed in order to assure possession.

IT is now stated that the flotation of the Amalgamated Copper Company stock was not such a grand success after all, as the promoters were obliged to absorb a large part of the $75,000,000 themselves. It is stated in New York that the actual legitimate demand for the amalgamated stock does not exceed one-half of the amount offered.

THE slight fluctuation in silver seems to indicate that nothing unusual is in progress that has a material influence on that metal. After a sudden rise two weeks ago, and a subsequent decline, it is again quoted at somewhat higher figures, but a fraction lower than the highest point reached previously.

The Miner Follows the Soldier.

It is interesting to see how closely the min treads upon the footsteps of the soldier. In rece years, in almost every instance, where new regio have been invested by civilized armies, the adve turesome army of prospectors was right at t soldier's heels. The London *Mining Journal* says:

Hardly had the Sirdar completed the pacificatic of the district round Omdurman, than he, or the a ministrative office of which he is for the present t titular head, was besieged by applications for gran and concessions, both agricultural and minin Speculators rushed in with a precipitancy whi argued the expectation of considerable wealth some of the reconquered districts, and they are r ported on reliable authority to be not a little d gusted at the hesitancy by which, as the result o prudent administrative policy, their bountiful d mands were confronted. With due regard to t interests of the Government, it was impossible grant off-hand, almost before the smoke of the b tle had been laid, the multitudinous demands whi at once poured in, and all but those who had be directly affected, and who in guilelessness of hea had imagined that no sort of opposition would offered to their demands, will be disposed to recc nize the political necessity of some restriction to t creation of wholesale land rights in a country whi has so recently passed again into the hand of t Egyptian Government. No objection has be offered to the letting of land, but it is direct pu chase that the Government officials for the pre ent set their faces against, until something mo has been done to ascertain, on the one hand, wh is likely to be the particular commercial destiny these comparatively new territories, and on t other, what land may be required by Governme for their own purposes. On the part of the app cants for concessions it is objected to this that lease is not a sufficient security of tenure to warra the expenditure necessary to production; but t answer to this is not far to seek. In the first plac it is in a high degree improbable that, once definite settled, the holders will ever be disturbed for an thing short of an actual pressing political necessit and it is, moreover, not altogether unreasonat that those who seek to be the first gainers by t enterprise of the Egyptian Government should willing to be bound by the limitations which a necessary to the effective administration of the n covered provinces.

The conquest of the Philippines is not yet cor pleted, but no one doubts it soon will be, but ev now is heard much talk of the mineral wealth those islands in the South Seas and the soldiers wi no doubt, if given an opportunity, themselves tu miner.

CALIFORNIA needs large storage reservoirs in t mountains, reservoirs of such size as will afford abundant supply of water throughout an entire yea There are numerous reservoirs and lakes, but tho in use are too small, as has been demonstrated ye after year. The mining industry in this State ca never reach its highest perfection so long as ea summer and fall season sees a shortage of wate The mining industry has demonstrated its perm nency and the large water supply will be need more in twenty or thirty years than now. The lar electric plants already installed must have a conti uous supply of water, and if each summer is to s this supply limited, industrial enterprises can fi no assurance that they can have power continuousl Already the great dam and canal on the Americ river above Folsom are proving insufficient. Mo power is demanded and, although there is a vast vo ume of water in the American river in spring a summer months, each fall season sees the river lo There are numerous basins in the Sierras, whe great reservoirs could be safely constructed, a also some natural lakes, which would afford an abu dant supply to certain localities. Enterprises su as suggested require large capital, but the inves ment would not be an unprofitable one.

THE rainfall in California this season, while su plying an abundance of water for present needs, evidently not sufficient to afford a full supply lastir until next winter's rains, and unless more rain fal somes mines will undoubtedly be obliged to clo down in the fall.

THE introduction of the dime and nickle-in-the-sl telephones is said to have been due to the desire the part of telephone companies to collect toll fro those who made a practice of borrowing the use telephones paid for by the month.

Concentrates.

KAOLIN is an aluminous silicate derived from the decomposition of feldspars.

TO FIND the greatest square in a given circle, multiply the diameter by .7071.

SALT lands are classified as mineral and are reserved from railroad grants.

THE essential constituents of granite are orthoclase (potash feldspar), quartz and mica.

AN electric motor is a machine for converting electrical energy into mechanical energy.

THERE are manganese and chrome mines on Cedar mountain, near Livermore, Alameda county, Cal.

THE Calumet & Hecla copper mine at Houghton, Mich., is said to be netting over $1,000,000 monthly.

SILVER sulphide may be chloridized in the pan by the addition of sodium chloride and copper sulphate.

A NUMBER of so-called boiler compounds are manufactured to prevent the formation of scale in boilers.

WHERE two veins unite in depth the location first made takes all of the ore below the point of junction.

TO FIND the diameter of a circle equal in area to a given square, multiply one side of the square by 1.12838.

ONE of the greatest sources of litigation is the extralateral right granted under the laws of the United States.

COMPRESSED AIR power cars are being successfully operated on the Metropolitan street railway in New York City.

THE greater part of the largely increased copper output of the United States is being absorbed by the domestic demand.

A BUILT UP wooden beam is no stronger than a solid beam of the same size provided the solid beam is perfectly sound.

THE laws do not permit the location of mineral or other claims on any Government reservations, whether military, forest reserve, or Indian.

PITCHSTONE is a vitreous variety of trachite or rocks of felsitic type. Pitchblende is uranium oxide, which is gray, brown or black in color.

A DYNAMO is described as a machine for converting mechanical energy into electrical energy. Generator is the name often applied to a dynamo.

CHALCOCITE (copper glance) is a copper sulphide containing 79.8% copper, and sometimes silver-bearing; color and streak blackish lead gray, dull.

GRANULITE is a fine granular rock composed of quartz and orthoclase or microcline. It usually contains small garnets which appear as brownish rounded grains.

IN soldering joints in copper wire, the lowest possible heat should be employed, for the reason that copper is softened by heat and loses strength in consequence.

THE quantity of feed water required for a good, economical engine is 30 pounds per I. H. P. per hour. A good condenser increases the efficiency of an engine 25% to 40%.

WOLFRAMITE (iron tungstate) was named years ago by Cornish miners "call" or "mock lead," for the reason that its great weight led them to believe it contained lead.

PYROLUSITE is manganese dioxide or black oxide of manganese, containing manganese, 63.2%; oxygen, 36.8%. Sometimes crystallized but usually massive. Hardness, 2 to 2.5.

GEO. F. BECKER said very tersely in a discussion of certain legal problems affecting mines: "The difference between scientific and judicial geology has long since been recognized."

A GOOD automatic, non-condensing steam engine requires from 3 to 4 pounds of coal per H. P. per hour. An automatic condensing engine requires from 2¼ to 3⅛ pounds per H. P. per hour.

GREISEN is a granular crystalline rock consisting of quartz and mica, usually lithia mica. Quartz is the predominant mineral. Cassiterite (tin stone) is often found associated with greisen.

CRYOLITE is a white to translucent mineral and resembles ice. It is an aluminous-sodium fluoride. It contains, alumina, 13%; sodium, 32.8%, and fluorine, 54.2%. It may be fused in the flame of a candle.

A NOMINAL H. P. is theoretically 33,000 foot pounds per minute. That is, a horse is supposed to be able to lift 33,000 pounds 1 foot high in one minute. It is an unsatisfactory manner of measuring power.

THE specific gravity of sphalerite (zinc blende) is 4.046 and that of galena is 7.586. While the lead sulphide is nearly twice as heavy as the zinc ore, they are most difficult to separate by mechanical devices.

PSILOMELANE is manganese dioxide, having a black or greenish black color, and a reddish to brown streak. It varies in composition, often contains baryta or potassa. It is an abundant ore. Hardness, 5 to 6.

IN gasoline engines the consumption of gasoline should not exceed one-tenth gallon per indicated horse power per hour. For a 20 H. P. engine the consumption should not be greater than two gallons per hour.

THE overflow from hydraulic separators should be passed over canvas or other tables having a grade suited to the material under treatment and a quantity of water adjusted to the requirements of the case.

THE laws of '66 did not require that end lines of mining locations should be parallel, but the law of May 10th, '72, makes this necessary in order to obtain the right to follow the vein on its dip outside of the side lines.

THE geological phenomena incident to a successful artesian well are not the same as those of an oil well. An artesian well will not flow unless the source of the water is at a higher level than the outlet of the well.

QUARTZ MILLS built upon flat surfaces instead of rock terraces should have the rock breaker set on timbers detached from the main structure, as the vibration in time is the occasion of much damage to the building.

GRANITITE is the name applied to those varieties of granite which contain plagioclase (soda, lime, feldspar). The orthoclase in these rocks is red and the mica which occurs sparingly is a blackish green magnesian variety.

SYENITE is a crystalline granular rock which contains from 55% to 60% silica and in the typical varieties consists of orthoclase feldspar and hornblende. This is the syenite of Werner, but it is a comparatively rare rock.

IN Moniteau county, Missouri, the coal veins developed in the mines are intersected by thin seams of galena and zinc-blende, filling joints in the mass of coal which in mining are saved, and occasionally a shipment of ore is made.

AN ore containing gold in native state and subject to amalgamation should be crushed only so fine as may be necessary to free the scales or particles of gold, and no finer. Further pulverization is unnecessary, and entails useless expense.

APPROXIMATELY every foot of elevation of a column of water will give a pressure of one-half pound per square inch. Thus a pressure of 200 pounds on a gauge would indicate a vertical height of the column of water to be about 400 feet.

THERE is no law prohibiting ground sluicing in California, but tailings from a mine having been worked by hydraulicking cannot be ground sluiced for the obvious reason that the very purpose for which the dam was constructed is defeated.

GALVANIZED IRON or steel ropes should never be used for running ropes. A single day's use causes the zinc coating to fall off, and the rusting of the rope then proceeds rapidly. Hoisting ropes made from poor steel are inferior to good iron ropes.

COLORADO claims to have produced up to Jan. 1st, '99, in gold, silver, copper and lead $620,974,211.46. The total production of the State of these metals during '98 was $42,646,343.95. At this rate within ten years they will have passed the billion dollar mark.

THE amount of assessment work on a claim is determined, not by the kind or quantity of rock removed, but by the amount of time required to perform the work, basing it upon the rate of wages paid for such work in the camp or district where the mine is situated.

THE theoretical loss in operating an air compressor at a point above sea level is computed to be at 1000 feet altitude 1.6%; at 2000 feet, 6%; at 3000 feet, 8.9%; at 4000 feet, 11.9%; at 5000 feet, 14.1%; at 6000 feet, 17.2%; at 7000 feet, 19.8%; at 10,000 feet, 27.3%.

HUBERNITE is a tungsten mineral near wolframite in composition, but containing 20% to 25% manganese oxide. It occurs in bladed forms usually and rarely in crystals. In color it is brownish red to hair brown to almost black. The streak or powder is yellowish brown to greenish gray, often translucent.

MONAZITE is a phosphate of cerium, lanthanum, yttrium and didymium. It is employed in the manufacture of the thin gauze mantles used on gas burners. When heated to a high temperature, as is the case in the Bunsen burner of the gas lights referred to, it gives out an intensly white brilliant light.

NARROW MORTARS in a stamp mill hasten discharge, but scour the inside plates. Mortars should be cast broad enough and deep enough to admit being lined with iron plates, which, upon wearing out, may be replaced by others, thus greatly increasing the life of a mortar and saving the expense incident to its earlier replacement by another.

THE passing of gravel, sand and cobbles down Coyote creek in Calaveras county, below Vallecito, at the time the hydraulic mines of that locality were worked extensively, cut down into the limestone bedrock in places 3 to 5 feet in a few years, showing the erosive effect of a stream having a heavy grade and carrying a large amount of solid material.

FLUORITE (fluorspar) is calcium-fluoride. It occurs at Cripple Creek associated with telluride ores, and causes the color of the so-called purple quartz. It occurs commonly in deposits of lead ore and is the mineral known to Cornish miners as tiff. It crystallizes in cubes most commonly, is soft and easily scratched. Its color is white, red, green, blue, purple, and often yellow of light shades.

WHERE A owns a patented placer claim B cannot go upon it and locate water, no matter how long disused. If a water right was at one time taken up on A's claim, and the water has not been used at the point to which it was originally taken or elsewhere, the water may be relocated at some point below or above A's claim under the laws governing the relocation of water rights.

FOAMING in boilers is caused by interference with the free escape of steam from the water in the boiler, and is usually observed in the water gauge by the rising and boiling of the water in the gauge, and also by water in the steam. The foaming is due to either of three causes—mud or other suspended matter in the water, the presence of sodium salts and organic matter. Mud and organic matter may be removed from the water by filtration, but to get rid of the sodium salts is impossible.

WHERE more than one vein occurs within the boundary lines of a claim the owner has the same extralateral rights as on the original discovery vein. Where veins pass outside of the side lines of the claim there is some difference of opinion as to where the extralateral right shall cease, whether at the point of intersection with the side line, and from that point extended downward along the vein in a line parallel with the end line, or whether the vein may be followed to a line projected outward from the end line.

THE definition of the term lode is various. Different authorities give different definitions. One definition is: "A somewhat continuous, unstratified, metal-bearing vein." Another is: "A metallic vein; any regular vein or course, whether metallic or not." A third definition is: "A metaliferous deposit, having more or less of a vein-like character—that is, having a certain degree of regularity, and being confined within walls." A lode is a mass of rock of any character whatsoever having continuity longitudinally and which contains precious or other metals and which extends downward into the earth. The definition should apply to all rocks, whether stratified or massive. The walls need not be regularly or sharply defined. Where, however, the outline of the lode is not sharply defined and the mineral-bearing formation is broad, "zone" is a better term than "lode."

MICA is an aluminous silicate and is usually transparent, colorless to dark wine color. It is very refractory in fire. The variety of gypsum (calcium sulphate) known as selenite resembles mica in being colorless and occurring in sheets, sometimes of considerable size. They may be easily distinguished. The clearest sheet of selenite turns chalky white under a low heat. Satinspar and alabaster are other varieties of gypsum. The gypsum minerals, when calcined and ground, become the plaster of Paris of commerce.

COLEMANITE is a hydrous calcium borate occurring in glassy crystals. It is the principal source of borax at the mines in San Bernardino county, Cal. The mineral occurs as a vein intercalated in the shales and sandstones of the Calico hills, having been formed on the floor of a Tertiary lake bed covered with sediment and subsequently tilted by geological disturbance to its present position. The rock is mined in the same manner as quartz, the workings being timbered in similar manner. The ore is shipped by wagon and rail to Alameda, Cal., where it is manufactured into borax, etc. The particular process employed at these works is not made public.

THE cassiterite found in Riverside county, Cal., occurs in a granitic formation traversed by numerous dykes of felsitic rock of dark color. The veins consist chiefly of an aggregate of fine needle-like crystals of black tourmaline. The cassiterate occurs in grains and in granular aggregates of brownish color with semi-pearly luster. The cassiterite in the Black Hills of South Dakota is found in veins of granite of coarse crystallization. The tin stone is found in greisen, in feldspar, quartz and in spodumene crystals, which occur in some of the mines in great size. Usually it is found in a mass of quartz and muscovite mica scales. The tin is black, but has a pearly streak.

OBSIDIAN is volcanic glass and results from a very quick cooling of a melted rock mass. If it cooled slowly it would develop crystalline structure and become a rock something like liparite, trachite or a rock of this type. Under the microscope, obsidian is often seen to contain numerous extremely small crystals, such as hexagonal mica plates. The black color of many obsidians is due to the vast number of small crystallites which occur as hair-like threads or rods. They have a black or dark color, and occur in such profusion as to make a mass of the rock appear jet black; but in thin sections, such as are prepared for microscopic investigation, the rock is almost transparent.

TO MEASURE WATER by means of a weir, place a board or plank in the stream at a point where a pond will form above. The length of the notch should be from two to four times its depth for small quantities of water and longer for large quantities. The edges of the notch should be bevelled toward the upper side, that is, should have the wide side down stream. In the pond, 6 feet above the dam drive a stake and then obstruct the water until it rises even with the botton of the notch. At this point mark the stake at the level of the water. Then complete the dam so that the water will all pass through the notch. When the water has settled and backed up in the pond as far as it will go, mark the level of the water on the stake. The stake can then be withdrawn and the distance between the marks will indicate the theoretical depth of flow.

WHEN the mining laws of the United States were framed the general knowledge of mining geology was not as extensive as to-day. At that time the principal fields of action were along the gold belt of California and on the Comstock. The numerous forms of irregular deposit found in stratified formations were but little known or understood. The laws very evidently contemplated a more simple condition than is often found to exist. The need for a change has long existed, but all efforts by State Legislatures to better the Federal laws have with few exceptions produced confusion and dissatisfaction. The only way in which the mining laws can be changed for the better is by drafting new laws, framed with a view to simplify matters. Geological distinctions cannot be made, for the reason that geologists will fail to agree on many important points.

THE copper belt at Butte, Montana, is 3000 feet wide at its western end at Missoula gulch and 7000 feet wide 10,000 feet east of that point. The usual strike of the copper lodes is about east and west. The ore deposits are not always sharply defined, the ore passing over gradually to an altered country rock of no commercial value. The formation in which these deposits occur is granite. The croppings in most cases consist of dark red or brownish quartz, usually containing silver and in some instances gold. Copper is not often present, having been leached out. Where carbonate of copper does occur on the surface the silver and gold values are low. The oxidized zone is usually sharply defined by the normal water line, where the free-milling ore suddenly gives place to sulphide copper ore of high grade, which with depth deteriorates in value. There are rich zones at lower levels in some of the mines. The values are always more or less variable. Manganese occurs sparingly in the copper belt but is abundant in the silver mines of the neighborhood.

IN the matter of the right of a junior locator on a cross lode to enter the lines of a prior location for the purpose of extracting the ore from the vein of the more recent location, the United States statutes say such junior locator may enter within the lines of a senior location and remove the more recently discovered vein, excepting that portion which lies within the intersection of the two veins. This seems clear, but several decisions have been rendered which make it uncertain, and in the event of a rich ore body, litigation would most inevitably follow. The court held in an important Arizona decision that "section twenty-three hundred and twenty-two gives not the lode alone, but all lodes, veins and ledges, throughout their entire depth, the top or apex, of which lies within the surface lines of the claim extended downward vertically. In other words, Congress has said to miners, comply with the requirements that we impose and the Government of the United States will grant absolutely to you a piece of earth bounded at the surface by straight lines, distinctly marked, and by planes extending through those lines to the center of the earth; and you shall have all lodes of mineral-bearing rock whose apex is within these boundaries. This is simple, plain, and the miners' rights thereunder are easy of ascertainment."

The Adjustment and Control of the Stamp Mill.*

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In submitting this paper it is necessary to preface it by saying that I am not aware that I will be able to advance a single new fact or proposition, but a discussion upon even so hackneyed a theme as the adjustments of the stamp mill may prove of some value by calling the attention of millmen anew to the importance of guarding well the minute details of practice, and of adapting their treatment to the peculiarities of the ore in which they have to deal. This may seem so obvious a necessity that the mere statement of it may strike some of you as being superfluous. But against this I must urge in my defense that it is a comparatively rare thing to find a stamp mill, either in its design or management, exactly suited to the ore passing through it, except where a mining belt yields—as sometimes happens—practically identical ores over large districts, and where some millman of judiciously investigating habit has worked out his problem for the benefit of himself and his neighbors. But ores from mines in the same district, no matter how restricted, nor how similar may be their appearance and geological setting, are very seldom identical in character. They may even vary greatly at different points in the same mine, and the millman who ignores these variations, however slight they may seem, will find fluctuations in his extraction, for which in many cases there might be a simple remedy if he knew how to determine the right one and apply it.

The first error that is usually committed in faulty accommodation of the mill to the ore is chargeable to the recklessness of the mine owner in ordering a "stamp mill" from the manufacturer. He sometimes does specify the weight of stamps he desires, without, as a rule, having the remotest idea why he wants any particular weight, except that he frequently assumes that capacity is the great thing to strive for, and he reasons that heavy stamps—if not too heavy on his purse—must necessarily be superior, forgetful that in amalgamating mills there are two different capacities to be aimed at, viz., crushing capacity and extracting capacity. The economical line between these two is the one that will be of the greatest importance to his company in the payment of dividends. But in ordering a stamp mill there are many considerations besides weight of stamps to be taken into account, such as the width and depth of the mortar, length of feed hole and character of automatic feeder, number and positions of inside plates, shape of discharge lip, slope of screens, etc. These are points which cannot be guessed at if the highest practical efficiency is to be attained. Obviously, then, a very considerable ore body should be in sight, not simply as a surface outcrop, but well explored below ground, so that its character may be fully known. The next step should be to make practical mill tests on average lots of the ore, the average involving not only value, but character of the ore. One mill test will commonly be insufficient to determine the design of mill required. If the extraction is well above 90% of the gold available by amalgamation, the test may be regarded as ample so far as the mortar and stamps are concerned. The millman should then, by careful attention to the finer adjustments, reach a very high extraction. But if the test falls below 90% of the gold which should be saved by amalgamation, samples identical with those first tested should be experimented with in another mill of different design as to details of mortar, etc. If the difference in the design of the two mills was considerable, very useful deductions may be drawn from these tests. Manifestly such testing as this is expensive, and the outlay may amount to no insignificant percentage of the cost of the mill finally ordered, but the propriety of incurring such an expense should not be judged of on that basis, but rather as compared with the loss in gold which would have gone irretrievably to the tailings dump had not these precautions been taken.

Although the design of mortar is a subject apart from that under discussion in this paper, it may be briefly pointed out that the two chief considerations are its width, measured at the discharge lip, and its depth from that line. Depth can be modified to a considerable extent by the simple device of clinch (chuck) blocks, but width is absolutely fixed. Other things remaining the same, increase of width reduces scour on inside amalgamating plates and lowers crushing capacity, or, what comes to the same thing, it lessens the discharge of relatively coarse material. Thus to some extent it increases the amalgamating power of the mill, more particularly on account of the improved efficiency of the inside plates. If the greatest possible amalgamation of gold is sought to be accomplished inside the battery, it is safer to err on the side of width than narrowness, for the millman can accomplish more by his adjustment with a relatively wide mortar. Likewise regarding depth it is safer to adopt a shallow instead of a deep mortar, for shallowness can be remedied, but its opposite imposes an unalterable condition. Depth favors fine crushing and high amalgamation at the expense of capacity.

The length of feed hole is also important. Many mortars are now made with a feed hole little more than one-third the length of the mortar. This imposes a concentration of the feed at the central stamp. This can scarcely be regarded as other than a serious mistake in mortar design. Though differences of opinion exist upon this matter, it can hardly be questioned that the central feed results in a preponderance of ore under the central stamp, and though this is soon worked off to the sides, this stamp is during a large part of the time falling a less distance with each drop, thus reducing its crushing efficiency and thereby lowering the output of the mill. The ideal condition is a uniform feed to each of the five stamps of the battery, and if the ore fed is previously reduced by rock breaker to a proper degree of fineness, so that the work of the rock breaker is not imposed upon the stamps, there should be no trouble experienced with banking of ore at the battery ends. In passing, it may be noted that, for purposes of amalgamation, the proper size of ore to be fed should be determined by experiment. Capacity is of course increased by feeding smaller stuff, and this may result in decreased saving of gold, but the remedy for this, up to a certain point, lies in those adjustments which either limit capacity, or, while hastening barren gangue through the screens, retain the gold longer in the battery. Where the gold in the free state is not exceedingly fine, such adjustments are easily possible. In any case, since the manner of feeding plays an important part in the efficiency of the stamps, there would seem to be no reason why a mill should be tied to a central feed, since central feeding can, if found desirable, be accomplished just as well through a long as through a short feed hole.

The weight of stamps, another fixed condition, should be carefully considered. The crushing power of the stamp depends partly on its weight, and also, other things being equal, on its momentum. Now there is a practical limit, which is a very narrow one, for the height of drop of heavy stamps. A lighter stamp with higher drop will acquire a momentum which will develop equal crushing capacity. While of course the element of time enters into the calculation, this sinks into comparative insignificance where the difference in height of drop is no more than 2 or 3 inches, and the greater flexibility as regards adjustability of a mill which has a possible range of say 4 inches in drop as against a mill with a range of 1½ to 2 inches is an advantage of no small consequence. An 800-pound stamp has all this in its favor over a 1000 pound stamp. There are undoubtedly many cases in which the greater weight is desirable, but the working condition of such a mill are so much more limited that its adaptability to the ore should be very definitely known before venturing thus to tie the hands of the millman. Where doubt exists lighter stamps should be chosen.

As mills are commonly constructed, the slope of the screen is also fixed. The vertical position is rarely adopted, and for a good reason. It is perhaps the crudest and least economical method of limiting discharge from the battery. Screens should be set sloping, and the angle should be capable of a certain amount of adjustment. There would be no difficulty in effecting a light seal around the edges of a screen under such circumstances, and the millman would thus be enabled to adjust his discharge to the quantity of water used with far greater nicety, giving him added control over the fineness of crushing.

The adjustments of the mill are height of drop, number of drops per minute, height of discharge, kind of screen and size of mesh, and quantity of water. The order of drop of the stamps is also a matter of importance.

The height of drop can be adjusted within certain limits, dependent upon the design of the mill. With an increase of height a longer time will be taken in falling, and a proper interval must be allowed for the rebound and settling back of the stamp before being again lifted by the cam. The speed should be adjusted to this, so that no more than the necessary interval is allowed in order that the stamp may perform its maximum duty. Prolongation of the period of rest, however, may be beneficial at times by permitting the heavier particles to settle, keeping them longer in the battery and thereby insuring a finer crushing of this material. If these particles contain gold, as is not unlikely to be the case, an increased saving by amalgamation will result. But care must be taken that such increased recovery of gold is not economically overbalanced by a reduction in total output of the mill. On the mechanical side the limits of this adjustment lie between a position of the tappet so low down on the stem as to incur the danger of "camming," and the opposite position at a height so great that the cam will not strike it until it has completed too much of its revolution, causing a risk of breaking the cam arm on account of the high speed at which the cam begins to lift the tappet. Further changes in the height of drop may be accomplished by substituting new cams designed specially to favor the object in view.

Height of discharge is to a limited extent independent of height of drop. The general practice in the best gold mills to-day is toward such a height of discharge that the stamp is never lifted entirely out of the water. This avoids any violent splashing of the pulp against the screens which not only retards the escape of the crushed ore, but occasions an undue wear of the screens. The regular pulsation of the pulp when working as above stated keeps the ore in suspension better than when the splash is violent, the coarser particles are not lifted so high above the dies, and the finer particles are afforded a superior opportunity to escape by the gentle flow of the waters over the screen surface. The resultant crushed product will be of more uniform size, and for the degree of fineness and crushing capacity sought the inside amalgamation will be higher when this method is followed. In general, it may be said that height of discharge should be increased in proportion as the ore contains other pyrites or harder portions of gangue locking up gold. On the other hand, if the "sulphurets" are of such a character as to promote "sickening" of the mercury, lower discharge will be necessary.

One of the most delicate adjustments of stamp milling operations is in the quantity of water fed to the battery. It should be uniformly distributed to the several stamps, and not delivered at one point. There should always be enough to make a pulp sufficiently thin so that the stamps may keep all of the material in the battery in motion. Any tendency to banking is fatal to good work. Addition of water beyond this point facilitates rapid discharge. If there is a considerable quantity of gold in the softer portions of the ore, thinning of the pulp will so hasten its escape that losses may be occasioned. On the other hand, if the softer portion of the ore is relatively barren an excess of water will so effectually discriminate between it and the harder ore that it will be hurried through, leaving the stamps free to do their work where it will yield the larger economical results. As a general thing, the quantity of water should be increased with greater height of discharge; but these two factors in milling should bear a relation to each other which should be very carefully determined for each individual ore in order to insure the maximum efficiency.

The slope of screen has already been mentioned. The difference of a degree will make a great difference in the rate of discharge. It will often make an even more important difference in the life of the screen. Very little dependence should be placed on the slope or the mesh of the screen for regulation of the discharge. This should be accomplished through other adjustments. The screen in a stamp mill, moreover, should not be regarded too much in the light of a sizing device. Regulation of size can be very neatly and accurately accomplished by suitable height of drop, height of discharge and quantity of water. If these are properly adjusted the screen should have comparatively little to do in sizing the pulp, serving mainly to arrest a relatively small amount of oversized stuff which has been thrown too high. This is particularly true where the stamps are set so as to drop in water instead of upon it.

Concerning the kind of screen and character of openings, opinions and practice differ widely. It might almost be said that these have changed arbitrarily, like fashions, with scarcely more justification. We have woven wire screens (the old standard), round-punched tin plate and Russian iron, diagonal slot and horizontal slot Russian iron and steel sheet, both punched and cut. The woven wire screen gives the larger area of open surface, and accordingly facilitates rapid discharge. Where the adjustments are so made as to depend least upon the screen for sizing, there can be no doubt that this is the best kind to adopt, for in such a case a very large amount of pulp thrown against its surface is presumably ready to be ejected. The flow of the pulp over a surface of this kind is also considerably retarded, which likewise promotes a free discharge. The outflowing pulp will therefore contain a relatively larger percentage of coarse material. Crimped steel wire is always to be preferred, except where the battery waters are corrosive from high acidity. Brass wire, and certain alloys, such as aluminum bronze, would then be found superior. These will absorb more or less amalgam, and the worn-out screens will ultimately be melted into bars and sold to refiners. The other forms of screen are manifestly used with a distinct view to their function in sizing the pulp. There may be cases where such sizing and restriction of discharge as they produce would prove more economical than the accomplishment of the same result by other means. The point is one to be decided with great care in each instance. The diagonal slot, ratio of open and blank areas being the same, will yield a faster discharge than the horizontal slot screens, and the cut metal will pass pulp more readily than punched or "burr" slot. It appears also that the "burr" slot is adapted only to mills where the stamps fall on the surface of the pulp, producing a violent splash. Round-punched tin plate, which is usually prepared on the ground, is rarely advisable, except as a means of using up accumulations of suitable material which would otherwise go to waste. Round-punched Russia iron is recommended by some manufacturers, and is used to a considerable extent in Australia, but the author has no knowledge as to its efficiency.

The order of drop of the stamps exercises an influ-

*Condensed from a paper read before the Canadian Mining Institute.

ence on the crushing capacity of the mill, on the amount of scour of inside plates, and on the wear of screens. For high amalgamation the order adopted most generally in the West is 1, 4, 2, 5, 3, and it is perhaps the best for all around purposes, though it has a slight tendency to crowding material somewhat away from stamp No. 1. Another good order is 1, 5, 2, 4, 3, which, however, tends to bring a slight excess of battery sands towards the middle stamps. The orders 1, 5, 2, 4, 3 and 1, 5, 3, 2, 4 both produce a very uniform distribution of sands in the battery, giving high crushing and discharging effect, at the cost of larger scour on inside plates with increased wear of screens. As an example of a bad order, 1, 4, 2, 3, 5 may be given, an order which rapidly tends to banking under stamp No. 5.

By control of the stamp mill is understood the maintenance of the same degree of pulverization, once the proper conditions have become established. Manifestly the mill must be adjusted to suit the ore, but on the other hand the ore must be adapted to the milling conditions. It is a great misfortune to have the ore which comes to mill frequently varying in character, so that either new adjustments must be made or loss allowed to take place. Such irregularities happen far more frequently than is necessary at many mines. The mine foreman can often adapt his work to the changing character of the ore (where the relative quantities of the different sorts of ore do not vary too erratically) so as to ship to mill at all times approximately the same mixture. Where the conditions of mining forbid such selective work the difficulty may be overcome, at least to an important extent, by crowding the production of ore ahead of the needs of the mill and "stocking" this in horizontal layers in large square or rectangular bins with flat bottoms. On removing the front of a bin thus "stocked" the material will fall down very uniformly mixed, so that the ore going to mill will present no wide difference in character.

To maintain the same degree of crushing it is necessary that the height of discharge lip above the die should follow the die down as it wears, which can only be accomplished by starting with chuck blocks under the screen so that these may be successively removed. The tappets will also require resetting at intervals to preserve the same height of drop of stamps. Care must be observed likewise to prevent "cupping" of shoes and dies, that is, an unequal wear, forming hollows and prominences. No mill is doing efficient service where "cupping" is permitted. The remedy, of course, exists in shifting the dies methodically so as to insure a uniform wear. There is always a tendency to slipping of tappets on the stems, which should be watched. The use of set screws for attaching tappets has been almost universally discarded in favor of gibs and keys. When properly tightened up they will rarely slip, but the danger must not be overlooked. The rotation of the stem is supposed to promote uniform wear of shoes and dies, but its importance is perhaps somewhat overestimated. Still, as stamps are made to be revolved, it is the duty of a careful millman to see that they do so, and that they do it uniformly. The number of lifts for one revolution of the stem depends mainly upon the lubrication of the cam arms, but, in general, things are assumed to be going well when one revolution is accomplished in from six to ten lifts. A tendency to a reverse rotation on dropping, if occurring with each drop throughout the revolution, indicates unequal wear of the stamp guides, which means that the stamp is not falling perpendicularly, and hence is not giving its full crushing effect. If the tendency to reverse rotation occurs during only a part of the revolution it indicates serious "cupping," which the millman should have discovered previously.

Difficulties in crushing are too commonly ascribed to some peculiarity of the ore, and the millman is thus allowed an easy escape from responsibility. The fact is that all ores crush practically alike, so long as the crushing conditions remain unchanged, granting that the material is discharged as soon as it has been reduced to the requisite degree of fineness. Bearing this in mind, it is easy for the millman to make his adjustments so as to produce the requisite results. The matter of course is complicated by the necessity of securing a high inside amalgamation of gold, and there is altogether too great a tendency to neglect the possibilities of amalgamation in the stamp mill, and resort to devices for outside amalgamation, which are frequently less efficient, and add largely to the costs of extraction. The stamp mill should be looked upon as primarily a combined crusher and amalgamator. As a crushing machine it is mechanically crude, and wasteful of power. For simple crushing there are appliances far more efficient, particularly where large quantities of ore are to be treated. But in its proper sphere the stamp mill has no rival, and the exceeding delicacy of the adjustment possible for the production of specific results will be hard to attain by any other machine.

A series of experiments were made in which the height of drop and discharge were changed. The table above shows the results of these experiments.

TABLE SHOWING EFFECTS PRODUCED BY CHANGING FROM LOW DROP AND LOW DISCHARGE TO HIGHER DROP AND HIGHER DISCHARGE IN STAMP MILLING THE SAME ORE.

Meshes.	Corresponding Size of Grains, Millimeters.	Per Cent of Total Ore Remaining on Each Screen.		Assay Results.				Ratios of Actual Amounts of Precious Metals in Each Grade of Pulp Between High and Low Drop Pulp.				
				High Drop.		Low Drop.		Excess on High Drop Side.		Excess on Low Drop Side.		
		High Drop.	Low Drop.	Gold, ozs.	Silver, ozs.	Gold, ozs.	Silver, ozs.	Gold.	Silver.	Gold.	Silver.	
20	0.85	.01	.88	.....	.....	0.34	8.51	.....	.....			$\frac{1}{x+1}=\frac{1}{7.06}$ and $\frac{1}{41.82}$
24	0.708	.04	1.96	0.25	8.98	0.455	10.70	.....	.....	$\frac{1}{6.06}$	$\frac{1}{40.82}$	
30	0.535	.26	8.16	.....	.....	0.43	10.44	.....	.....			
40	0.374	5.96	16.14	0.245	7.875	0.235	8.565	.....	.....	$\frac{1}{2.61}$	$\frac{1}{2.49}$	
50	0.279	6.34	8.34	0.22	8.105	0.175	8.665	.....	.....	$\frac{1}{1.04}$	$\frac{1}{1.40}$	
60	0.232	9.70	8.54	0.255	8.04	0.405	8.58	.....	$\frac{1}{1.06}$	$\frac{1}{1.35}$		
70	0.197	2.37	1.21	0.26	8.09	0.345	9.275	$\frac{1}{1.45}$	$\frac{1}{1.75}$			
80	0.171	3.10	1.96	0.28	8.105	0.485	10.615	.....	$\frac{1}{1.20}$	$\frac{1}{1.09}$		
90	0.155	10.54	8.62	0.325	9.80	0.40	10.81	$\frac{1}{1}$	$\frac{1}{1.10}$	$\frac{1}{1}$		
100	0.139	5.58	2.90	0.30	10.29	0.355	12.195	$\frac{1}{1.62}$	$\frac{1}{1.62}$			
120	0.110	6.57	5.25	0.25	9.49	0.455	14.93	$\frac{1}{1.45}$	.....	.....	$\frac{1}{1.26}$	
150	0.093	9.82	5.35	0.31	11.33	0.585	15.385	$\frac{1}{1.02}$	$\frac{1}{1.35}$			
Finer than 150	.....	39.55	30.19	0.35	15.95	0.50	19.135	.....	$\frac{1}{1.09}$	$\frac{1}{1.05}$		
Totals..	.....	99.84	99.50	.....	.....	.....	.....	.....	.....	.....	.....	.....

Some Notes on the Petroleum Deposits of California.

Written for the MINING AND SCIENTIFIC PRESS by HAROLD W. FAIRBANKS.

In a recent article in the Bulletin of the Geological Society of America Prof. Edward Orton of Ohio gives a brief resume of the "Geological Probabilities as to Petroleum."

The origin of petroleum and the conditions under which it occurs are taken up. In accordance with the views of the great majority of geologists Prof. Orton concludes that petroleum is of organic origin, derived from either animal or vegetable remains.

He argues for the importance of rock structure in determining the position of petroleum deposits, and further that the oil is formed in the stratum or rock in which it is found. That is, he believes that it does not migrate either up or down through the rocks.

It is with this last conclusion that I wish to take issue, basing my discussion upon the conditions under which petroleum occurs in California.

Beds of Tertiary age furnish almost all the oils and bitumens of California. Of the three divisions of the Tertiary—the Eocene, the Miocene, and the Pliocene—the middle one is the most important in this regard. In one locality at least the Eocene furnishes large quantities of petroleum, while very little has with certainty been derived from the Pliocene.

I shall not here try to prove that these formations are the source of the oil, but merely state that where they are absent, or do not contain the thick beds of organic origin which are so characteristic especially of the Miocene, the oil and bitumen deposits are not found.

The organic origin of the oil is almost self evident. The silicious and calcareous shales, known in general as the "bituminous shales" are made up largely of remains of sea organisms. The greater number of these are microscopic in size although the remains of fish are quite abundant. In California, then, it is chiefly due to animal remains that we have the extensive and valuable oils and asphaltum.

Now as to the local position of the deposits. The structure of the rocks appears in many cases without any doubt to determine just were the oil shall collect. This is true in California as in the Eastern States, but owing to the much greater deformation of the strata here it is impossible in many cases to determine just what the relation is. The summit of an anticlinal knob or ridge (point or axis from which the strata dip away on opposite sides) is theoretically the place for finding oil in an oil-bearing field.

In California the rocks are often closely folded and broken along the axis and the oil is found along one side of the fold instead of in the center. Sometimes the oil is found in porous strata in monoclinal folds; a monoclinal fold being a series of rocks dipping in one direction only. In such cases the anticlinal theory seems to fail.

It is however concerning the migration of the petroleum from its original source to its present position that the most unique and interesting facts come out; facts which are radically different from those which Prof. Orton has found to be characteristic of the Eastern fields. He says that petroleum migrates neither up nor down from the horizon in which it is formed.

For most regions it is undoubtedly true that water with which porous rocks are more or less impregnated would prevent the oil from passing downward. As it is lighter than water it must be forced upward unless hindered by an impervious layer. While in a region of but little disturbed rocks there is not apt to be much fissuring, permitting the escape of the oil, yet even there it seems to me the present position of the petroluem is not necessarily the original one: the one where it was formed.

Petroleum in commercial quantities is most often encountered, as we should expect theoretically, in porous rocks, such as sandstone, and must at some time have migrated from shales or limestone in which it was distilled. The movement would naturally be in the direction of least resistance: into porous rocks overlying or into fissures and seams in the rocks.

Now in California the petroleum and asphaltum deposits are frequently found removed thousands of feet from any formation in which they could have originated. The movement in most cases has been an upward one.

In the Sespe district, in Ventura county, there is a most remarkable and interesting field of petroleum. The present position of this petroleum can be accounted for only through the supposition that it has passed downward from the shales in which it originated.

In this region there is a thickness of more than a mile of Eocene beds consisting chiefly of sandstone. Near the top of the series there is a body of light colored sandstone. Below that, and exposed in great bluffs just to the east of the Sespe district, is a thick bed of shaly limestone made up of the remains of microscopic sea organisms. The limestone is dark and when freshly broken gives out a strong bituminous odor.

Below the limestone are clay shales and then a thickness of several thousand feet of reddish or purplish sandstone. The wells have been bored in clay shales and sandstone, penetrating the latter in some cases more than 1500 feet. The oil is found chiefly in the more porous portions of the sandstone.

The greater portion of the large body of petroleum occurring here must have been derived from the shaly limestones. They once covered the sandstone but have now been removed by erosion from the area in which the wells have been bored.

There can be little doubt that the oil has passed downward from the limestone to the sandstone where it has found lodgment. This condition has been made possible by the fact, illustrated in some of the wells, that the sandstone contains but little water. One well put down in the sandstone to the west of the main producing area reached a depth of more than 1500 feet without encountering enough water for drilling purposes. While to the east where the most of the wells are there is more water now, this water must have been absent once for we cannot concieve of petroleum passing downward into rocks filled with water.

There can be no doubt then that petroleum does move from one horizon to another in response to the law of equilibrium. The direction which it takes is dependent upon the character and position of the rock strata.

Chemical action is an important factor in the formation of the oil from the organic remains and in its subsequent movements. In many of the fields it is undoubtedly still forming, for we find it coming to the surface in connection with hot or cold mineral springs. Many interesting problems are encountered in the California oil fields, and generalizations for other fields are not always true for this region.

Some Characteristic Mines of the California Gold Belt.

Written for the MINING AND SCIENTIFIC PRESS.

The mines of the gold belt of California occur in a variety of formations, and under the varying conditions met along a distance of more than 200 miles these mines have certain characteristics peculiar to each type of vein. These distinctive features are influenced largely by the character of the inclosing rocks. In a recent issue was printed some characteristic features of veins in granite in California, which may be considered as one of a number of papers on this subject. Veins occurring in slate are very different from those in granite, and those in amphibolite schist differ in many respects from those in other rocks, and so throughout the State the formation has an important bearing on the geological structure, if not the value of the mines.

The largest and most extensively developed mine on the Mariposa Estate is the Josephine and Pine Tree mine. This property is situated on a mountain side overlooking the Merced river, a mile and a half north of the town of Bear Valley. The property was one of the first opened in the county. It has had several owners, but is now owned by the Mariposa Mining & Commercial Co. of San Francisco, Cal. The mine consists of two gold-bearing quartz veins which form a union near the summit of the mountain. The Pine Tree vein has a strike a few degrees west of north. On the surface the point of divergence is at what is known as the Fremont shaft. The Pine Tree vein is about 8 feet in width at this place and dips 62° to the eastward.

On the croppings at the point of junction the Josephine vein greatly resembles the Pine Tree, and is separated from the latter by a seam in the quartz. The former suddenly sweeps around to the westward in a curve, having a radius of about 100 feet. When it has reached a line striking north 30 west the vein seems to strike in a tangent in that direction and maintains it as far as observed for a long distance. The Josephine takes the same pitch as the Pine Tree, or approaches it closely, being about 55° to 58° to the northeast and eastward.

On the lower (foot wall) side of the Josephine vein are two large and several small veins of quartz, separated from each other by soft, much decomposed material having a slaty structure. These veins branch out from a common point in the Fremont shaft, sweeping around to the westward, but appear to converge slightly northward as seen in an exposure in a cut some distance from the point of divergence, and probably reunite to form one vein or mass of quartz and gold-bearing material. The two principal veins—Pine Tree and Josephine—have quite marked but widely differing characteristics.

The veins are best exposed on the level known as the English Trail drift, which was started under the direction of the English company that at one time owned the property.

Taking a cross section at a point 437 feet below the croppings at the Fremont shaft, it is found that the two veins converge on this level at a point about 100 feet north of the point of meeting on the croppings, showing that the line of convergence is not vertical, but inclined to the northward.

A crosscut at the point where these veins converge in the English Trail level shows a body of quartz 40 feet in width, dipping uniformly to the westward at an angle of 60°. Along the drift, which follows closely the Pine Tree vein, the two great veins are separated by a mere seam no thicker than a knife-blade. Northward a mass of soft material, composed of ankerite with mariposite and quartz, separates the veins by a few feet. Still farther northward the divergence is greater, and the Pine Tree vein shows a gouge 1 inch thick on the hanging wall side of the vein. A crosscut has been driven 25 feet eastward through a mass of crushed and highly altered ankerite to a second gouge, containing fragments of the rock mass. The gouge is from 1 to 2 inches thick and is extremely tough, but soft. The wall beyond is polished like a mirror and was formerly considered the hanging wall of the vein. I find the material beyond the slip to be identical with that in the crosscut, and conclude that it is not the true wall. Serpentine occurs on the hanging wall side of the vein at the surface, over 200 feet distant. The serpentine approaches the vein, going northward, however, and the tunnel driven near the Merced river, about 900 feet lower than the English Trail drift, lies on the hanging wall side of a zone of material similar to that found in the crosscut above referred to, the altered ankerite. The ankerite, containing mariposite, separates the Pine Tree and Josephine vein, and the material grows broader as the veins diverge, until where they are 80 to 100 feet apart and more does not fill the entire space between them.

The Josephine vein is distinguished everywhere along its course by what may be termed its fragmental appearance. A banded structure is frequently apparent, but mixtures of quartz and black slaty material are the most persistent feature.

The quartz of the Pine Tree vein is massive, often iron-stained in the upper portions and occasionally contains a small amount of the magnesian silicate—mariposite. It never includes black slaty material in any portion of the vein.

Taking as the initial point of observation that portion of the mine lying a short distance south of the intersection of the veins in the English Trail drift level, it is found that both veins thin out like a wedge and come to a seam of quartz. The workings here do not disclose whether or not the veins reappear immediately southward. On the surface, however, considerable outcrops are found at intervals going toward Bear Valley, showing that the crevice is continuous at least.

From the point where these great veins thin out they swell going northward and northwestward. At a distance of 115 feet they have made a wide mass of quartz, being still together, but separated by a mere seam or crack in the quartz. In a short crosscut a little way farther on a clay gouge 4 inches in width constitutes the dividing line. At 66 feet from the point of the wedge the two veins have parted abruptly, and in a crosscut, run here, are found to be separated by 30 feet of ankerite and mariposite, which is seamed with quartz. Similar material is found on the footwall or west side of the Josephine, near where the veins separate.

What might have proved an interesting exposure in a drift was inaccessible, owing to its having been filled with ore mined in some other portion of the works and stored there. I am told the Pine Tree vein is 40 feet wide here and is separated from the Josephine by ankerite containing mariposite.

Continuing northwestward to another crosscut, the two veins are found to be 60 feet apart. Another crosscut farther north crosses the Josephine ore body, which is 48 feet in width. The cut has extended but a foot beyond the ore body, but here discloses a talcose material heavily charged with cobaltiferous mispickel (danaite), and forming the hanging wall. In a crosscut 514 feet to the northwestward from that last described as cutting both veins, it is found that the Josephine ore body is 51 feet in thickness, having a black slate footwall and a hanging wall of the talcose rock above referred to. This rock has a thickness of 15 feet and is succeeded by 115 feet of ankerite and mariposite with many quartz seams. Thus the Josephine and Pine Tree veins are at this point 130 feet apart.

It is found by platting the workings and the several formations that when the Josephine vein has assumed a regular course the angle of divergence is about 8°, though on the surface it would seem to be 30° or more. The Josephine is characterized by a ragged, bunchy appearance of the masses of quartz and slaty material which sometimes assumes a banded appearance. Frequently solid vein-like masses or kidneys of quartz are developed, which are separated from each other by the quartzose, slaty rock or by black slate. All of this material contains gold, however, and may be considered as one shoot or ore body. From present knowledge the pay shoot seems to dip to the northward along the vein. About 1000 feet to the northward of the workings above described are other workings which show an ore shoot 70 feet or more in width similar in character to that on the English Trail drift level.

The material separating the Josephine and Pine Tree, mostly a mass of ankerite and mariposite, contains little or no gold.

The Pine Tree mine is everywhere characterized by its massiveness, its entire freedom from slaty inclusions. Iron pyrite occurs in the quartz, but is not abundant.

The vein is usually well defined by smooth walls, the foot wall being always, as far as observed, mariposite and ankerite. The hanging wall side of the quartz vein is a granulated mass of rock, containing many fragments of what appear to be the ankerite. The real hanging wall—normal country rock, *i. e.*, slate, diabase or serpentine—have not been cut on the English Trail level. At the mouth of the old Pine Tree tunnel, now caved and inaccessible, the serpentine is found close to the vein. Southward, up the hill, it is fully 200 feet away from the vein. In the River tunnel the serpentine forms the hanging wall of the vein—that is, it lies on the hanging wall side of the fragmental rock referred to as occurring on the hanging wall side of the quartz on the English Trail level. In the River tunnel the Pine Tree vein splits up and makes good-sized quartz veins in this fragmental material—the crushed ankerite—which to me appears to be a dyke which has become greatly altered by the movement and fracturing of the rock masses. In places the quartz is confined to the foot wall side of the dykes, ranging in width from 4 to over 40 feet.

The Josephine vein occurs along a zone of shattered slaty rock, into which quartz has infiltrated, forming the great kidney-shaped masses. A fault plane doubtless exists, and in some places it appears thereon, several of them extending across a zone fully 50 feet in width.

Northward the Pine Tree vein has not been distinctly traced beyond the Merced river, but several miles southeasterly from Coulterville great dolmitic masses—ankerite, in part, with much mariposite—are found, and extend for miles in a generally northerly direction, accompanied by large veins and kidneys of quartz, in many ways similar to the occurrence at the Pine Tree. The formations are usually either amphibolite schist, serpentine, diabase or black slate, differing from point to point.

The Josephine vein has a foot wall of black slate, which at some distance from the vein gives place to a typical grauwacke. Northward the vein splits up into several veins, and continues to near Pinon Blanco, where it reunites with the great dolmitic vein.

W. H. S.

Liquid Air and Its Possibilities.

There have been some extravagant claims made for liquid air. The discovery of the fact that liquid air can be actually produced is new—too new to make broad assertions as to the tremendous energy which may be developed by its use. Should it be demonstrated that liquid air in assuming a normal temperature develops an amount of energy greater than that required to make it, it will be contrary to all laws of physics heretofore accepted. Many men in many ages have experimented on devices which, once set in motion, continue to move on forever—perpetual motion. Mr. Tripler has made claims for liquid air which put perpetual motion in the shade. Prof. Henry Mortan, in a communication to the *Scientific American*, disputes some of the extravagant statements. He says:

"We are told that Mr. Tripler uses to make his liquid air a steam engine of 50 H. P., and that with this he can make liquid air at the rate of fifty gallons a day. This I know, from other sources, is substantially correct, and means that each H. P. in a day (say ten hours) makes one gallon of liquid air; in other words, one gallon for 10 H. P. hours.

"It is again stated that a cubic foot of liquid air contains 800 cubic feet of air at ordinary atmospheric temperature and pressure, or, in other words, any volume of liquid air, if adequately heated, will expand 800 times in reaching atmospheric temperature and pressure. This is also substantially correct.

"We may remark in passing that this is nothing wonderful; for water, when expanded into steam at atmospheric pressure, increases about 1700 times in volume, or more than twice as much as liquid air.

"Now, if we apply to the above data the well-known and universally accepted formula for the maximum work done by air when expanded at constant temperature, we find that a pound of liquid air in expanding 800 times would develop about 190,000 foot pounds of work. As a gallon of liquid air weighs about 8 pounds, this would give eight times as many foot pounds, or 1,520,000. If this work were accomplished in an hour it would represent almost exactly three-fourths of a H. P., because 1 H. P. means 1,980,000 foot pounds of work per hour, and 1,520,000 is only a little over three-fourths of this.

"From the above it follows as a matter of absolute certainty that the maximum power which liquid air could develop in an ideally perfect engine without any loss from friction or other cause would be three-fourths of a H. P. for an hour for each gallon of liquid air expended.

"We have seen, however, that with his 50 H. P. plant, which on account of its size should operate with considerable efficiency, Mr. Tripler makes only one gallon of liquid air with 10 H. P. hours. In other words, he requires to make a gallon of liquid air twelve times as much power as a gallon of liquid air could possibly develop in an ideally perfect engine.

"In face of this, how extremely absurd is the statement that with a little engine, lacking all conditions for efficient working, he can make ten gallons of liquid air by the use of three!"

More Light in Greater America.

The hitherto unequalled illuminations of the grand court of honor during the Transmississippi Exposition will be admirably outshone by the electrical novelties and effects now being prepared by skillful electricans for the Greater America Exposition at Omaha, which will open its gates July 1st and continue for four months. Over 15,000 new lights are being placed upon the great main buildings alone, whose grand proportions will be completely outlined in flaming curves and angles, and many startling effects never shown before in outdoor electric illuminations are being provided. Last year's illuminations excited the warmest admiration of all visitors, but a marvelous revelation awaits visitors to the first Great American Colonial Exposition.

Shipping Ore from Maine to Colorado.

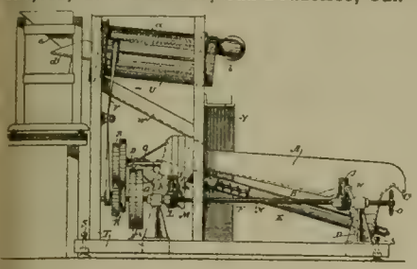
The Portland *Courier* says: "In a few days a carload of lead ore will be shipped to Denver, Colo., from Maine. This is the first time that ore has been taken from the Atlantic States half way across the continent. The ore comes from the Robinson mine, near Solon, Me., in Somerset county. The owner is a Pennsylvanian, who discovered, when he went into the woods near the vicinity to mark up lumber, a well-defined vein of galena ore, mixed with white quartz, 5 feet 5 inches wide. He sunk a shaft which is now 60 feet deep and found the ore to assay 93.21 ounces in silver."

Latest Mining and Metallurgical Patents.

Patents Issued May 9, 1899.

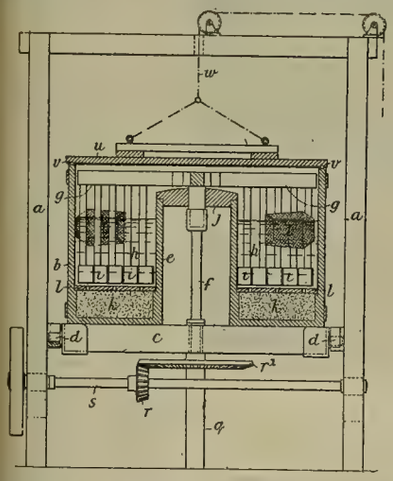
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

COMBINED GRAVITY SEPARATOR AND CONVEYOR.—No. 624,612; T. J. Barbour, San Francisco, Cal.



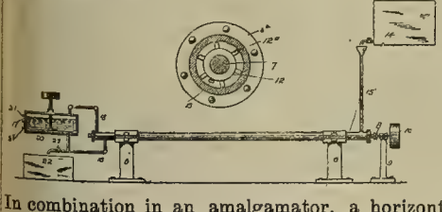
An apparatus for separating materials of different specific gravity comprising a receptacle having an ungated inclined bottom and vertical sides, a feed ening at upper end and a discharge at top of lower d, a chamber or well extending vertically below ttom proximate to the discharge and in which er end of inclined bottom terminates to receive avier material therefrom; means for supplying ter to receptacle whereby lighter material overws therewith at discharge, a screw conveyor and nclosing casing therefor exterior to receptacle, d conveyor having its receiving end entering mber or well at a point above its bottom whereby terial of intermediate specific gravity is conveyed of the chamber or well and discharged at the opite end of the conveyor; an overflow passage at upper side of tank adjacent to chamber, an ined cylindrical screen situated above upper end of k, a chute into which material passing through een falls and by which it is delivered into tank, a te into which larger material from the lower end ylindrical screen is conveyed away, a water-spray e extending longitudinally within upper part of ary cylinder and a feed apparatus by which maial is delivered into upper end of cylindrical screen l connecting mechanism whereby parts are kept motion.

APPARATUS FOR USE IN TREATING METALLIC ORES; No. 624,633; F. A. Edwardes, London, England.



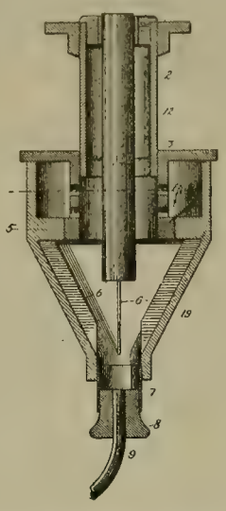
Apparatus for treatment of metallic ores, the comation with a vat for containing ores, of skimmers sisting of perforated receptacles, located in a rizontal plane above bottom of vat and means for ving receptacles in vat, in a plane parallel with face of liquid, receptacles being open on side ing direction in which they are moved through id and having a stirrer and a skimmer working vat, a cover for hermetically closing the vat and ans for tipping vat for discharging contents.

AMALGAMATOR.—No. 624,894; W. M. Fuller, Colodo Springs, Colo.



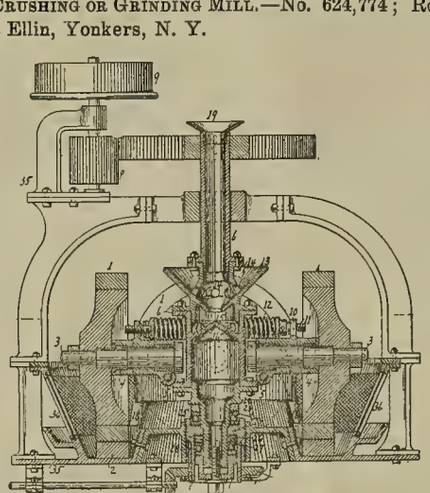
In combination in an amalgamator, a horizontal pe, a rotary shaft therein having agitating projecons extending therefrom with free spaces between permit pulp to exert a pressure freely longitudilly of pipe and between projections of shaft, an elested pulp tank elevated at a suitable distance ove horizontal shaft to produce a hydrostatic essure therein, a pipe connecting same with one end of amalgamating pipe and an elevated receptacle for displaced mercury having a pipe connection with same and end of horizontal pipe opposite to that with which feed pipe for pulp connects. Means for rotating shaft, an elevated pulp tank to place material in horizontal pipe under a positive hydrostatic pressure to force the material therethrough, a pipe connecting same with horizontal pipe at one end thereof, a receptacle for mercury elevated in relation to horizontal pipe, a connecting pipe extending from mercury receptacle to end of horizontal pipe opposite that with which pulp tank is connected, and a tailings pipe extending from opposite end of horizontal pipe to discharge into mercury receptacle.

HYDRAULIC SEPARATING APPARATUS AND METHOD OF SEPARATING.—No. 624,684; R. H. Richards, Boston, Mass.



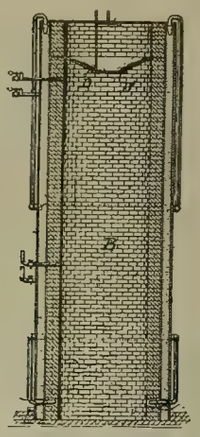
A method of separating or removing from a stream or current of water fine particles of matter contained therein, which consists in subjecting carrying stream or current to action of an ascending current of water having a whirling or spiral movement, whereby pressure is rendered and maintained uniform throughout its entire area, pressure or force of ascending column being regulated to prevent descent of any particles of less than predetermined weight. The herein described well or pocket for hydraulic separators consists of pipe 2; flanged annular body 3; shell 4 provided with ledge 5 and fins or wings 6; tangential inlet 10; oblique passages 11; core 12; blades 13; in combination with a trough, a supporting-collar 1; a tube 2 suspended from collar; a flanged shell 3 carried by tube; a casing 4 carried by shell and provided with ledge 5 and wings 6; a plug 8 closing lower end of casing; a discharge pipe 9; a tangentially arranged inlet pipe 10 communicating with interior of casing; non-radial inlet openings 11 through shell; and a spider 13 provided with vertical wings or blades; in a well or pocket for hydraulic separators, combination of an annular or cylindrical chamber provided with a tangential inlet for admission of water; a vertical pipe or extension through which water may rise, tapering base to receive particles falling through water; a non-radial passage for delivery of water from annular chamber to upward extension, a central core and blades or wings located above and below annular or cylindrical chamber, and serving to arrest whirling motion of the water which occurs between said points.

CRUSHING OR GRINDING MILL.—No. 624,774; Robert Ellin, Yonkers, N. Y.



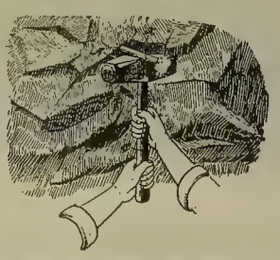
In a grinding mill, the combination with a pan and grinding wheels, of a centrally arranged hollow shaft provided with a feed hopper and having plurality of perforations formed at point beneath hopper, a conical distributer arranged in hollow shaft, base of conical distributer extending entirely to inner wall of hollow shaft at a point immediately below perforations therein, and a plurality of feed chutes leading from perforations and terminating between grinding wheels. The combination with a pan and grinding wheels, of a centrally arranged hollow shaft provided with a feed hopper surrounding shaft and provided with a discharge end disposed centrally within shaft. Combination with a pan, of an upright shaft, radial sleeves hinged to shaft, horizontal shafts journaled in sleeves and carrying at their outer ends grinding wheels arranged to travel in a circular path in pan, springs arranged above sleeves and bearing at one end against upright shaft and at their opposite ends against a support on upper side of sleeves, and means for adjusting tension of springs. Radial sleeves hinged to the shaft, each provided with a threaded eye, screws fitted in eyes, coiled springs interposed between the ends of screws and upright shaft, horizontal shafts journaled in sleeves, and grinding wheels mounted on outer ends of shafts and arranged to travel in a circular path in pan, screws operating to adjust tension of springs and press wheels into the pan with an adjustable pressure.

PROCESS OF ROASTING ORES.—No. 624,833; E. E. Lungwitz, Pueblo, Colo.



In the roasting of sulphide ores, the method of stirring ores which consists in effecting roasting under atmospheric pressure and suddenly removing external pressure on ore while blast is temporarily shut off, whereby compressed gasses within ore mass break it open.

MINING HAMMER.—No. 624,883; F. R. Waters, Ouray, Colo.



A miner's hammer having its head provided with a transverse groove extending across the outer side, same being central or equidistant from its ends, which are similar in form and size, as shown and described. A hammer-head for miners' use, having a transverse groove sunk in body of head, whereby latter is adapted for use upon a drill, as and for purpose specified.

The Future of Zinc.

David D. Day, chief of the division of mineral statistics of the United States, gives it as his opinion that $55 a ton for zinc ore is an extreme price, but is satisfied that prices will not return to what they were before the rise began. The conditions indicate a permanent degree of prosperity for the zinc industry never before known. He thinks $55 a ton a high price, but believes the future price will be between $30 and $40 a ton. Metallic zinc is quoted at 6¼ to 6½ cents a pound, or twice the price of three years ago, yet no surplus is accumulating. A recent order for 2500 tons of zinc could not be filled.

In '96 the United States metallic zinc product was 78,000 tons; in '97 it was 100,000 tons; in '98 it was 125,000 tons.

The Missouri-Kansas district in this time increased from 360,000,000 pounds in '96 to 470,000,000 pounds in '98. In '99 it should exceed 500,000,000 pounds. The zinc mines abroad are giving out, and from being an importer, the United States has become an exporter of zinc.

Water as a Road Maker.

Written for the MINING AND SCIENTIFIC PRESS by WM. M. BRISTOL.

There is a trite maxim that fire and water are good servants but bad masters. Certain it is that, in its relation to roads, storm water usually occupies the latter position; in fact, in hilly or mountainous districts it is a destructive tyrant.

The use of water in the preservation of roads during the dry season in California is becoming general, it having been repeatedly demonstrated that sprinkling not only keeps down the dust, but prevents the formation of "chuck holes" and the disintegration of the roadbed. The employment of water in road construction, however, is not so common, chiefly because the conditions favorable to its use in this manner are not often found in conjunction.

The accompanying illustration presents a view of a section of the new road connecting Redlands and Highlands, in San Bernardino Co., Cal. The bluff shown is the south bank of the Santa Ana wash and is about 35 feet in height. It is also the northern terminus of the plain on which stands the fruit-growing district of Lugonia. The plain slopes toward this terminus on a grade of about one per cent. When the opening of the road was decided upon two years ago the method of connecting that portion of it on the plain with the part traversing the wash was one of the first questions to be settled. Either an elevator or a cable was suggested in burlesque, but the simple and natural way was to make a long and deep cut and an equally long and high fill. It was an easy matter to borrow a stream of water from an irrigation ditch, lead it in a furrow along the center line of the proposed cut and let it tumble down the face of the bluff, carrying with it the sandy loam from the ever deepening and widening furrow. Here was an ocular demonstration of the power of running and falling water, and it fascinated the grown-up boys who had fettered the hydraulic Samson. A wagon-way from the plain down to the wash was sluiced out in a day, but a major portion of the debris which was deposited in fan shape at the foot of the bluff was lost so far as the needed fill was concerned.

A ROAD BUILT BY WATER POWER IN SAN BERNARDINO CO., CAL.

The road was left for a year in this unfinished condition, and the teamsters who toiled up the steep grade through the cut said hard things about the soft sand. Although of sufficient depth the cut was barely wide enough for a single vehicle, but last winter it was proposed that the water be made to finish the widening and at the same time deposit the debris where it was wanted. With this in view the prunings from adjacent orchards were siloed on either side of the road, beginning at the foot of the bluff and extending some distance into the wash, the inner sides of these wingdams being lined with fine brush and leaves. The object of this was to confine and direct the flow of the debris-laden water, and it served the purpose fairly well. But the supply of brush was insufficient and some other method had to be devised; consequently two teams were employed in plowing the fill, repeatedly turning the earth from the center toward the sides and leaving an enormous dead furrow down which the water was turned.

During the first part of the work the water was shut off as soon as this dead furrow was filled with earth, and the deposit was of such a sandy nature that plowing could immediately be resumed. Later the plowmen, who wore rubber boots, found that they could plow while the water was running, and for days irrigation and tillage wrestled with each other in seemingly vain confusion; but the fill grew until the brush flanks were left several feet below.

For the purpose of widening the cut a stream of water was led along the top of each bank some distance back from the edge, the streams being turned inward at such a point as to debouch within the brush wings. Thus it may be seen there were for a time three cuts which finally became merged into one. The work of the plowmen was not confined to the fill, but extended through the cut as well. In the latter, however, the earth was turned toward the center where, in its loosened condition, it was easily moved by the water, running on a grade ranging from four to six per cent.

The approach of the irrigating season, coupled with the scarcity of water last spring, necessitated the suspension of the work before it was quite finished. Since the view was taken, however, the sluicing has been finished and the sub-grade is soon to be covered with an 8-inch layer of red, mesa soil. After this surfacing is completed and before it is hardened by travel, the roadway is to be thoroughly sprinkled with crude petroleum. This will make the surface waterproof and will prevent storm water from making ruts in it, and, as has been amply proven elsewhere, will also be a preventive of dust.

There are times and places in southern California where water may be profitably employed in the construction of roads, and others where the use of oil will doubtless be found the most economical method of preserving them.

Some Notes on the Geology of Leadville, Colorado.

Written for the MINING AND SCIENTIFIC PRESS.

After having been flooded several years, the mines in the lower portion of the Leadville district are being unwatered and the great carbonate camp is taking on new life. Since these mines were shut down some important changes have taken place in the economy of mining in that region, and that, together with an advance in the price of silver, has resulted in the reopening of these long-abandoned mines. No doubt the active interest being taken in all mining enterprises is also in a measure responsible for the renewed activity in the mines of Leadville. The city is situated on the slopes of the hills lying on the east side of the Arkansas river, at an altitude of over 10,000 feet above the sea.

This revival of the mining industry gives the geology of the ore deposits of that region renewed interest.

The large amphitheater-shaped basin in which the mines of Leadville occur shows clearly the glacial origin of that portion of the valley. But the evidence is doubly conclusive in the glacial lakebeds and drift which underlie the city of Leadville and a considerable area outside of the city limits.

The Leadville district has been and is still a large silver producer from lead and iron ores. The geology of the district is not by any means complex, though faults are numerous and extensive.

The base of the sedimentary series is represented by a heavy bed of dense, firm quartzite which is referred to the Cambrian, and this is generally conceded as being correct. In places it attains a thickness of over 100 feet. Some gold and a little silver has been mined from it. The quartzite rests unconformably on the upturned schists of Archæan time, though the latter is in places displaced by porphyritic eruptives.

Overlying and conformable to the quartzite is a stratum of white magnesian limestone, and upon this rests a second stratum of quartzite (locally known as the parting quartzite). These latter are probably of Silurian age, but some refer them to the Cambrian.

Next in the ascending order is a thick, heavy bedded deposit of blue limestone (Silurian), which is one of the principal ore-bearing formations of that region.

The blue limestone is usually covered by a heavy sheet of felsite porphyry of a white or light gray color, which in places is interstratified with sheets of gray porphyry, which bear the appearance of having been injected into the mass from the neighboring eruptive dykes.

Over the greater portion of the area, immediately in and about Leadville, the felsite porphyry completes the series of rock formation. The remaining localities are covered with a deposit of Weber grits (a coarse-grained sandrock), which in places is deserving the name of conglomerate. The thickness of this deposit is variable.

Over the entire region is spread a deep quaternary deposit of glacial lake beds and post-glacial drift. So general is this formation that an outcrop of rock is rarely found at the surface.

This fact alone has rendered prospecting in Leadville difficult, expensive and uncertain; but, fortunately, owing to the unusual extent of the ore deposits, but few shafts have been sunk to contact that have failed to find the ore in greater or less quantity. The great ore bodies which made Leadville famous during the early period of her history, lie mostly in the upper portion of the blue limestone, and usually in contact with the overlying felsite; there are, however, exceptions.

Mining experts have advanced numerous theories to account for the ore deposits, and there is still a disagreement as to the class of veins to which these ore bodies should be referred. Many have called them contact veins. Others call them contact fissures. The finding of slickensides in some of the mines, notably the Colonel Sellers, probably led to the adoption of the latter name. It should be borne in mind that the crust of the earth is being subjected constantly to forces which produce motion, and slickensides is the result—not only in mines, but elsewhere, far removed from mineral veins.

Slickensides very frequently occur in mines subsequent to the formation of the veins or ore deposits. When this is the case there is usually some physical evidence by which it may be determined.

The origin of the Leadville ore deposits is a question which has been much discussed, and many theories have been advanced to satisfactorily account for them. While these several theories differ somewhat, all geologists agree that there is an intimate relation between the ore bodies and the eruptive rock of the region.

The opinion of S. F. Emmons, as given in the United States Geological Survey reports during the early history of Leadville, was to the effect that the ore deposits were derived directly from the overlying felsite; that the mineral solutions percolating along the bedding planes of the upper portion of the blue limestone, precipitated or deposited their mineral contents, slowly, atom by atom, replacing the limestone, which, being dissolved by the mineral acid in the water, was carried away by the percolating waters. Mr. Emmons was also of the opinion that when the mineral solutions came in contact with a dyke of porphyry, the dyke acted as a dam, and for a time checked the flow of the mineral waters, and that portion of the ore body was in consequence much enriched. Finally, however, the waters passing through the dyke were arrested, as in an eddy, on the other side, and it, too, became

the resting place of large quantities of silver-bearing ores.

Charles M. Rolker, having the advantage of a more thorough and extensive development of the mines of the district, was also of the opinion that the ore bodies derived their contents from mineral solutions circulating along the bedding planes of the lime rock, and also of the contact with the porphyry, and that the mineral solutions came from the eruptive rock of the vicinity, but not from the white porphyry. His opinion is that they came from the gray porphyry dykes, and, to give greater force to his argument, points to the fact that over considerable areas a dolmitic sand intervenes between the ore body and the felsite. He furthermore offers as evidence that these mineral solutions came from the gray dyke porphyry, that the ore chutes follow the dykes and are richer near to them than at a distance. This is more particularly the case on Fryer Hill, where are located some of the most famous mines of the district.

There are other bodies of lead-silver ore where no overlying sheet of porphyry exists, and where the ore bodies have an undoubted relation to porphyry dykes in the vicinity. This is the case at Galena, in the Black Hills of South Dakota, where the ore bodies occur in a heavy stratum of Cambrian quartzite; also at the Carbonate Camp, West Virginia, South Dakota, where the ore bodies occur in limestone accompanying porphyry dykes and there are other instances similar to those at Leadville.

It is more probable that the solutions which deposited the ores in the limestones and quartzites of the Leadville district came from great depth and used the fissures formed by the porphyry dykes as convenient channels along which the ascending currents passed, depositing the ore in the most favored localities—that is, where the previous preparation of the limestone or quartzite by crushing, due to dynamic causes, made the dissolution of the atoms of lime, etc., more easy.

The normal condition of the ores of Leadville was beyond question sulphide, as proven by the frequent occurrence of sulphide ores in partially decomposed masses of ore, and more particularly from the fact that the ore being taken from below the water line of the district is, without exception, sulphide. The minerals are the sulphides of lead, iron, copper, zinc and sulphide of silver, with some native silver and a little gold.

The ores of the large and rich bodies found near the surface or in the higher levels of the mines are carbonate and sulphate of lead, with minimum and some rarer lead ores, oxides of iron, carbonates and oxides of copper, with some oxide of zinc, together with chloride of silver (in some instances in large and handsome masses), all of which have been produced by a decomposition of the sulphide minerals. Native silver and gold also occur.

The large masses of chert found in some of the mines are probably due to the more silicious condition of the limestone prior to the deposition of the ore.

During the earlier period of the history of Leadville it was thought that the ore bodies were confined exclusively to the upper portion of the blue limestone, but the development of later years has disproved this theory, as many large and rich deposits have been found in the lower portions of the limestone, which in places has a thickness of 300 feet. The first development in sulphide ore bodies took place in the Colonel Sellers mine, in California gulch, and subsequently similar deposits have been discovered on Carbonate hill and elsewhere. A like development of ore bodies obtains at the Carbonate camp, South Dakota. These ore bodies occur in segregated bunches and sheets, sometimes apparently following the bedding planes of the limestone and at other times being entirely independent of it. They frequently have no apparent connection with each other, but a very close examination usually discovers a narrow seam of ochre or mineral (sometimes a mere seam of clay), which actually forms a connection between two or more bodies.

Leadville is by no means an anomaly, having many duplicates in all essential characteristics. In addition to the mines of South Dakota above mentioned may be added the mines at Aspen, Colorado; those of Eureka Hill, Nevada; Little Cottonwood and the Bingham and Dry Canyon mines of Utah; the mines of Sierra Majada, Mexico; and some in North Park, Colorado, Wyoming, and in Idaho. The mines of all sections mentioned bear a similarity to those of Leadville. From a consideration of the conditions found in these various mining regions it would seem that the intimate association of limestone and porphyry or any sedimentary rock, and an eruptive rock, may possibly result in a mine. Hundreds of places may be pointed out where the contact exists, but where no ore body has been found, but there are few lead-silver mines in existence where these conditions do not obtain.

It is a matter of fact that nearly all large productive mines have some very evident relation to volcanic rocks in the vicinity, at least volcanic rock is there—in the neighborhood of the vein.

There are several different porphyries at Leadville, the most important of which are the white or felsite porphyry and the gray or dyke porphyry, which deserve more particular mention because of their intimate association with the ore bodies.

The felsite at one time extended over the entire region in an immense sheet, which in some places attained a thickness of several hundred feet, though much of it has since been eroded by the scouring of glaciers, until, in a few instances, it has been removed entirely.

This porphyry is a portion of the immense eruptive mass which found vent at the head of Big Evans gulch, some ten miles from Leadville. It doubtless occurred in the form of a great lacolite, and the sheet which covers the area of the Leadville region is probably only one of a number of such sheets which were injected between the layers of sedimentary strata.

The gray porphyry, however, seems to have been the result of local forces and is confined to a limited area (the mineral region), and has a more intimate relation to the ore bodies than to the felsite.

There is reason to believe that the ore bodies of Leadville were formed at a depth of 10,000 feet. The fact that this amount of sedimentary strata has been removed by the various processes of erosion would suggest this. The ore bodies, where found cropping at the surface, expose a considerable face, showing that they undoubtedly extended outwardly beyond their present limits. All the faults of the region have occurred since the deposition of the ore. There is ample proof of this in the fact that where ore bodies have been faulted their continuations have always been found to be counterparts, as regards size; moreover, fragments of the ore bodies have, in many instances, been dragged into the fault planes, and this alone is considered conclusive.

Most of the mines which have been recently unwatered are producers of sulphide ores of comparatively low grade, but containing sufficient values at the present price of lead and silver to insure a profit.

The gold mines which in recent years have attracted attention to Leadville are located in the eruptive rocks, forming the hills east of the city. They belong to that type of ore deposit common to massive eruptive rocks elsewhere, the gold occurring in zones of fracture and crushing. Auriferous pyrite forms an important factor in these ores. Among the first of these mines to attract attention were the Antioch and Printer Boy, and later the Little Johnnie. Whether the quartzites which lie in the lower portion of the Cambrian formation in Leadville district contain valuable deposits of gold telluride ores similar to those found in the Black Hills of South Dakota under similar geological conditions has not as yet been determined, but as the known ore deposits of each district are otherwise so similar, it is not unreasonable to expect to find the telluride ores in the Leadville quartzites. S.

Some Experiences of a Working Miner.

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Miners and prospectors are often sorely puzzled over the meaning and application of scientific and legal terms used in the various branches of the mining industry. In mineralogy particularly, there are some stumbling blocks in the way of the prospector who can pass an intelligent judgment on a prospect or kit of tools, but who knows little of such terms as ceragyrite and tetrahedrite, though he may readily recognize horn silver or chloride, as he is more apt to term it, and gray copper may be an every day thing with him.

I have known several prospectors who had gotten hold of a mineralogy, or at any rate some mineralogical terms, and they used them to the best advantage and in a most wonderful way. One day a party of prospectors were passing along a hot canyon in Lower California not far from Juarez, when one of them glancing at a ledge of rock incrused with thin coatings of green copper carbonate, remarked: "That's a pretty good looking prospect." "What is it?" one of the party inquired.

"Its malachite," replied the first,—"copper carbonate."

In the party was one of the kind of mineralogists above referred to and here was a good opportunity for him to display his superior knowledge of mineralogy. He climbed up to the ledge and knocked off a piece, examined it carefully and, tossing it disdainfully aside said, "that ain't malachite."

"What is it then," inquired the first, who had called it malachite.

"Why its nothing but verdigris o' arsenic," was the answer.

Many miners, mill and smelter men know to their sorrow of the danger arising from working in dry lead mines, dry-crushing mills where lead ores are treated, and around some furnaces where lead is a prominent constituent of the ore being smelted. When a man gets "leaded" from inhaling the dry dust of lead ores, or the fumes rising from large quantities of heated metal or ore, he is usually a very sick man and he soon is but a shadow of his former self.

We were discussing the phenomena attending "leading" one day when W—— spoke up.

"Yes, you bet!" he remarked. "I know what it is to be "leaded." Its pretty tough. I worked on the dump at the S—— B—— smelter last year and I gained eleven pounds in two weeks."

Everyone present laughed heartily, but W—— felt injured to think that his distressing experience should cause any merriment.

A few days later a prospector brought a strange looking piece of ore into camp and various opinions were passed as to what kind of ore it was. Finally one of the party, who was present at the discussion of the effect of "leading," suggested: "Show it to W——, he can tell, he has eleven pounds of lead in his stomach."

Mr. O—— was a schemer. His capital was largely made up of fertility of resource, and the undertaking he would not attempt could scarcely be conceived. I first met him in C——. Within fifteen minutes of the time of our first meeting O—— had told me that he was a schemer, and he had a scheme on foot right then. Said he: "I have a concession in H—— covering several miles of the richest placer ground in the world." Here he produced several bottles filled with dust and nuggets of gold. "These," continued he, "came from my mines. I am now outfitting to go there with a party of men. All I lack is a couple more miners."

I was rather taken with the magnitude of the scheme and finally made a deal with him, and myself and a friend joined the party, and a few days later we were on our way to the richest mines in the world.

The money to pay the expenses of this expedition was raised in C—— by the sale of stock in the organization, and we were told of the tons of provisions that had been provided; the easy time all would have; the fine houses on the concession, and the fortune that could be made incidentally from the magnificent forest of mahogany, rubber and other valuable trees on the concession in H——. A sawmill constituted a portion of the outfit, and we had also several hundred feet of iron pipe in sections, to be riveted at the mines. The party finally reached H——, and then the difficulties began. Among other things, there was a very apparent lack of management. Another and quite as important shortcoming was observable in the amount of money available for necessaries. When civilization was finally left behind (for these mines were a long way from anywhere), the several members of the party began to inquire what had become of those tons of provisions. To make a long story short, O—— had not provided enough grub to take the party to the mines, to say nothing at all of affording a means of living when we were at our destination. However, we were good foragers and managed to live on the natural resources of the country through which we passed, and we were thankful indeed that they were abundant—of the kind. At length, after much privation and hardship, the mines were reached; but, although the party got there without the loss of a man, there were no provisions, no tools, and no money with which to purchase the necessaries of life, and such things were not to be had if we had had million. The sawmill was scattered piece by piece along several hundred miles of our path, and the iron pipe had been similarly distributed along more than 1000 miles of the route to the mines. Not a single board was obtainable for any purpose, and there was no means at hand to make one. There was an abundance of fine pine timber, but there was neither a mahogany nor a rubber tree within more than 100 miles of the mines; and for houses, the only one was a cabin 10x12 feet, built of poles and furnished with a flat roof covered with earth. When it rained it was comfortable outside. The gravel deposits we found all right, and they were gold-bearing, too, but we had no means of testing their value further than by panning, and the outlook was so discouraging that myself and another of the party concluded we had had enough experience of this kind, and we walked over 300 miles to the nearest seaport and returned to C——.

This experience, which had been boomed considerably, cost the dupes of O——, who had induced them to subscribe to shares in this particular scheme, over $20,000. I don't know who got all that money. I know we did not. It seems almost incredible that a thing of this kind could be done, and so foolishly done at that; but these are facts.

I heard of another enterprising individual some time since who hired a number of miners and millmen—and in fact a full crew—and took them out to the H—— mine on the desert in the southwest. The mine was developed and had a good mill, but had been idle for some years owing to trouble among the owners. The property was located nearly 100 miles from the railroad or other communication of any kind. This man went out there with his party, opened the mine, stoped ore and ran the mill without the knowledge or consent of any one connected with the property. At the end of a month he took the cleanup, amounting to several thousand dollars, and left for the railroad, the men feeling secure in their position, as the mine and mill were still running full blast, with one of their own number in charge. They concluded to get their pay from the next cleanup if their employer did not return. He didn't return, but the owners had gotten word of what was going on and came in his stead.

Mining Summary.

ALASKA.

It is reported that claims on Minook creek are rich.

The latest advices from Cape Nome country tend to confirm the reports of strikes in the streams tributary to Snake river.

Sitka *Alaskan*: J. Winnie, from Dawson, reports at Skaguay that claims on the American side are turning out rich.

Juneau *Record*: A party of seven, headed by A. W. Boyle, has left Juneau for Indian creek, near Sunrise City, to develop property belonging to the Old Glory M. Co., in which H. Blackwell of Seattle and parties of Brooklyn are interested. They will build a dam across Indian creek to create artificial floods for sluicing. The property was prospected last year.

ARIZONA.

The Old Dominion copper mine is said to be earning from $50,000 to $60,000 per month.

G. N. Hooper, representing Boston capital, has purchased the Buster group of mines from Forbes & McKenzie, the price being $33,500. The group is in the Bradshaw mountains, two and one-half miles from the Crowned King. The Buster has 550 feet of development, showing a vein of free-milling gold ore ranging from 3 to 8 feet in width. A 10-stamp mill will be placed on the properties.

F. Dalby has discovered a copper lead near the mouth of the Grand Canyon of the Colorado river that shows free gold.

Prescott *Courier*: The Grand Canyon Copper mine is sending ore fifty miles to the railroad, where it is shipped to smelters. This property was bonded from G. Ridenour, and payments have been promptly made. Seventeen men are on the payroll. The paystreak is 24 inches wide.

Globe *Times*: Reports say that on the 200 level in the Ray mine the crosscut driven in the quartz porphyry is over 75 feet in concentrating ore.——At the Tribunal claim sulphide ores were found sinking.——M. Innes has his shaft down 150 feet and has high-grade concentrating ore, occasionally bunches of glance running as high as 70% copper. He will sink to the 200 level and crosscut to both walls.

Solomonville *Bulletin*: Stanley Butte mining district, which covers the coal fields mineral strip, cut from the San Carlos reservation, contains many promising prospects. Copper seems to be the predominating mineral in all the claims which have been opened, though silver and gold are also found. A shipment of sixteen tons from one of the claims netted the owners $2283.20. This shipment contained 1956 ounces of silver. The ore carried 33% copper. This was the first shipment of ore made from the Stanley Butte district, which covers a strip formerly part of the Indian reservation, and the Government would permit no work there prior to its segregation, which was consummated last fall.

Arizona *Republican*: The Richenbar mine, sixty-five miles from Prescott and eighteen from Mayer, is reported sold to J. H. Darragh of Trenton, N. J., who will erect a 20-stamp mill on the property. It is reported that there is $200,000 worth of gold ore in sight. Besides this 20-stamp mill Mr. Darragh is credited with saying that he will erect a smelter of 200 tons at Mayer, the eastern terminus of the Prescott & Eastern Railway, to treat ores from the Big Bug district.

Boston *News Bureau*: It is said that W. A. Clark has been offered $55,000,000 cash for his United Verde by French interests. The ore is said to run 18% copper as well as gold and silver values. Some reports have placed the price of his copper as low as 1⅛ cents per pound, by reason of the precious metal values in the ore. The shaft is down 550 feet, but he has bored 500 feet lower and 1500 feet ahead along his ore body without finding any change in the character of the rock. It is reported he is mining from a face 500 feet wide.

Tucson *Star*: The Weldon group of copper mines, in Pima county, is in the Quijotoa district, thirty-five miles southwest from Casa Grande, on the Southern Pacific Railroad, and eighty-five miles westerly from Tucson. Several claims show large croppings of oxidized copper and iron ores. These croppings are 1200 feet wide and 4000 feet long and rise 1500 feet above the neighboring hills. Several of these mines have ledges of good-grade, silicious gold-silver ores, which will work nearly ton for ton through water-jacket furnaces with the ferruginous copper ores, and make a product of black copper bars, carrying approximately 100 ounces silver and $100 gold per ton of bullion. The facilities for operation are good; the ores may be handled by gravity, and wood and water are plentiful. The mines are owned by McKay & Burgess.

CALIFORNIA.

Alameda.

The discovery of a vein of copper ore, bearing silver, is reported on the property of Dr. F. Saudelin, North San Leandro. A drift was run on the vein 15 feet, where it was found that the vein widened to 36 inches. The rock is decomposed white quartz, carrying silver and a trace of gold and copper.

Amador.

Sutter Creek *Record*: Twenty stamps are running at the Baliol mine at Sutter Creek and crosscutting is in progress on the 300 level.——At the Potazuba mine, Sutter Creek, a crosscut has been started at the 350 level to cut the vein, found in the drift on the 200 level.

Jackson *Ledger*: The Bellwether mine at Jackson has been reorganized by Mrs. Hepburn. The new organization is by San Francisco capitalists, who have agreed to pay 10 cents per share as the initial payment and an amount not to exceed 5 cents per share per month thereafter. Mrs. Hepburn retains an interest in the property.

Jackson *Dispatch*: R. Read has charge of the Centennial mine near Drytown and expects to start operations.——The Newton Copper Co. has taken charge of the copper mines belonging to H. Ranlett between Jackson and Ione, and has ten men at work unwatering the old shaft. Machinery for an 80-ton smelter is at the mine. This will be the first smelter operated in this county. Mr. Ranlett is president and manager of the company.——At the Pocahontas mine, Drytown, the 10-stamp mill is steadily at work. Preparations are being made to sink the shaft 200 feet deeper.——A San Francisco company has taken the North Gover and Loyal mines near Amador City, and will begin development of these properties. The company is headed by the Goodall-Perkins Co.——The Spagnoli mine at Clinton has started up. The perpendicular 4x8 shaft is down 40 feet. Two shifts are at work. Supt. D. Fisher expects to have the 10-stamp mill working as soon as the shaft is down.

Butte.

Oroville *Mercury*: The Bader mine on Magalia ridge works steadily and pays. It is owned and operated by Bader & Mowry, G. B. Mowry Supt. The mine drains itself. Surveyor McCoy is making surveys and a short bedrock tunnel is to be driven to tap the channel ahead of the present works.——At the Mineral Slide, near Paradise, a double track tunnel, 7x9 feet clear, is being driven to tap the gravel bed. It is owned by the Magalia Con. M. Co. of London, C. B. Frost Supt.——At the Golden Drift, near the Mineral Slide, prospect work is being done.——Three and one-half miles east of Paradise A. N. Butts of San Francisco has been working the Durgen or Miocene mine. He has the lands of Durgen and D. Westwood bonded and will prospect them.——At Kanaka Bar, on the west branch of Feather river east of Paradise, a flume has been built through which the stream will be diverted and the river bed worked by the Sterritt Co.——The American Lithographic Stone, Mine & Milling Co. are prospecting for the Big Channel and running a bedrock tunnel on Little West Branch, now in 1600 feet on the east rim.——At the Emancipation mine on Butte creek four men are driving a bedrock tunnel.——R. Diller has a force of men employed at the John Dix mine, taking out gravel.——The Old Tom Neal diggings are being worked by hydraulic under permit from the Debris Commission by West & Cummings. These diggings are on a tributary of Little Butte creek. They began washing May 1st and are getting coarse gold. At the Iron Rock channel in the bed of Big Butte creek a short distance below Inskip ravine gravel is being sluiced.——At Cherokee work is being done on "the flat." Supt. Helman says seventy-six men are working there on percentage.

Calaveras.

At the mine owned by J. M. A. Hauselt, west of Murphys, work is going on and it is expected the bottom of the channel will be reached soon. The machinery is ample to cope with the water and do all hoisting.

Central Hill placer mine has closed down. The main channel, which has been followed successfully for years, has been nearly worked out. The company still has a large area of unworked ground, which will be prospected. Some fine quartz gold was taken out during the recent work.

Mokelumne Hill *Chronicle*: A cleanup made at the Prussian Hill mine after a run of eleven days with a 5-stamp mill yielded nearly $1200. The mine is owned by C. and B. C. O'Neill of Jackson, Amador county.——Improvements are being added to the plant at the Paragon mine on the Licking Fork between West Point and Railroad, including a two-drill compressor, which will be running June 1st. The compressor plant is being installed at the mill. Air will be conveyed through a 2-inch pipe to the face of tunnel No. 1 which will be extended to cut the lead 200 feet vertical under tunnel No. 8. An east crosscut will be run 150 feet from No. 1 to No. 9. Lead in No. 8 is 20 feet wide and ore from this point supplies the 10-stamp mill. Grading for a concentrator room is in progress. The intention of Mgr. Shuman is to increase the milling plant to twenty stamps. Thirty-five men are employed. —— At the Cockley placer claim in Buckeye Gulch, three miles from Mokelumne Hill, a cleanup was made this week, the result of which was up in the hundreds. The gold is coarse and a number of ounce pieces were found.——At the Baire gravel mine, one mile east of Railroad Flat, the tunnel is in 700 feet and is 4x6 clear. At 350 feet from mouth drifts have been run across the channel which is 60 feet from rim to rim with an average depth of 5 feet. The development gives 2000 feet of unworked gravel. Taking out gravel from the back drifts towards the mouth of the tunnel has been commenced. Water is obtained from Clark's ditch and there is a good dump for the tailings. A cleanup is made every month. ——The Yellow Aster M. Co. near West Point will crush 100 tons of ore in the mill on the Champion mine. This is the mine which Cueto, Zavalla and Quantaro sold to Morgan, Jackson and Doane of San Francisco last winter.——W. E. Holbrook, J. A. Sterling, Jas. Kline and J. F. Sterling are at work on the Wide West mine near West Point. They have erected a 12-foot water wheel run by 2 inches of water taken from the Lone Star ditch. This wheel runs a 3-inch pump and keeps the mine free from water. They have twelve tons of shipping ore and twice as much free-milling ore. —— J. Bardsley of Sandy Gulch will commence milling ore at the Carlton mill next week.

Colusa.

Colusa *Sun*: J. P. Rathburn has leased his land to capitalists, who are to commence June 1st to bore for oil. There is a large area known to contain oil.

El Dorado.

A. Weske of San Francisco is preparing to work the Weske & LeBoeuf mine, near Georgetown. A ditch from Otter creek to North canyon is under way; an electric plant will be erected and mining operations commenced just as soon as theemachinery can be placed in position.

Dench & Craddock are keeping the 2-stamp mill at work on ore from their mine near Placerville.

A small town has sprung up around the Zentgraf mine, which is employing 100 men.

The cyanide plant at the Taylor mine is to be started up under the direction of H. S. Chapman. The sulphurets on hand, it is thought, will keep the plant busy for six months.

Placerville *Democrat*: Work at the Darling mine on Bear creek, near Georgetown, has recommenced. An English company has taken the property and work of unwatering the lower levels was commenced the past week. J. Word is putting the 20-stamp mill in shape. ——A. H. Jinkerson of Indian Diggings reports that place as being active since work commenced on the Indian Diggings gravel mine, owned by Hayward, Lane and the Hobart estate. Twenty men are employed and more will be put to work as soon as room can be made for them.

Kern.

The Red Dog mill at Johannesburg is running steadily. A 30-ton cyanide plant is operated in connection with the mill.

The Kramer rich find reported several weeks ago is now reported to be an ordinary prospect. A single shaft 40 feet deep has cut several small veins of gold rock. Some of the rock is said to be rich.

Bakersfield *Echo*: At the Comet mine on Greenhorn mountain pay shoots have been struck in two shafts and a tunnel, and the rock is paying $35 a ton. Arrangements have been made to put in a Cornish pumping plant and a 2-stamp mill. This mine is a mile and a half from the Waugaman mine.

Mariposa.

The results of the mill runs on ore bodies from new developments in the Mary Harrison mine, two miles south of Coulterville, are reported to have been satisfactory.

Nevada.

Grass Valley *Union*: Maroney, Schoonmaker, Webb & Baldwin have returned from French Corral, where they bonded the Red Ledge mine from D. Roberts for the California & Colorado Development Co., who will erect a plant on the property. Twenty years ago the Red Ledge was worked, but the gold was so fine, under the crude methods then in vogue it was not profitable.——The Geneva M. Co. will erect a 10-stamp mill on the Slide mine, which is located near French Corral.

Nevada City *Transcript*: Some rich specimens were taken from the Sleeping Beauty mine, near Moore's Flat, on Saturday, the pieces being filled with gold and sulphurets. Vizzard & Bauder are the owners.——Paul Ehmann of Spenceville has bought the copper mine belonging to the Jacksons, and has put men to work extending the main tunnel, which is in 200 feet. He will drive it 500 feet farther.——Work is going on at the St. Patrick mine and the men are busy grading for the mill.——Work has commenced at the American Hill gravel mine, with L. Phelps as Supt.——Wm. Hogan has four men at the Prolific quartz mine.——J. Jewell has found rich gold rock in a vein on his place on Deer creek, near the California mine.

Orange.

Test wells are being bored for petroleum on the Irvine ranch. The formation underlying a large area of this property is oil-bearing elsewhere in southern California, and it is thought probable that petroleum may be found here also.

Plumas.

A number of men are working in the Plumas Eureka mine on tribute.

Quincy *Bulletin*: Last week Thomas & Werner began crushing ore at the Bell mill, north of Quincy. The ore comes from an extension of the Bell mine and some of it is reported to be rich.——Packer & Son have sixteen men at work in the Alturas claim on Slate creek.——The Plumas Development Co. have their pipe in place and will commence operation as soon as their restraining dam is finished.——The hoisting works of the Jamison mine at Johnsville were recently burned. ——The copper prospects near Taylorville are being investigated by A. B. Summers, who has two crews of men at work on various claims.

Placer.

Colfax *Sentinel*: Three men are doing development work at the Redstone mine, two miles east of Blue Canyon. The tunnel is in 300 feet and the ledge averages 5 feet. Some rich chutes of ore have been encountered. The property is equipped with a 10-stamp mill and concentrators. N. B. Willy of Idaho is Supt. ——The Alder Creek M. Co. of Des Moines, Iowa, is operating the Van Avery mine, one mile east of Blue Canyon. The ledge is 5 feet. Tunnels Nos. 1 and 2 have been driven in 300 feet each. L. Balliett is Supt.——The Haub drift gravel mine, near Shady Run, is being worked on a lease by C. C. Haub and R. Watson. Five men are employed and twenty cars of gravel are mined each day, which average $2 per car. The tunnel is in 1200 feet. The mine is worked through chutes extending to gravel 35 feet above the tunnel. The channel is 1000 feet in width and contains white, free washing gravel. The mine has long been a producer.——The Cedar Creek drift gravel mine is three-fourths of a mile below Shady Run on the same channel as the Haub mine. The gravel was struck in the channel above the main tunnel, which is now in 1300 feet. The main tunnel is being driven; W. J. Davis, Jr., is Supt.——The Golden West mine, owned by R. H. Lloyd of San Francisco, is situated on the south side of the North Fork of the American river, five miles south of Blue Canyon. The ledge is 200 feet wide. A large amount of development work has been done on the mine. Operations will be commenced within thirty days under the direction of J. B. Khapp of Blue Canyon. A tunnel will be started 40 feet above high water mark. Mr. Lloyd has located a water right appropriating 1000 inches. A 5-foot flume from the dam site, 1600 feet to the mill site, will give a fall of 32 feet.——The Blue Canyon M. & D. Co. have their tunnel at the Azalea drift gravel mine in 1560 feet. They make from 4½ to 5 feet per day. The property consists of 690 acres of land, well timbered. The company has a bond on a portion of the channel above their holdings. Water with a pressure of 200 feet is used to run the 9-foot Pelton wheel, which drives a 10½x14-inch compressor. A power drill is used in the tunnel, which is timbered for the first 84 feet, the rest in solid bedrock. The company employ six men, working two shifts. I. M. McKay is foreman. The estimated distance to the channel is 2500 feet.

Riverside.

New Era: From Jan. 1st, '99, to April 22d, three months and twenty-two days, Hook Bros. have shipped to Los Angeles gold bricks valued at $12,900, extracted from the tailings from the Good Hope and Santa Rosa mines, which at one time were considered of no value. They are now put through the cyanide process. At each of the above mines there are thousands of tons of tailings, and it is estimated that the yield will reach $100,000.

San Bernardino.

(Special Correspondence). — The Imperial lode is a silver bearing vein in the Lava Beds district, thirty-six miles east of Daggett. It is 4 to 60 feet wide and outcrops along the surface for 8000 feet, standing above the softer country rocks 20 to 80 feet in height like a wall. It ends abruptly at its western end. A large amount of work has been done on the vein, and some rich ore found. There are several shoots of low-grade rock of considerable extent. There are numerous branching veins, which sometimes carry gold. When silver was worth $1.20 per ounce silver ore was shipped from this lode at a profit. It has been idle for a long time.

Daggett, May 2nd, '99.

It is reported that A. G. Campbell, owner of the Gold Bar, Saint George and Boomerang group of mines at Vanderbilt, has refused an offer of $300,000 for the property.

There are large deposits of low-grade copper ore in several of the mining districts in the eastern part of this county.

San Diego.

In the Cargo Muchacho mountains, four miles east from Hedges and four miles from Ogilby, are situated the group of mines owned by the American Girl G. M. Co., of which H. H. Markham, ex-Governor of California, is at the head. The ore is worked by roller crushers and the cyanide process. The rollers are equal to about a 25-stamp mill. There are three kinds of ore—talc, quartz and clay. There is about 10 feet of clay that follows the ledge of quartz. For a long time it was overlooked and considered worthless, but a chance assay showed it to be the richest of all. This cyanide plant has been working the clay by a process which overcomes the difficulty in percolation, under the direction of T. B. Bassett, who is superintending the process.

Colorado men have been inspecting the Owens mine at Julian with a view to purchase.

Ramona *Sentinel*: D. W. Godfrey is hauling rock from the Hidden Treasure mine to the Ready Relief mill to be crushed for Luther & Bailey.

San Bernardino *Sun*: The Southern Pacific Railway Co. has a surveying party running a line from Bagdad on the Atlantic and Pacific to either Whitewater or Palm Springs and are now near Dale City. The line will go close to Dale City, and touch at Surprise springs, Twenty-nine Palms, Warren's ranch, through Little Morongo pass to the Southern Pacific road.——Three mines are in operation at Vanderbilt.——Drennan & Jennings, who own a mine in the Black Metal district, forty miles below Needles, are negotiating for the sale of their claims.

Shasta.

A rich ore body has been found in the Globe claim, near Copper City, twenty-two miles east of Redding. It is not base ore, the rock carrying free gold and silver, with copper preponderating. Assays of the rock return $40 per ton.

Redding *Searchlight*: The Mountain Copper Co. has published its second annual report. It shows an expenditure of £35,288 in California and £487 in New Jersey during '98. The net profits amount to £163,235, against £63,145 in '97. A dividend of 7½% has been declared. The quantity of ore taken out was 221,895 tons, averaging 8.42% copper, against 165,060 tons averaging 8.56% copper—an increase of 56,835 tons. The quantity of ore smelted was 168,541 tons, producing 10,721 tons copper, against 97,835 tons, producing 7238 tons matte, in '97. This is an increase of 71,356 tons of ore and 3483 tons of matte. The quantity of finished copper marketed was 8273 tons, against 6025 tons in '97—an increase of 2248 tons.

Siskiyou.

Cottonwood creek is being prospected with drills.

The mill at the Cherry Hill mine, Cherry Creek, is in operation.

The tailings from the Jillson & Roberts mine at Hornbrook are being treated by the cyanide process by J. Palmer.

Trinity.

The Trinity Center Co. will put in a dredge on Trinity river, two miles above Trinity Center.

Sixty men are employed on the Nash mine doing development work.

W. B. Frue, Jr., will put in a 40-stamp mill to treat the product of his mine near Carrville.

The sale of the Copper Queen group of mines, five miles north of Trinity Center, has been consummated. The purchasers are B. Brown of Napa, and Schuppert & Buckman, owners of the Old Spanish mine of Shasta county, also of Napa. The sellers are W.

Vollmers, T. Baker, F. Dimmock and E. Ellery. Strode Bros. of Trinity Center will put in five more stamps.

Twenty men are employed at the Bloss & McClary gravel mines. It is expected to wash nine acres of ground.

It is reported that a strike has been made on the lower levels of the Altoona quicksilver mine. The mine is producing ten flasks of quicksilver daily.

COLORADO.

BOULDER COUNTY.

In Ward district mining operations are beginning to show activity. The Copper Glance has opened at the bottom of a 30-foot shaft 18 inches of mineral in which are two streaks of solid iron, each 3 inches wide, that run two and one-half ounces gold and four ounces silver.——The Binford mill has been leased by M. Bertolin, and is being put in repair. A 30-horse water motor will take the place of the steam plant.——W. Brainerd has commenced work at Camp Talcott and will put fifteen men on. Work will be confined to sinking on the Coy and Polar Star shafts and driving the Alaska tunnel.

CLEAR CREEK COUNTY.

Herald: Johnson & Segstrom, leasing the Johnson mine, have shipped ore which ran well in gold and silver.——W. Rogers, Sr., W. Rogers, Jr., W. Quick and R. Rogers, leasing on the Paymaster mine, in the Argentine district, have a 5-inch streak of ore, running from 50% to 60% lead and forty ounces silver per ton. Shipments are delayed on account of the snow.——The Stevens mine this week produced twelve tons of high-grade ore, and there are fifty tons at the mine to be hauled as soon as roads permit. Wolfe, Robeson & Seifried contemplate improvements as soon as timbers, wood, provisions, etc., can be hauled up.

Denver *Republican*: L. L. Oliver, who is working the Toledo, is shipping copper ore which he finds at the east end of the Toledo workings. Some ore running ten ounces gold per ton has been mined.——A contract has been let for driving the Lost adit. This is being driven for the purpose of reaching the ore body disclosed in workings ahead of the adit, on the same vein. The same parties are working placer ground near the mouth of the adit on Clear creek.——The ore body in the Perkins tunnel continues to improve. A wagon road is now building from the tunnel to Chicago creek.——Owen, Burns & Wood have made a shipment of a carload of ore from the Eclipse mine which ran $250 a ton. They will ship second-class ore during the week.——Riley Bros. have opened a streak of first-class ore at the Franklin mine. They will drift ahead and raise on this ore.——The bodies of zinc ore in the Mendota and other properties at Silver Plume are attracting attention from owners of zinc smelters. For years large amounts of zinc ore have been left in the mines. Streaks of ore, from 1 foot to 3 feet, were either left standing in the mines or thrown over the dumps. F. A. Maxwell of Georgetown has leased the Mendota, Frostburg and other lodes belonging to the Mendota group, from the Victoria tunnel level to the surface, together with the dumps of these properties. Mr. Maxwell intends to erect a concentrating mill and take out the low-grade streaks which are still in the mine. The mill when completed will have a capacity of seventy-five tons daily, and it will be the first mill of its kind erected in this camp.——A small streak of good ore has been opened by Proutt & Sons in their lease on the Terrible, which they are working through the Union tunnel. But little work has been done for several years on this mine.

FREMONT COUNTY.

Denver *Republican*: Dawson camp is one of the camps in the State that has developed in a few months into a steady producer. The Copper King has been shipping for several months to the zinc smelter at Canyon City, ore averaging $10 per ton. Last week 100 tons were shipped, and with a hand power drill the output will be increased to twenty-five tons per day. It is claimed that rich ore has been uncovered.——The Metallic King is putting in a steam hoist, which will be in operation by June 1st. A shipment of 2000 pounds taken from across a 12-foot vein, shipped to Canyon City smelter, gave returns of $14 in gold, silver and copper, and a 2-foot streak assays $40 in gold.——The Sentinel, at the depth of 40 feet, has pay ore. The copper values have paid from the surface, and the gold values range from $2 to $40 to the ton.——The Copper Boy is making shipments that yield good returns from the low-grade ore, and some of the ore is high-grade. A large body of ore has been opened.

GILPIN COUNTY.

Ore shipments from Blackhawk for the week ending May 8th, '99, aggregated ninety-two carloads.

The Concrete mine shipped 1500 tons of ore in the month of April, all of which was milled at Blackhawk.

The Kansas-Burroughs shipped 3475 tons of ore in April.

The Cook M. Co. shipped 385 tons of smelting ore and 2800 tons of milling ore during the month of April.

HINSDALE COUNTY.

Lake City *Times*: Mgr. Farrell of the Leslie mine has a specimen of gray copper ore which will be sent to the Paris Exposition.——S. D. Nicholson, accompanied by Civil Engineer Jacox of Leadville, has been looking over the Auric Co.'s property, upon which costly improvements will be made.——It is stated that ten tons of high-grade ore will be shipped daily from the Superior group, at Carson, as soon as the road is open.——Mr. Bardwell will put three men to work on the Neptune, in Casa Grande gulch, to get out a carload of ore.——Several veins are said to have been cut by the Meidrum tunnel. Prospecting on these will be started, and, as soon as the extent and value of the ore is known, a reduction plant is to be erected at the Telluride end of the tunnel.

MONTROSE COUNTY.

W. H. Tibbals and associates of Salt Lake City, Utah, recently received an offer of $40,000 for three claims in the La Sal mountains from P. McCourt of Denver and have accepted the proposition. The contract provides for the payment of $10,000 in July, $10,000 in January next and the balance before Jan. 1, 1901. The owners have expended less than $200 on the ground.

J. N. McBride has sold to the La Sal Copper M. Co., for $100,000, the Red Bird, Red Chief, Angell, Bennio, Horseshoe, Malachite, Maud, Titan, Cumberland, Canon, Deer, Silver Bell, Detroit, White Pine and Lulu lode claims and several mill sites in Paradox valley. This group comprises the property worked last year by the La Sal Co. on La Sal creek. The company has been shipping for months, the ore netting $980 per car.

OURAY COUNTY.

Ouray *Herald*: During winter the Maud S., Monona and Brooklyn, properties of Senator Newman, have been worked; 150,000 tons of copper sulphide have been blocked out, the ore vein being 7 feet. The ore runs from $5 to $15.——The Pueblo lode, near Ironton, is being worked by leasers, who have lead-copper ore uncovered running $40. This ore concentrates five tons into one. The Beaver & Belfast group has been worked all winter by Paquin & Tucker. They have been drifting.——The Bob Tail, in Commodore gulch, owned in Titusville, Pa., is bringing to the surface lead and copper sulphides, the values ranging from $10 to $50.——The Gennessee-Vanderbilt, worked by Haynes & Ryan, has eight carloads of ore which will run 25% copper.——Davy & Terrel, working the Silver Bell under lease, have fifteen cars of gray copper ore as a result of their winter's work. A 10-ton car last fall brought $90.——A. C. King, working the Mountain Lion lode, on the Red Mountain side, has opened a body of silver and gold ore. The average test of a 3-foot streak was 260 ounces silver and 1½ ounces in gold. Shipments will commence in June.——A. Rice & Son have commenced work on the Comstock lode in Galena gulch. They have a body of copper sulphide.

TELLER COUNTY.

(Special Correspondence).—The Mary McKinney group of mines, at Anaconda, is being developed rapidly and will soon be in position to ship 3000 tons of ore per month. The workings through five shafts, from 250 to 280 feet deep, extend along the course of the parallel ledges for 2000 feet. Drifts on the veins at 75-foot stations connect each shaft with the others. The two main parallel veins are 40 feet apart, with numerous crossing stringers of ore connecting, this condition admitting of a great amount of profitable work in ground contiguous to the principal vertical veins. There are five leases on the property which ship from 700 to 900 tons per month. In the district generally ores below two ounces gold in value are regarded as milling ore; all of higher grade are rated as smelting ore. In the Mary McKinney the two classes of ore are divided about equally. The equipment of the Mary McKinney is modern and substantial. The 150 H. P. hoist, 20x20 compressor, the four boilers of 125 H. P. each were put in by the Hendrie & Bolthoff Mfg. & Supply Co. The gallows-frame of heavy timber is 80 feet high, with no splicing. The ore house and shaft house, under one roof, is 80x190 feet, within which is also a machine shop. The building is covered with sheet iron. The work is under the direction of Supt. G. L. Keener, with C. C. Lewis master mechanic.

The Mary Jane, on Raven hill, belonging to the Advance Bonding & Leasing Co., is sinking a shaft with the expectation of cutting the Jack Pot vein at a little over 200 feet. This is one of the many small properties in the district which is equipped with an electric hoist.

The Tornado, on Raven hill, recently fitted out with new machinery, has been shipping for the past sixteen months and produces 200 tons per month, all of such grade as to justify shipment to the smelters. F. M. Wright is Supt.

The Raven mine has some interesting development. Its main shaft sinks from near the summit of Raven hill to a depth of 675 feet, at the bottom of which it connects with the 3000-foot tunnel from Squaw gulch. Near the breast of this tunnel is a hoist used in sinking a winze on the vein. Tunnel No. 2, from the opposite side of the hill, connects with the other tunnel and main shaft. This property is shipping 450 to 500 tons of ore per month, to the cyanide mills. The ores run from 1½ to 2 ounces. M. F. Stark is Supt.

The Badger Boy, on Globe hill, is being developed by the Greater Gold Belt M. Co., under the management of O. P. Hine. A 300-foot shaft cuts the vein, from which some high-grade ore is being shipped.

The Anchoria-Leland, on Gold hill, whose shaft is 870 feet deep, is shipping an average of 450 tons per month, most of which goes to the smelters.

The plant of the Oneida Reduction & Mining Co., near Victor, is almost complete. This is known as the Murphy process, which was developed by Fraser & Chalmers. It combines fine pulverization, roasting and amalgamation, having crushers, rolls, roasting furnace and a modified system of pans and settlers. Its capacity is about seventy-tons per day. A. C. Seiboth is manager of construction.

The Victor mine, one of the Pioneers of Bull hill, is shipping 2000 tons per month to the cyanide works. The management is now paying special attention to development. They are driving drifts into new territory. The mine will soon be supplied with electric power from La Belle M., W. & Power Co. at Goldfield.

The Doctor mine, on Raven hill, which was closed for several months by reason of litigation, is to resume work. This property has a record of high production. It belongs to Dr. J. J. Cone and Lyman Robinson. WASCOTT.

Cripple Creek, Colo., May 12th, '99.

Victor *Record*: Smith, Phillips and Simmons, who recently leased the New Zealand, made a strike of ore last week in a new shaft. Assays taken from talc gave values of from $400 to $600 to the ton. There is also considerable low-grade ore.——A 2-inch streak of ore has been encountered in the Damon, said to assay up into the thousands. This ore was found on the hanging wall of the 17-foot vein. The shaft will be sunk to a depth of 200 feet, at which point another level will be started.——T. J. Moynahan, lessee and manager of the Los Angeles mine, has offered $20,000 cash or guaranteed to sink the working shaft 300 feet in return for an extension of his lease. The offer was refused. Moynahan's lease expires on November 1st.——Four carloads of ore were sent out each week from the Horn, Rose and Hanson lease on the south end of the Deadwood. The ore is smelting grade.——Ore has been found in the tenth level of the Lafayette carrying sylvanite and free gold and a test made recently returned an average of $120 per ton. The claim is operated under bond and lease by the Princess Alice Co.——The Last Dollar production for the month was twenty-nine carloads of cyanide ore and twelve carloads of high-grade ore.——Smelting ore is being mined from the east end of the Orizaba, located on Beacon Hill, the lessees drifting at a depth of 75 feet, the vein averaging 8 inches.——The shipment sent from the Foley & King lease on the Ocean Wave was settled for at $45 to the ton. The ore was from the 100 level where the vein is 5 feet wide.——The production from the Orpha May during April was 800 tons of five-ounce ore. A fifteen-ton shipment of $200 ore has been sent out from the Tanna & Pollock lease.

IDAHO.

The Conjecture M. Co., at Hope, is to have a 20-ton concentrator. The mill will probably be running by the end of May. Workmen are getting out timbers and preparing for the machinery. The vein has widened to 6 feet.

The Big Buffalo Co. is sinking; the shaft is down 60 feet. The next payment on the bond is due June 1st.

F. Brown is at Buffalo. He has men at work on the trail preparatory to starting his pack train. Mr. Brown claims that this trail will make the distance from Grangeville forty-four miles.

H. Schwartz, special agent of the United States Land Department, is at Buffalo to stop illegal mineral locations and to enforce regulations of the land office. He has served notice on all saloons that they must close.

A crosscut tunnel is being run on the St. Paul claim under Supt. Pooley.

Spokesman-Review: On the Clearwater near Agatha a ledge of blue granite and a ledge of white marble have been discovered and are being stripped for quarrying. The white marble is burned for lime. A lime kiln has been built. On the Snake river, twenty-five miles distant, another ledge of granite is being developed, some of which is finding a market in Lewiston.

MICHIGAN.

The Calumet & Hecla is running twenty of the twenty-two steam stamps in its two mills as compared with sixteen stamps one year ago, which calls for the mining and stamping of 5500 tons of rock daily, yielding 175 tons refined copper. This is practically the rate of production of the Anaconda last year.

MONTANA.

The Fisher Creek M. Co. is to build a 10-stamp mill, which has been ordered.

NEVADA.

After an enforced stoppage of removing the water from the lower levels of the Comstock, occasioned by the breaking of the surface pipes, two ejectors are again at work and at latest report the water had been quickly lowered to the point which had been reached when the break occurred, and both elevators were working steadily. The water was 166 feet below the Sutro tunnel level.

C. K. McCornick, H. Joseph and H. Peery, of Salt Lake, Utah, have taken an option on the Fifty-Six group, six miles north of Humboldt House on the line of the Southern Pacific. Samples from the group show metallic copper from a vein 60 feet wide.

Salt Lake *Tribune*: G. D. Bunch of Searchlight district reports that a Boston company has contracted to build an electric railway for transportation of ores from the camp to the Colorado river, twelve miles distant, where the mills are located. Prospectors have developed bodies of ore, rich in gold, silver and copper.

Virginia *Report*: Ten days ago a location was made south of Osceola by Gaby, Benton & Doyle of Salt Lake on a mineral known as hubnerite, used in the manufacture of steel. The vein is 2 to 4 feet wide and has been exposed for 400 feet on the line of the ledge and has granite walls.

Mohave *Miner*: The Sheep Trail mines have been sold to the New England & Arizona M. Co, the consideration being $100,000. The mines are situated in the Union Pass country, near the Colorado river. Two 20-stamp mills will be put up. A 10-stamp mill is now in operation.

Needles *Eye*: B. F. Hamilton has uncovered a copper prospect near Sandy and will soon ship pay ore.——Placer properties along the Colorado river are being worked by several companies and individuals, and locations have been made for over 200 miles.——The cyanide plant at El Dorado canyon is proving satisfactory.——At Good Springs machinery for leaching and chloridizing copper ores is being erected by a German company. One hundred men are employed.——At Valley Wells the World Co. have completed the two-stack smelter. There are 150 men employed.——On the Mormon road from St. Thomas to El Dorado canyon, ten miles from Colville, a DeLamar outfit has located a copper lead 5 feet in width which runs 55% copper, with a trace of gold and a few ounces of silver.

NEW MEXICO.

Silver City *Enterprise*: Operations on the Last Chance mine at Mogollon are to be resumed. The mill will be repaired and a run of 500 tons made.——Crawford & Derbyshire's concentrator at Santa Rita has been shut down for ten days while additional machinery is being put in.——The main shaft on the Romero mine has been pumped out and retimbered to the 200 level. The 100-foot level was found to have bodies of ore developed by 3000 feet of drifts. The 200-foot level has 5000 feet of drifts to be unwatered. The pump has been running full capacity the past ten days, and it is expected the 200-foot level will be reached in a few days. The Standard Oil Copper Syndicate is bearing the expense for the purpose of investigating the workings before purchasing.——Crawford & Derbyshire are sinking two shafts on the Yosemite mine at Santa Rita. From the old shaft seven tons of smelting ore is shipped daily, besides that which goes to their concentrating mill.——Bible & Jay have sunk a new shaft upon the Carraseo and tapped the old Spanish workings. They are taking out high-grade copper ore.——Ashton, Roach & Williams continue to take out copper ore from the Montoya lease. They have native copper ready for shipment; they have made a shipment of a carload of high-grade copper ore from their Romero lease.

Santa Fe *New Mexican*: The Old Abe mine, near White Oaks, was located in '83, and has been worked since '90. The new shaft is 1050 feet deep. From 850 to 900 feet all work was in ore, and at 1050 feet the paystreak was found with a short drift. All levels run north 200 feet and show a regular vein 8 to 13 inches wide, with an average value of $175 per ton. A number of seams from the vein have been followed and pockets of free-milling ore found. Near the surface specimens of wire gold in gypsum were found. J. Y. Hewitt is Mgr. There are 10,000 tons of tailings, worth $6 per ton. The mine is said to have produced $650,000.

OREGON.

The Standard Oil Co., who now own the Bonanza mine, near Baker City, it is reported, are to build a 100-stamp mill.

UTAH.

Additions are being made to the force of the Ontario mine, at Park City.

R. Smith has completed his contract on the Superior mine, at Park City, having drifted 400 feet from the lower crosscut tunnel on a vein of lead-silver ore, which has an average value of forty ounces silver and 40% lead. The company will open the gold-copper vein, which outcrops on the surface parallel with the lead vein. At one point an open cut, 30 feet in length, with a shaft 80 feet deep, shows an 8-foot vein of ore carrying from 5% to 25% copper, eight ounces silver, $4 gold and 40% iron.

The strike recently made at the Comstock mine, at Park, assayed 45% lead, sixty ounces silver, $4.60 gold and 7% copper.

At the Daly-West the force is being increased daily, and a night shift is being put on in the mill, with E. Buckley in charge. There are now 300 tons of concentrates and 1000 tons of first-class ore awaiting shipment.

J. Green, from the Naildriver, reports that at that property a small force is employed, but expects to increase it.

Barnes Bros., Girard & Daniels and Nelson & Wright are operating jigs in Woodside canyon.

The new Silver King mill has commenced a test run.

Engineers have been surveying the site for the new Anchor mill at Park.

Cooney Bros. added a new set of slime tables to their plant in Woodside canyon recently. They are preparing for an active summer's work and expect to make more than wages.

T. Brubach has offered the Morgan M. Co. at Park City $100,000 for their property, adjoining that of the Daly-West on the north. The workings on it have attained a depth of 800 feet, but no ores have been marketed.

Lowe & Barnett of Salt Lake City have bought the Calumet group of seven claims in the North Star district, below Milford, and let a contract to sink 100 feet. Assays from the ore show 4% to 11.5% copper and $1.25 to $13.40 gold.

The Cleopatra M. Co., whose property is at Silver City, has placed an order for a hoisting plant that will enable it to go down 1200 feet. Development will be under direction of C. V. Allen. The shaft is down 200 feet, from which level prospecting will begin.

Discoveries of copper in the eastern part of Emery county have been made. The find is a blanket vein. Returns from Salt Lake City show values of $43.60 in gold, copper and silver. The discoveries are six miles from the railroad.

WASHINGTON.

Three quartz locations have been recorded by S. C. Hendrix at Spokane for the Wild Temple, Long Tom and Tin Horn mica lodes, a mile and a half northwest of Newman lake, near Spokane.

It is reported good ore is being found in the Nevada claim, on Lone Pine hill, at Republic.

Spokesman-Review: An extra shift has been put on at the Q. S., in Okanogan county, in the upper drift, and good ore is being stacked on the dump, the average assays running 14% copper and $10 in gold. S. E. Barron is Mgr.——The Little Six M. Co. has let a contract for 200 feet of tunnel, which will carry the tunnel in 300 feet. The company owns a group of silver claims located midway between Cedar Canyon and the Cleveland mine, in Stevens county. The tunnel, upon which work is to be resumed this week, will cut the vein at a depth of 300 feet.

Spokesman-Review: In Cedar canyon the Deer Trail and Royal, the first two claims located in the camp, are to commence shipping. The Royal is the north extension of

Deer Trail No. 2, which is paying dividends. n the Royal claim the vein dips with the hill and short tunnels have been driven to encounter the vein. Six of these have opened the ore for a length of 1400 feet, and the difference in depth between the highest and lowest tunnel is 300 feet. At no point have they failed to encounter the ore body. The vein lies in granite and porphyry and varies in width. The average is between 6 and 12 inches of ore, and where it is narrowest it is richest.

FOREIGN.

AUSTRALIA.

In the Northern Territory, on the property of the Northern Territories G. M. Association, known as the Terrors, the shaft is lined with structural steel, instead of timbers.

The Preamimma copper mine, six miles northeast of Callington, is to be reworked. This mine was discovered in 1854, and some ore, chiefly carbonate, produced. The property is to be worked mainly for arsenical pyrites, of which there is said to be an abundance.

Good progress is being made at the Wyacca copper mine, and more men have been put on. The vertical shaft is down 150 feet, and the lode in the bottom is between 3 and 4 feet wide. The shaft on the south lode is down 45 feet on a big body of ore.

The cost of production of copper at Wallaroo in 1898 was £49 14s 9d per ton. This leaves a margin of profit at the present price of copper, but would leave none if the old rates ruled.

BRITISH COLUMBIA.

Work has been resumed on the Deer Park with sixteen men under the superintendency of W. Tregear. A crosscut will be run to the ledge from the bottom of the 300-foot shaft.

Samples of ore taken from the bottom of the shaft of the Sullivan mine near Fort Steele run 63% lead and thirty-four ounces silver. The silver values have doubled since the shaft was started.

Another strike was made in the North Star mine recently. The ore was found in the drift on the 200-foot level.

G. Pfunder, Supt. of the Iron Horse, reports two strikes on the 300 level. For several days the crosscut has been in solid chalcopyrite and pyrrotite ore in quartz gangue 12 feet in width. This ledge is supposed to be the Le Roi. On the same level the west crosscut 50 feet from the bottom of the shaft has encountered the War Eagle ledge.

A strike in the Golden Eagle claim on Pass creek, eleven miles northeast of Greenwood, is reported. The claim is owned by L. S. M. Barrett and others. Assays run as high as $64 in a 4-foot lead.

Numbers of prospectors are fitting out at Greenwood for the West Fork of the Kettle river and the Similkameen.

McEntire, McDonnell & Co. have bonded from R. Wood the North Star in Long Lake camp, seven miles north of Greenwood.

Ore shipments from Rossland for the week ending May 13th amounted to 4345 tons. Total tons this year, 41,127.

Spokesman-Review: It is reported from Grand Forks that J. P. Graves, operating in the Boundary country for a Montreal syndicate, about to erect a smelter there, has selected a site on the north bank of the North Fork of Kettle river, one mile and a half from Grand Forks. The smelter will have a capacity of 500 tons per day with provision for a large increase. Work will begin in thirty days.

Rossland *Miner*: At the Center Star, at Rossland, men are timbering the main shaft from the 100 to the 300-foot level. A large ore bin is being erected. Upon its completion the mine will commence shipping to Trail. In the Center Star winze, on Iron Mask ground, the territory in dispute in the pending lawsuit, the 18 feet of sinking directed by the court to be done under D. J. Macdonald's management has been finished and connection has been made with the Iron Mask tunnel.——The ore shipments from Slocan lake points from Jan. 1st to May 1st were over 1000 tons. ——The first gold bricks have been shipped from the Ymir Co.'s mine to Nelson. They were valued at $10,000, and represent gold saved on the plates in a fifteen days' run. The company has $4000 in concentrates, making the output for the first fifteen days' run about $1000 per day.——The cleanup of the Athabasca mill for April was not up to expectations, due to trouble with the miners over the eight-hour law.

Spokesman-Review: Central or White's camp is north of the international boundary, about five miles from Columbia. There are two companies developing the holdings of the City of Paris G. M. Co. and the Lexington G. M. Co., both under the management of J. P. Graves of Spokane. H. White is Supt. and H. Johnson Mgr. Other properties in this camp are the No. 7, Jack of Spades, Golden Cache, St. Lawrence, Mabel and Oro, but these are not being worked on account of lack of transportation. The City of Paris group is equipped with a five-drill compressor and a boiler. This machinery is on the Oregon claim, adjacent to water. The air is piped up to the mine, a distance of 1000 feet. The mine employs sixteen men. For the Lexington a five-drill compressor plant has been ordered. On the surface the vein shows 8 feet of oxidized ore. The face of the tunnel is in solid pyrrhotite.——The Montreal claim is said to have a 15-foot ledge of quartz. Its development is in the way of a prospect shaft. ——On the surface of the City of Denver the ore is similar in character to that found on the City of Paris. A 45-foot shaft constitutes development.

LOWER CALIFORNIA.

Not since the Alamo excitement has there been such a stampede to a new placer camp as that which is now under way to the Santa Clara diggings, 400 miles south of San Diego, and fifteen miles back from the coast. Supt. Swayne of the Ibarra G. M. Co. at Calmalli, sent a runner 200 miles to San Quintin with a message to agents of the company, notifying them that the 200 men in the company's employ had gone to the Santa Clara diggings, leaving Calmalli deserted, and, in consequence, the Ibarra mines have been closed, and also notifying them not to ship machinery and freight for Calmalli, there being no means of getting it from the landing at Santa Domingo to Calmalli, sixty miles, all the men having gone to the new diggings. Santa Clara is a sparsely settled part of Lower California and has no communication with the outside world except by trail to Calmalli and to Santo Domingo, where the steamer touches every month. The first reports of the placer discovery were brought up three weeks ago. At that time there were said to be 800 men in the diggings, many having gone from Santa Rosalia, on the gulf coast.

Personal.

L. A. GROSS of San Francisco is in the East on mining business.

SCOFIELD & BROOKS have opened an assay office at Victor, Colo.

E. R. ABADIE AND DAVID MCKAY are visiting Grass Valley, Cal.

W. S. KEYES, E. M., has returned from a professional visit to Butte, Mont.

SIGNOR MARCONI expects to visit the United States the coming summer or fall.

W. E. JOHNSON, a Denver mining man, recently returned from the Pacific coast.

GEO. S. TAYLOR, a mine owner of Murphys, Cal., is in San Francisco, Cal., on business.

W. B. WILSON, Supt. of the Elkton mine, Cripple Creek district, has gone to Scotland.

J. W. DEAN, of Denver, Colo., returned from Boston lately and has now gone to Arizona.

M. M. VAN FLEET & Co. will soon open offices in Denver and Pueblo as ore factors and samplers.

FRANK M. WRIGHT is now Supt. of the Tornado mine on Raven Hill, Cripple Creek district.

PERCY L. SHUMAN, Mgr. of the Paragon Con. G. M. Co., near Railroad Flat, Cal., is in San Francisco, Cal.

BYRON E. SHEAR, of Denver, Colo., recently made an examination of some of the mines near Baker City, Oregon.

C. H. ATKINS of Colorado has been engaged in inspecting mines in the Julian and Banner districts, San Diego Co., Cal.

E. P. JENNINGS will have the direction of the development of the Dragon Iron mine at Bingham, Utah. He will also have charge of the Boston Con.

J. T. MILLIKEN, Supt. of the Colorado Reduction Co.'s chlorination mill in Cripple Creek district, recently visited the zinc-lead mines at Joplin, Mo.

HENRY BRATNOBER, who recently left the London Exploration Co., it is reported will open offices at Seattle and Skaguay for the purpose of promoting mines.

F. M. WATSON, until recently Gen. Mgr. Simmer & Jack mine at Johannesburg, S. A. R., has been appointed joint manager in South Africa of the Con. Gold Fields.

STILLMAN W. WHEELOCK, for the past five years with the Black Diamond Steel Works at Denver, Colo., has been appointed manager of the office of the Illinois Steel Co. at Denver.

FRANCIS E. DRAKE, American Director of Machinery and Electricity at the Paris Exposition, has arrived in New York from Paris. He says the work on the Exposition buildings is progressing satisfactorily.

MISS MOLLIE O'BRYAN, a stenographer and court reporter of Cripple Creek, Colo., recently cleared $5000 on investments in Isabella mining stock and she now owns the control in the Teutonic property on Bull Hill, for which she was offered and has refused about $20,000 cash.

Books Received.

"*The Characters of Crystals*," 211 pp., illustrated; Alfred J. Moses, E. M., Ph.D. A handsome volume, treating on the interesting science of crystallography, in which is described, simply and concisely, the methods and apparatus employed in studying the physical characters of crystals. The various phenomena observed are described in plain language, without complex mathematical discussions. The book treats of the geometrical characters of crystals, their optical characters and thermal, magnetic and electrical characteristics, etc. It will become a useful and popular volume in the hands of students of the interesting science of petrography. D. Van Nostrand & Co., New York City. Price $2.50.

"*Manual of Assaying*," 551 pp., illustrated; Walter Lee Brown; eighth edition. A compact, clear and comprehensive treatise on the assay of gold, silver, lead and copper. The several editions of this excellent little volume are noted for the thoroughness and simplicity with which the subject is treated. All errors appearing in previous editions have been corrected. The book treats of the apparatus used in assaying, reagents, determination and preliminary treatment of ores. A chapter is devoted to the volumetric method of assaying, and the appendix contains an interesting chapter on prospecting. E. H. Sargent & Co., Chicago. Price $2.50.

Catalogues Received.

THE Jeffrey Manufacturing Co., of Columbus, Ohio, has issued a handsomely illustrated catalogue, No. 16, of electric and compressed air coal mining machinery, particularly coal cutters, drills, motors and pumps.

Recent Mining Incorporations.

Arrow G. & S. M. Co., San Francisco; capital stock, $240,000—all subscribed; C. L. Fair, G. A. Knight, G. Dean, R. Stevenson, F. S. Knight.

Santa Ana Oil Co., Santa Ana, Orange county; capital stock $50,000, subscribed $15,000; M. M. Crookshank, J. Cribbon, R. F. Chilton, J. M. Dawson, W. B. Wall, all of Santa Ana.

Mountain View G. M. Co., Forest City, Sierra county; capital stock $10,000, all subscribed; T. E. Edwards, F. C. Davis, D. Devero, A. Mulligan, M. Davis, all of Forest City.

Occidental Oil Co., Fresno; capital stock $32,000, all subscribed; J. J. Vincent, W. Helm, E. A. Walrod, I. Miles, F. Cleary, R. J. Cooper, G. W. Prickett, E. W. Risley, C. B. Kemble, all of Fresno.

Mount Godard Oil Co., Fresno; capital stock $200,000, subscribed $8500; F. K. Prescott, M. K. Harris, W. N. Rohrer, C. A. Teefer, C. A. Murdoch, C. S. Pierce, B. F. Shepherd Jr., all of Fresno.

Black Diamond Oil Co., Hanford, Kings county; capital stock $32,000, subscribed $9000; W. Walker, J. Welcher, W. F. Harrison, C. E. Moore, L. Meyers, all of Hanford.

Little Tar Canyon Oil Co., Hanford, Kings county; capital stock $100,000, subscribed $68,000; L. S. Chittenden, F. L. Welding, E. Newman, W. J. Burnett, L. Nathan, all of Hanford.

Tecopa M. & S. Co., Los Angeles; capital stock $50,000, subscribed $40,000; D. W. Shanks, W. O. Dow, J. H. Fawcett, W. S. Porter, M. L. Graff, all of Los Angeles.

Industrial Notes.

—The Electric Storage Battery Co. of Philadelphia has increased its capital stock to the extent of $4,500,000, making its total capital stock $18,000,000. The company was incorporated in 1888 with a capitalization of $10,000,000.

—A syndicate of Colorado Springs capitalists, headed by W. S. Stratton, who recently sold the Independence mine in England for $10,000,000, has purchased the Cripple Creek District Electric Railroad, and will extend it immediately to Colorado Springs. It has twenty-five miles of track, reaching the principal mines.

—The Sacramento, Cal., Electric Railway Co., which is now transmitting 4000 H. P. from Folsom to Sacramento, is about to add the fifth 1000 H. P. unit, which will only partially supply the increasing demand at the receiving end of its system. The company has also contracted with the Yolo Electric Power Co. for 5000 H. P. more. A new plant will be constructed with a capacity of 15,000 H. P. The present dam will have to be enlarged and a reservoir constructed at the forebay with a capacity sufficient to furnish 10,000 H. P. for six days continuously at the normal head, which will be 688 feet. The overhead line to Sacramento will be of aluminum wire, worked at 40,000 volts pressure.

Recently Declared Mining Dividends.

Parrot Silver & Copper M. Co., Butte, Montana, $1.50; payable May 31.

Osceola Con. M. Co., $3 per share; payable June 15; being an increase of $1 over previous dividend.

Portland G. M. Co. of Cripple Creek, Colo., a monthly dividend of $60,000; May 15. To date $2,100,000.

Deer Trail No. 2 M. Co., Washington, regular dividend No. 12, $2500; May 15. Total $30,000.

Montana Ore Purchasing Co., extra $1 per share; payable at the New York office on May 24. Total $1,120,000 since Jan. 1, '95.

Commercial Paragraphs.

THE Edward P. Allis Co. of Milwaukee, Wis., has secured an order from the Dahlonega Con. G. M. Co., Dahlonega, Ga., for a 120-stamp mill, each stamp 850 pounds weight. The mill is also provided with hydraulic classifiers and thirty-six Reliance vanners, so that the pulp, after passing over three sections of copper plates, is sized in the classifiers and concentrated on the vanners. One large Gates crusher crushes all the ore for 120 stamps, which is distributed to the various bins by belt conveyors. The power for the mill is derived from two 6-foot Pelton water wheels, and the vanners are driven by Pelton water motors. The concentrates will be conveyed by an electric trolley road to the chlorination plant, the order for which was also given to the Allis Co. This plant is equipped with a Holthoff-Wethey roasting furnace, 10x100 feet, having a cooling floor attached, for cooling the ore after roasting and before chlorination takes place. There are two five-ton chlorinating barrels and the necessary tanks, etc., in the chlorination plant, which will treat at least thirty tons of concentrates in twenty-four hours. The Allis Co. were also given an order for a twelve-drill air compressor, with all the necessary drills, tools, etc., belonging thereto. This compressor will be located in the power room of the stamp mill. The chlorination plant is also driven by Pelton water wheel. It is expected that the two plants will be in operation by Sept. 1st of this year. This company has also received an order for a 10-stamp mill, with concentrators, from the Fisher Creek M. Co., which will be built in Libby creek district, Montana; also, an order for a 20-stamp mill complete from T. F. Walsh, through their Denver agency, to be built in Ouray, Colo.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MAY 9, 1899.

624,612.—SEPARATOR AND CONVEYOR—T. J. Barlow, S. F.
624,614.—EDUCATIONAL DEVICE—J. A. Bevington, Escondido, Cal.
624,745.—MITER BOX—F. Bootsman, Artic, Wash
624,627.—BOILER CLEANER—V. Clark, Dryad, Wash.
624,455.—PUFFING IRON—P. F. Clerc, S. F.
624,785 —PLOW—W. B. Gray, Ashland, Or.
624,618. — ROPEWAY CONVEYOR —A. S. Hallidie, S. F.
624,483. — WAVE MOTOR — Hamilton & Mahany, White Hills, Ariz.
624,669.—LUGGAGE CARRIER — V. L. Moore, San Rafael, Cal.
624,860.—CURTAIN FIXTURE—R. E. Phillips, Portland, Or.
624,689.—MOTOR VEHICLE—W. S. Schuyler, Oceanside, Cal.
624,594.—MOTIVE POWER — M. L. Wilkinson, Los Angeles, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BICYCLE LUGGAGE CARRIERS.—V. L. Moore, San Rafael, Cal. No. 624,629. Dated May 9, 1899. This invention relates to improvement in luggage carriers which are especially designed for use upon bicycles. It consists essentially of a flexible netting, a rectangular frame, to which the upper edge of the netting is secured, the lower portion being closed, a bar having curved hooks, and loops adapted to engage the handle bar and the vertical steering post of the machine, so as to secure it thereto, said bar having loops formed in its ends, which are engaged by corresponding loops or links in the net-carrying bar, whereby the latter is allowed to fold automatically, adjust itself with relation to the frame of the machine and to any load which may be placed in it.

CONVEYOR ATTACHMENT FOR ROPEWAYS.—A. S. Hallidie, San Francisco, Cal. No. 624,648. Dated May 9, 1899. This invention relates to a device by which buckets, hangers or load carriers are connected with endless wire ropes and is especially designed for such connection where the apparatus is employed as an aerial ropeway. The invention consists essentially of an arm having a journal at one end for the suspension of the hanger or part to be carried thereby and having the other end formed with a plurality of thin leaves drawn down so as to pass between the adjacent wires or strands of the rope and terminating in short sections which fit within the strand in the place ordinarily occupied by the core, or they may be made to embrace the core.

COMBINED GRAVITY SEPARATOR AND CONVEYOR.—Thos. J. Barbour, San Francisco, Cal. No. 624,612. Dated May 9, 1899. This invention relates to an apparatus which is designed for the purpose of separating light and heavy material and to a means for delivering the separated materials of different specific gravity at different points with relation to the apparatus. It consists essentially of a receptacle having an elongated bottom and vertical sides, a feed device at the upper end and a discharge at the top of the lower end, a chamber or well extending vertically below the bottom proximate to the discharge and in which the lower end of the inclined bottom terminates to receive heavier material therefrom, means for supplying water to the receptacle whereby the lighter material overflows therewith at the discharge, a screw conveyor and an enclosing casing therefor exterior to the receptacle, said conveyor having its receiving end entering the conveyor or well at a point above its bottom so that material of intermediate specific gravity is conveyed out of the chamber or well and is discharged at the opposite end of the conveyor. In conjunction with the feed mechanism a rotary screen is employed by which the material is separated and classified, a conveyor by which the larger portions are moved from the screen without passing through the other part of the apparatus, while the portion which passes through the screen is delivered by a chute into the main portion of the machine.

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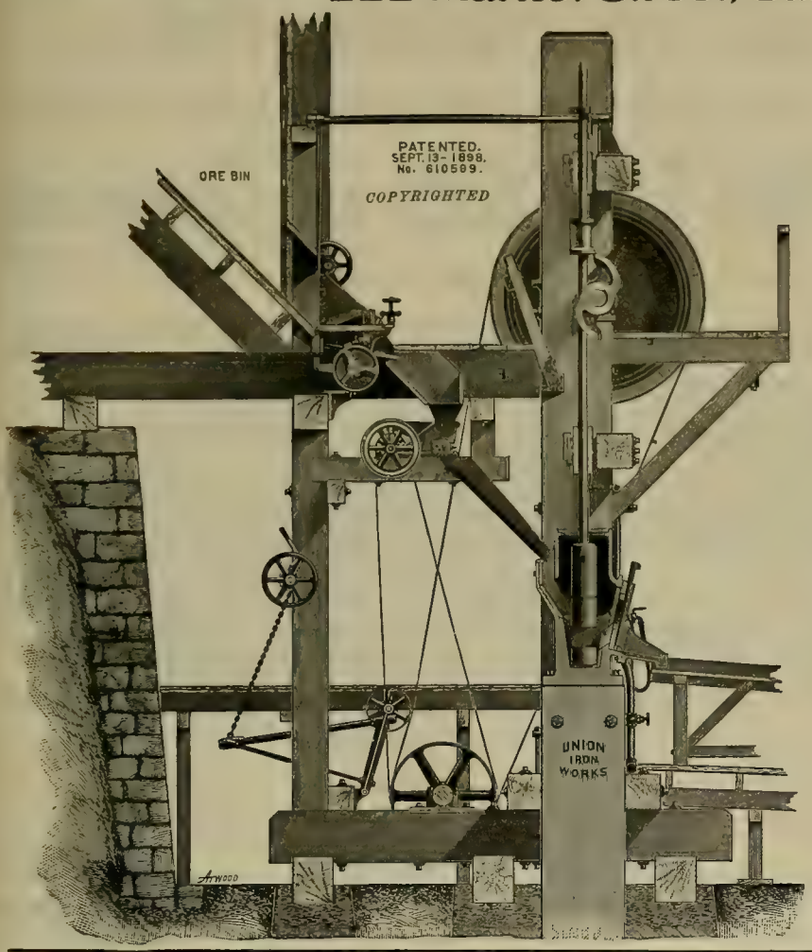

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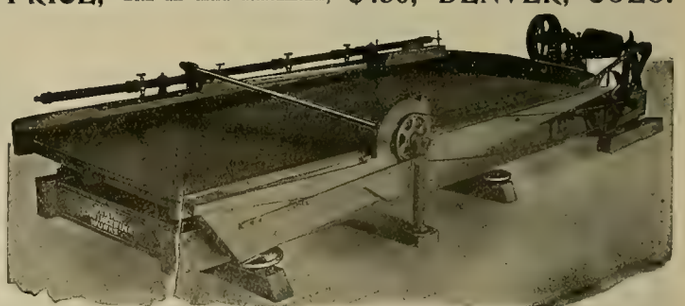

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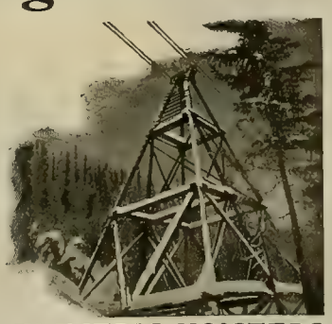

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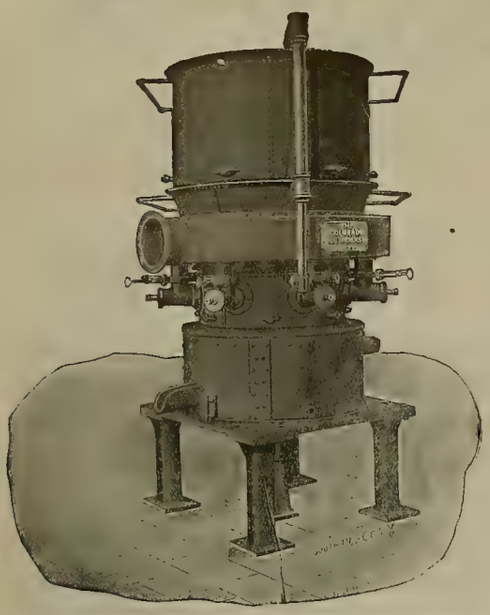

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(SEE PAGE 552.)

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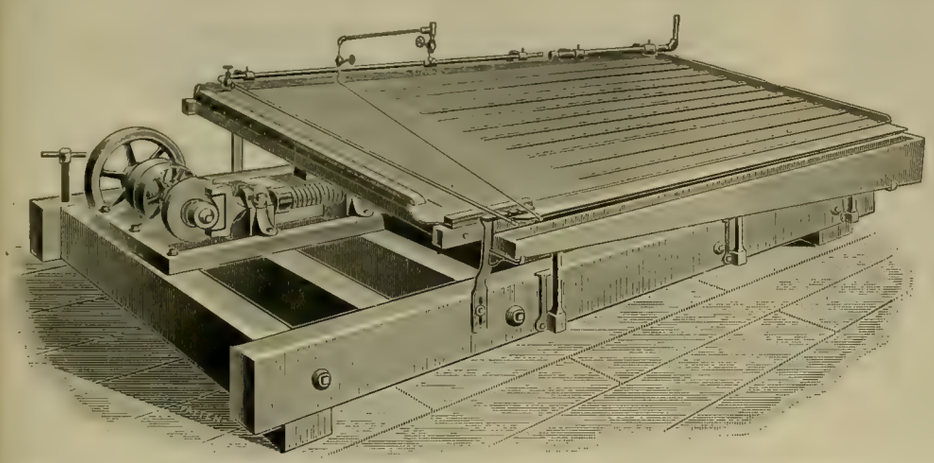

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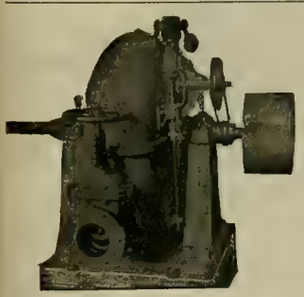

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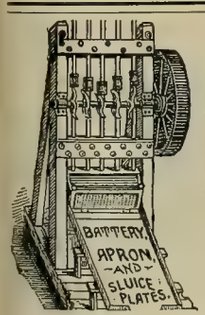

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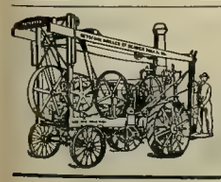

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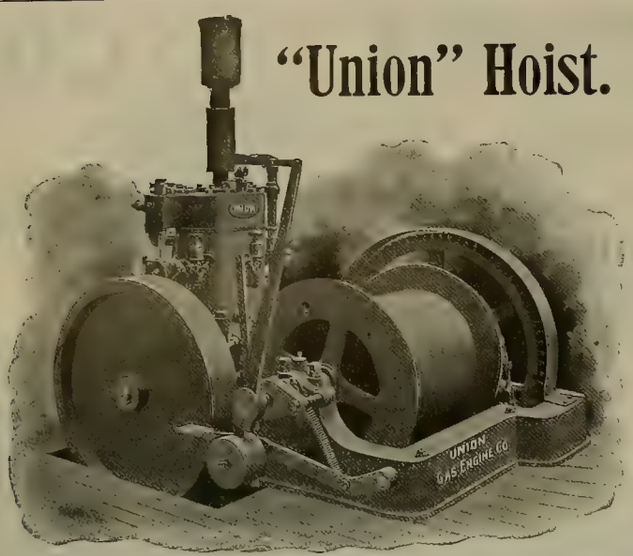

The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over800 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

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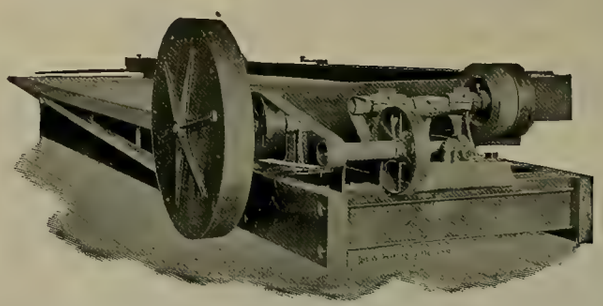

The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

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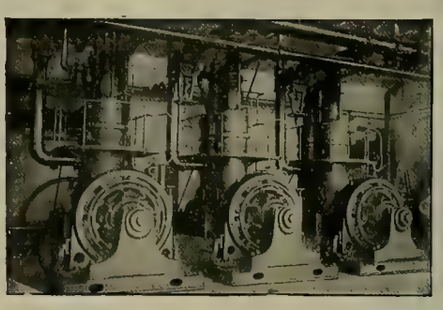

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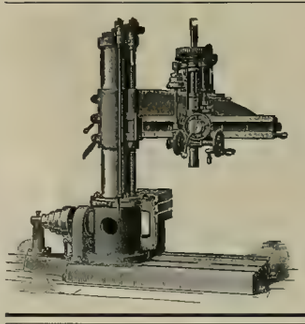

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The Jeanesville Mining Pump.

The pump illustrated herewith was built by the Jeanesville Iron Works Company of Jeanesville, Pa., for the Yellow Aster Mining and Milling Company of Randsburg, California, and has a capacity of 300 gallons a minute; the discharge pipe being 5 inches in diameter and 6 miles long.

The water pressure at the pump is 375 pounds to the square inch. This water end is a special design, pot valve pattern, intended for high lifts of 500 to 1200 feet.

As the efficiency of a complete machine is made up and determined by the efficiency of each detail, so the design of a modern mine pump becomes a study in detail of each distinct part. In former times only general results were looked for; a pump delivering the required amount of water was accepted. The mining engineer of to-day, however, not only calls for volume and height of discharge, but specifies features relating to steam consumption, simplicity, accessibility, material used and many other items relative to the general efficiency of the machine.

Figs. 1 and 2 illustrate one of the latest products from the shops of this company. The general design contemplates a pump suitable for pressures of from 500 to 800 pounds per square inch, which is compact, simple in construction and absolutely safe to perform the necessary work with a minimum of attention and repairs.

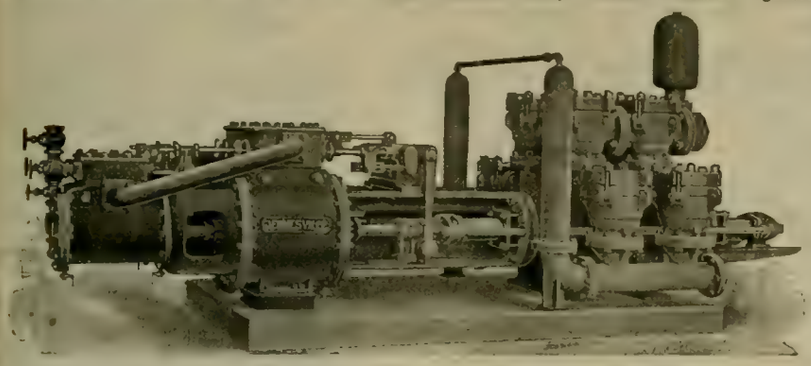


FIG. 1.

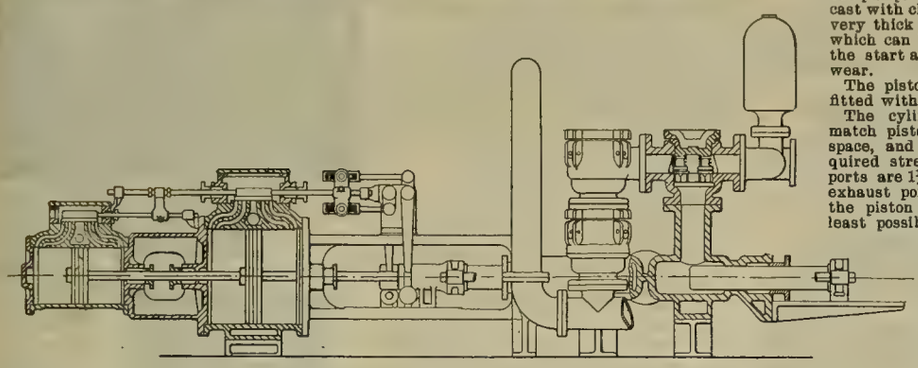


FIG. 2.

Referring to the illustration, Fig. 1, and the sectional elevation, Fig. 2, the commanding features of the detail of construction may be cited as follows:

The steam cylinders in this line of pumps are always compounded, thus insuring maximum steam expansion, high and uniform piston speed, which produces continuous and uniform discharge to the water column. The high and low pressure cylinders are connected by a yoke or cradle, and steam end complete rest upon low pressure cylinder bed plates, which arrangement allows expansion and contraction in high pressure cylinders not to interfere with the alignment of the pump. The steam cylinders are cast with close grained iron and with very thick walls, insuring a cylinder which can be accurately finished in the start and rebored after years of wear.

The pistons are hollow cored and fitted with cast iron spring rings.

The cylinder heads are faced to match pistons to take up clearance space, and ribbed outside to give required strength. The inlet steam ports are 1¼% to 2% and the outlet exhaust ports are from 3% to 4% of the piston area; this provides the least possible friction of steam, in pressing into and out of cylinder.

The valve motion is of the well known duplex type with improved outside adjustment for equalizing the stroke in the two cylinders.

A heavy rigid cradle connects the steam and water end, giving a substantial support to valve to plunger crossheads. The working barrels are made with long packing and plunger-bearing surfaces at each end.

The central divide in water cylinder is made by two spherical partitions connected by webs on the outside; the usual construction at this point is a single web, either inserted or cast with the cylinders. This revised arrangement gives greater strength and certainty of sound casting.

The valve pots or chambers are bolted upon the side and top of flanges of the working barrels and are connected with the suction and discharge piping; each pot or chamber is arranged with cover held in position by hinge bolts, for examination of the working valves.

One of the most important details of an efficient pump are the valves, and it is claimed from test and working of the pump, that the arrangement and design of valves used are as near perfection as it is possible to produce.

The valves proper work upon a bronze seating with a flat face and the cone shape of the poppets admits the water with the least friction. The combined area of each section is epual to from 50% to 75% of the plunger area. This large area allows the pump to work economically, with the valves at a minimum lift. The wing poppet valves are faced with either rubber or leather as may be desired.

The plungers are cast on end and are connected by extra large parallel rods, which serve the double purpose of carrying working strain and also to give rigidity, so that the weight of the plungers are distributed on the guides at either end of the working barrels; this relieves the stuffing boxes of the heavy weight of the plungers.

At dead end of each suction pipe is placed a large vacuum chamber, which contributes materially to the smooth running of the pump, by always maintaining a volume of water to be taken into the working barrels at the expiration of each stroke.

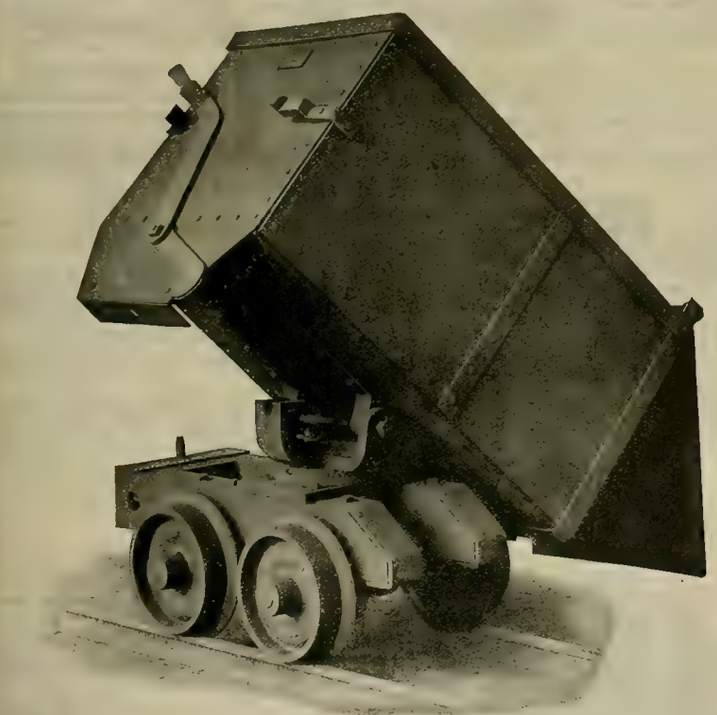
The fittings are complete, including all the wrenches, steam valves, gauges, oilers and spanners, necessary to make a quick inspection of the parts. The pump as a whole presents a compact and neat appearance and is fitted with well proportioned supports for resting on foundation.

The western office is at 1328 Seventeenth St., Denver, Colorado, A. Middlebrook, manager. *

The Standard Ore Car.

The accompanying illustration is of the Standard ore car, manufactured by the American Engineering Works, 204 Dearborn St., Chicago, Ill. Code word: Zangvogel. The cut shows a Standard ore car with Anaconda patent self-oiling axles and wheels, which is being used in many of the largest mines in this country and giving universal satisfaction.

The dimensions of the car as shown are:



Shipping weight, 1000 pounds; capacity, 16 cubic feet; wheel diameter, 12 inches; gauge, 18 inches; height over all from top of rail, 4 feet ¼ inch; height from top of box to top of rail, 3 feet 9½ inches.

Dimensions of box: Depth, 24 inches; width, 26 inches; length, 44 inches; thickness of sides, 3-16 inch; thickness of bottom, 5-10 inch.

These cars are furnished with whatever sized wheels may be desired, also for 18, 20, 22 or 24-inch gauge track.

The car body rests on a heavy cast-iron bolster and turntable, the latter being securely bolted to the truck. This permits of the car being swung in any direction desired, and the contents dumped sideways or endways. The discharge door in front is hinged at the top and operated from the rear end, with a wrought-iron handle fixed to the latch rod which runs under the car body, and by means of which the car can be exactly locked or unlocked as desired.

The sides and bottom of the car can be made of any thickness of steel desired. In the Standard car 3-16-inch is used for sides and 5-16-inch for bottom. All corners are reinforced with 2-inch angle iron, and the top and sides are stiffened with heavy steel bands and straps. The patent self-oiling axles are let into the frame and bolted strongly thereto. The workmanship, quality of material and details of the car are of the best. The car is guaranteed to stand the severest kind of work.

It is the endeavor to always carry in stock a number of Standard cars with 12-inch wheels for 18-inch gauge. Some of these cars are built with steel frame, using channel iron instead of wood, as shown in cut. *

History of the Rand Mining District of California.

Geo. W. McPherson, an old resident of the town of Randsburg and at present Secretary of the District Board of Trade, and one who is thoroughly familiar with the vast mineral resources of that part of California, has just published a very large and highly-illustrated book, in which he gives a complete history and description of the Rand mining district. The cover is printed in three colors, and the half-tone views of the various mines and town scenes are of the very best, and, as the paper used is a fine quality of coated book, they give a splendid idea of the scenes they represent. The book is certainly well written and is beyond doubt one of the finest and most extensive ever published on the resources of any mining district, and anyone desiring to have a complete knowledge of the mines and general mineral resources of that much-talked of district should have a copy. It has been placed on sale with the leading news agents of San Francisco and is selling readily for 50 cents per copy, or will be forwarded by addressing Geo. W. McPherson, Box 71, Murphy Bldg., San Francisco, Cal. *

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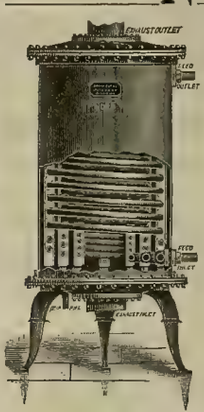

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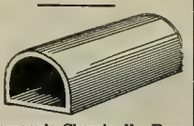

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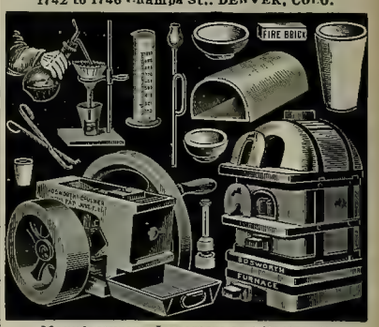

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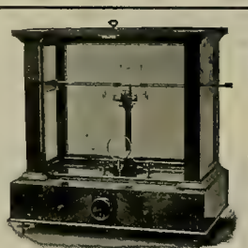

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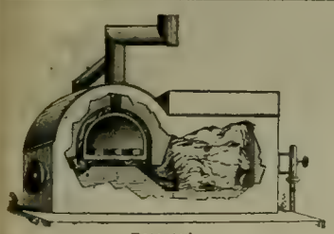

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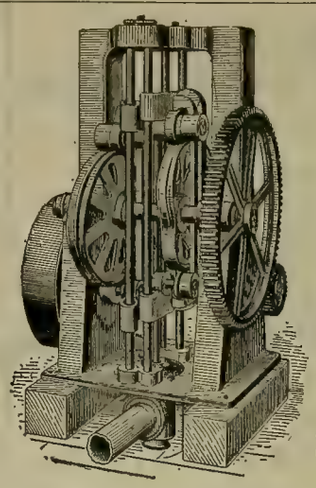

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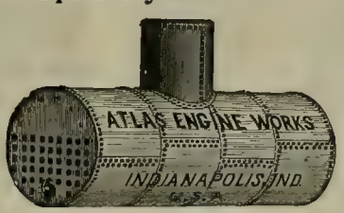

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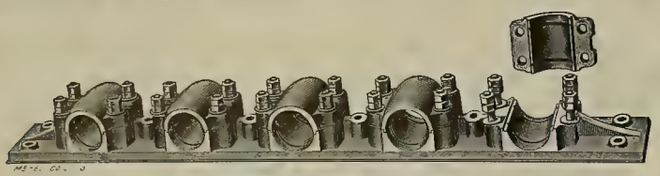

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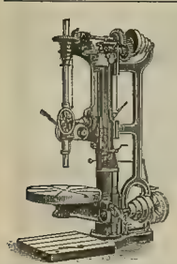

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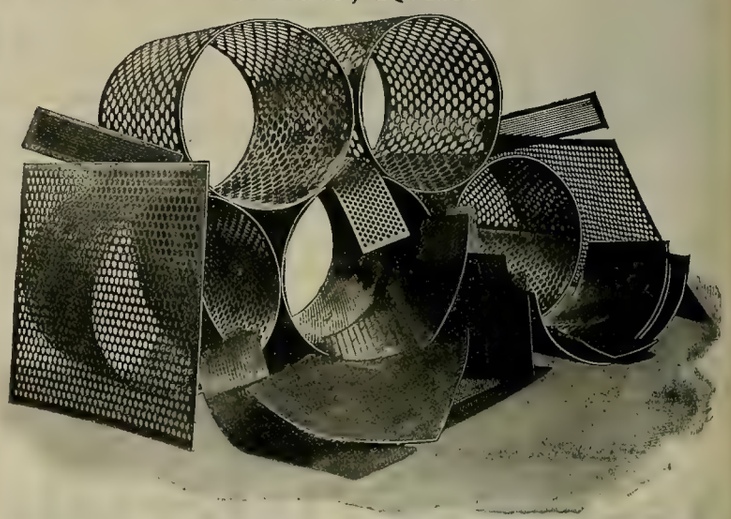

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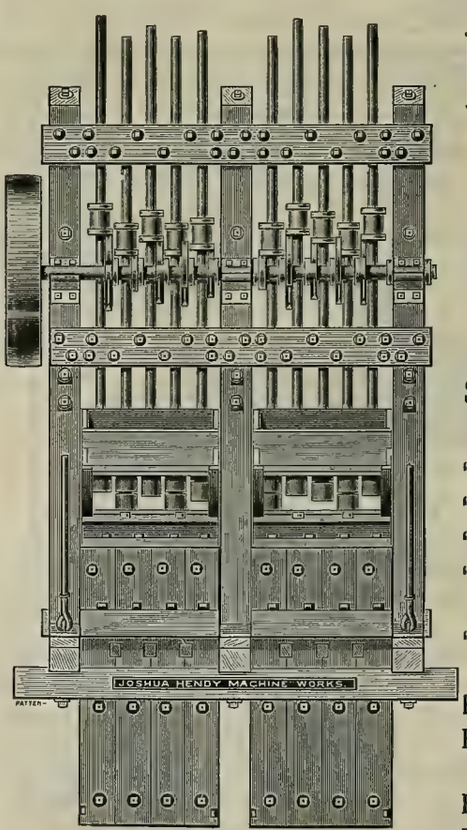

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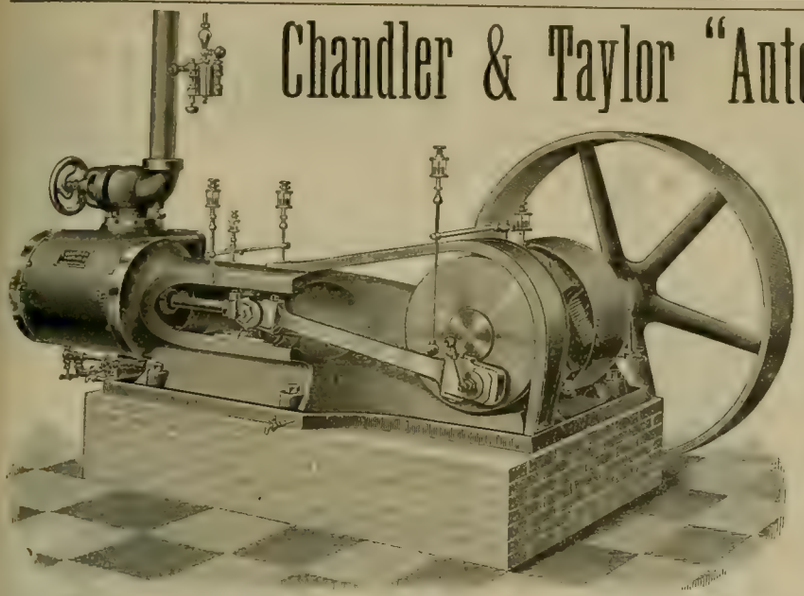

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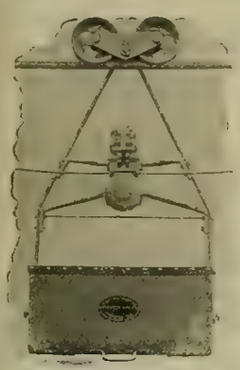

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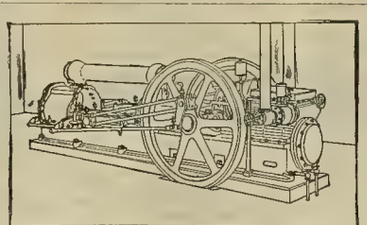

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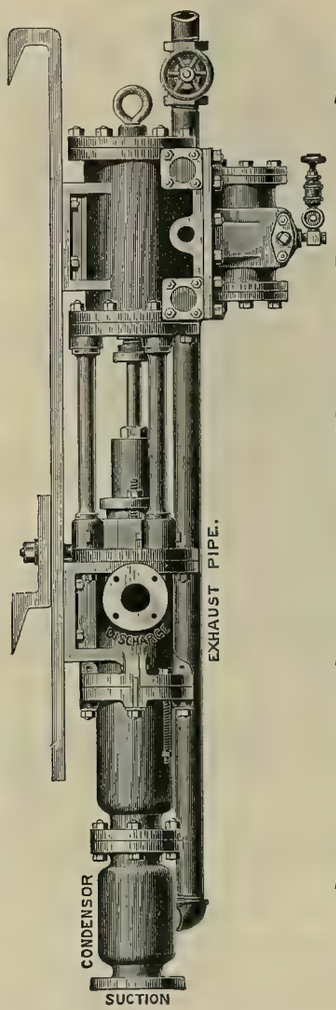

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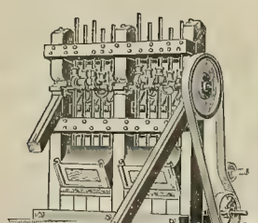

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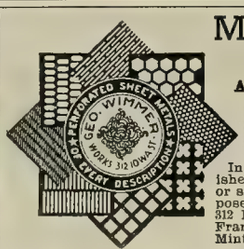

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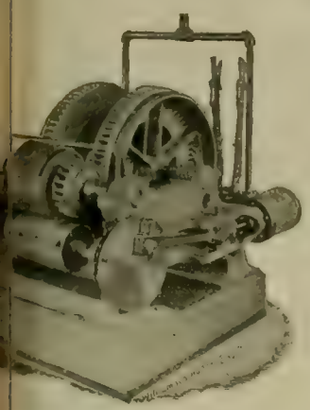

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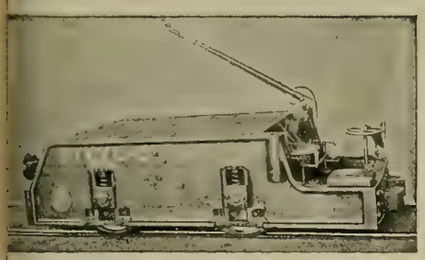

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Cyanide Potassium—99% pure, Beckton brand.
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We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

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Of the Latest Improved Design for

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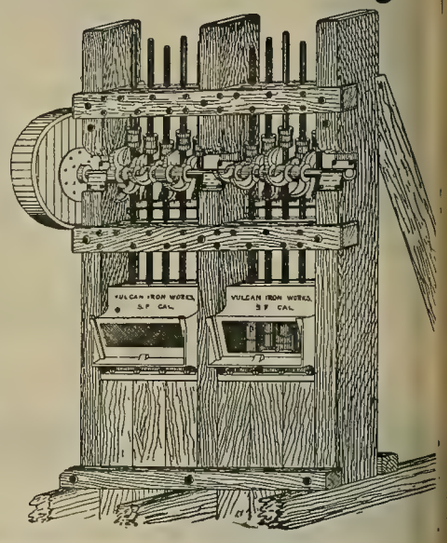

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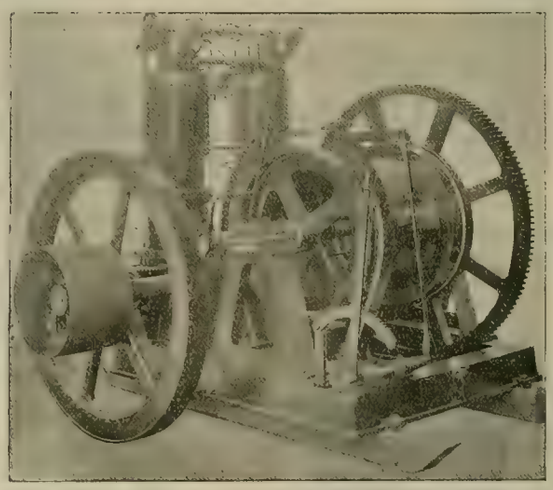

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Will Raise More Ore at Less Cost Than Any Other.

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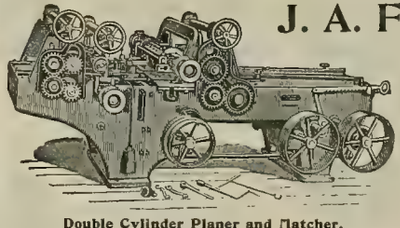

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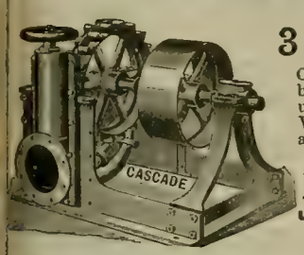

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Send for a Pamphlet of either Wheel and write full particulars.

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Suitable for all kinds of **Excavating Work**, making a specialty of

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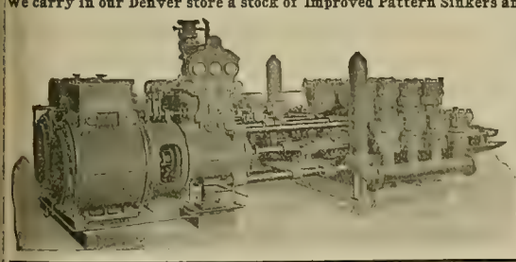

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The Sullivan Rock Drill made of Cast Steel, therefore, is very **LIGHT** and **STRONG.**
The **RATCHET** or **ROTATING DEVICE** has never been broken.
Valve motion **positive** and designed for Air or Steam and will not **freeze** or **stick.**
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Standard Electric Mining Apparatus

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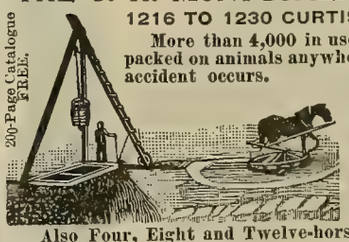

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Price of One-Horse Whim, complete, with shieves	$90.
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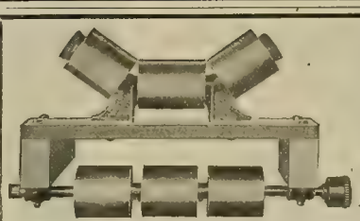
Also Four, Eight and Twelve-horsepower Whims.



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Skeleton Mining Report.

NEEDED BY EVERY MINING MAN.

FIFTY CENTS POSTPAID.

Mining and Scientific Press, 330 Market St., S. F.

Market Reports.

SAN FRANCISCO, May 18, 1899.

SILVER.—London, 28 1-16d; New York, 61; San Francisco, 61; Mexican Dollars, 48¾. New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.—New York reports quiet, $4.45 bid, $4.50 asked; brokers' price, $4.25.

Local, pipe, 7¼@7½c; sheet, 7¾@8¼c; pig, 7c; bar, 7¼c.

COPPER.—New York reports Lake dull at $19.; brokers' price, $19; mill copper plates, 23¼c.

Copper the past week has not changed materially. The Amalgamated Copper Co. does not appear to have affected the market thus far. The markets in fact have been dull for several days.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Pig, 31c per lb.; Bar, 35c. New York dull, $25.65 bid, $25.70 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $42; export, $38.50 @39; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

RED LEAD AND LITHARGE.—One ton and over, at one purchase, 6¼c; 500 lbs. and less than one ton, 6½c; less than 500 lbs., 7c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₩ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¾c; 6s, 14 oz., 7¾c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 22½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia . ..)	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 18, 1899.

9:30 A. M. SESSION.

400 Best & Belcher	49c	500 Ophir	$1 05
100 Con. Cal. & Va.	$1 40	100 Potosi	25c
100 Confidence	95c	100 Sierra Nevada	75c
400 Crown Point	26c	400 Union Con	42c
600 Mexican	43c	100 Yellow Jacket	35c
100 Occidental	27c		

2:30 P. M. SESSION.

100 Ophir	$1 05	200 Belcher	35c
200 Mexican	45c	500 Overman	13c
400 C. Cal. & Va.	$1 45	100 Yellow Jacket	36c
100 Crown Point	26c		

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Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

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For May and June, 1899, only, **Drs. Mansfield & Porterfield**, at **838 Market St., San Francisco,** are issuing certificates entitling the holder to free examination for **Rupture** or **Piles**, with treatment till cured, for $30. Send for one.

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FOR SALE IN LOTS TO SUIT.

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THE **MOORE SINKING PUMP.**

Weight 450 lbs.

No outside valve gear. Valve requires no setting. Is simplicity itself.

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UNION STEAM PUMP CO., Battle Creek, Mich.

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Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. ☞ Extra sizes and lengths made to order on short notice

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SIMPLEST.

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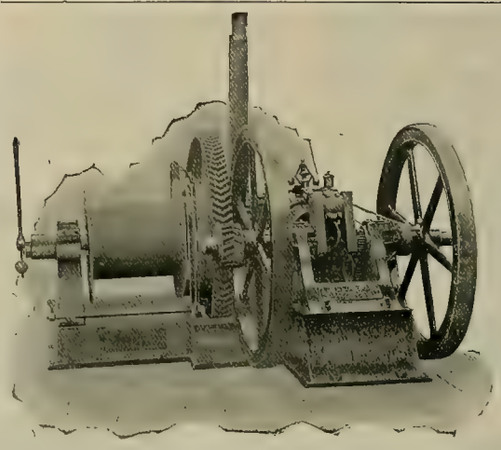

FRESNO, June 25, 1

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DEAR SIRS:—

The fifteen-horse power ... line engine and hoist purch... from you is doing fine ... and is perfectly satisfacto... every respect.

Yours truly,

TUOLUMNE MOTHER L... M. & D. CO.,

Per N. W. Moodey, ...

We have two large books full of testimonials; they speak better for the HERCULES ... we can. Our works are the largest in the country. We have built and sold over 3500 engi... they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Mar...

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ELECTRICAL ENGINEERING COMPAN...

MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevator...

Estimates Given on All Kinds of Mining Apparat...

ALSO REPAIR AND JOB WORK OF ANY KIND.

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H. P. DICKINSON. W. H. KINNON. J. F. CRITCHE...

Denver Ore-Testing Works,

CHEMISTS ASSAYERS ENGINEERS.

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WORKING TESTS by Amalgamation, Concentration, Chlorination and Cyani...

ORES CRUSHED AND SAMPLED. MILL RUNS.

Prices on Application.

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The Vancouver Assay Office and Ore Testing Work...

MINING ENGINEER, METALLURGIST AND ASSAYER.

Working Tests by Amalgamation and Cyanidation. Ores Purchas...

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Representative for:

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Engines, Boilers,

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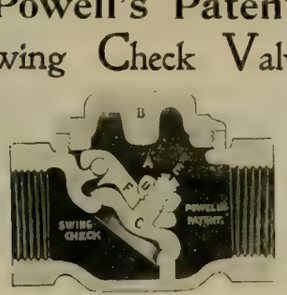
Powell's Patent Swing Check Valve.



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Can quickly and easily be reground at any time. Works equally well in either a horizontal or vertical position. Try them. Jobbers on the Pacific coast can furnish them. Manufactured by

THE WM. POWELL CO.,
CINCINNATI, O.

Assessment Notices.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

CONSOLIDATED CALIFORNIA & VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the nineteenth day of April, 1899, an assessment (No. 13) of twenty-five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the twenty-fourth day of May, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the fourteenth day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

BADGER HILL AND CHEROKEE GRAVEL MINing Company.—Location of principal place of business, San Francisco, California; location of works, Cherokee, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of May, 1899, an assessment of Three Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 27th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of April, 1899, an assessment (No. 18) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 17th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of May, 1899, an assessment (No. 13) of Ten Cents (10c.) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of June, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California.

The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

ROSE CREEK MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899 to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

MARINA MARSICANO GOLD MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of May, 1899, an assessment (No. 19) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of June, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3rd day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, Cal.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1899, an assessment (No. 3) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 11th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson street, San Francisco, Cal.

DELINQUENT SALE NOTICE.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 24) levied on the 3rd day of April, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. E. Howard	8	333	$10 00
H. S. Durden	7	2,000	60 00
J. W. Jesse	10	1,500	45 00
C. C. Duhain	80	125	3 75
C. C. Duhain	100	150	4 50
W. L. Watts	25	2,000	60 00
W. L. Watts	71	1,005	30 00
H. Sylvester, Trustee	165	1,000	30 00
F. C. Mathyas	173	250	7 50
E. H. Hamilton	70	2,000	60 00
J. H. Means	83	200	6 00
J. H. Means	91	500	15 00
Calvert Meade, Trustee	113	2,000	60 00
Calvert Meade, Trustee	115	2,000	60 00
Calvert Meade, Trustee	137	700	21 00
Calvert Meade, Trustee	196	200	6 00
Calvert Meade, Trustee	202	200	6 00
Joseph Adams	14	334	10 00
S. P. Adams	15	333	10 00
A. S. Weaver	17	150	4 50
J. A. Wiles	16	333	10 00
Wm. Wilson	18	100	18 00
John Lathrop	43	250	7 50
Van W. Jacobs	105	100	3 00
Van W. Jacobs	188	300	9 00
H. L. Barker	106	100	3 00
H. L. Barker	189	300	9 00
H. L. Barker	195	200	6 00
G. W. Schell	20.	1,000	30 00
L. V. Holmes	20.	1,000	30 00

And in accordance with law, and an order from the Board of Directors, made on the 3rd day of April, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at pubic auction, at the office of the company, 106 Liedesdorff street, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CALVERT MEADE, Secretary

Office—106 Leidesdorff street, San Francisco, California.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 6) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. Rehn, balance	77	1,000	$90 00
G. F. Volz	84	1,000	100 00
G. F. Volz	85	1,000	100 00
G. F. Volz	86	1,000	100 00
J. J. S. Pey	13	500	50 00
F. Baltz	123	500	50 00
F. Baltz	140	500	50 00
S. T. Bernhardt	182	500	50 00
G. F. Schwarz	151	66	6 60
C. Mayer	171	500	50 00
C. Mayer	172	500	50 00
C. Mayer	177	500	50 00
C. Mayer	178	150	15 00
C. Smyth	222	60	6 00

And in accordance with law, and an order from the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, 773 Mission St., San Francisco, California, on THURSDAY, the 1st day of June, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

DELINQUENT SALE NOTICE.

HEAD CENTRE CONSOLIDATED MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. B. Parsons, Trustee	108	100	$20 00
H. B. Parsons, Trustee	112	100	20 00
H. B. Parsons, Trustee	116	100	20 00
H. B. Parsons, Trustee	145	100	20 00
H. B. Parsons, Trustee	152	100	20 00
J. W. Pew, Trustee	348	500	100 00
S. B. Wakefield	361	3	60
J. W. Pew, Trustee	384	100	20 00
J. W. Pew, Trustee	389	100	20 00
J. W. Pew, Trustee	390	50	10 00
J. W. Pew, Trustee	463	100	20 00
J. W. Pew, Trustee	504	5	1 00
J. W. Pew, Trustee	536	50	10 00
G. B. Root, Trustee	564	20	4 00
G. B. Bayley, Trustee	674	50	10 00
J. W. Pew, Trustee	710	100	20 00
J. W. Pew, Trustee	711	100	20 00
J. W. Pew, Trustee	712	100	20 00
E. B. Deane, Trustee	717	100	20 00
S. Iglauer, Trustee	820	100	20 00
H. H. Shinn, Trustee	873	700	140 00
F. A. Benjamin	875	5	1 00
W. Steele, Trustee	890	500	100 00
J. W. Pew, Trustee	898	50	10 00
J. W. Pew, Trustee	905	100	20 00
H. W. Hasselgren	908	100	20 00
H. W. Hasselgren	909	100	20 00
Peter Lane	910	630	126 00
M. Rehfisch, Trustee	917	1,250	250 00
M. Rehfisch, Trustee	918	1,250	250 00
M. Rehfisch, Trustee	922	300	60 00
M. Rehfisch, Trustee	923	200	40 00
M. Rehfisch, Trustee	924	400	80 00
J. W. Pew	946	1,333	266 60
John Sinclair	951	500	100 00
A. W. Foster	957	8,000	160 00
A. W. Foster	958	4,000	80 00
Rehfisch & Co., Trustees	960	100	20 00
Jas. Rolph, Trustee	968	500	100 00
S. B. Wakefield & Co., Trust's	969	1,500	300 00
S. B. Wakefield & Co., Trust's	971	3,833	766 60
J. W. Pew, Trustee	976	400	80 00
J. W. Pew, Trustee	989	40	8 00
A. W. Foster	1010	3,000	600 00

And in accordance with law, and an order of the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the NATIONAL CON. MINING CO. will be held at the office of the Company, 773 Mission St., San Francisco, California, on MONDAY, the 5th day of June, 1899, at the hour of 8 P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

NOTICE.

SALE OF THE BUNKER HILL AND MAYflower Mines Amador, Amador County, Cal., by the Receiver of the Spring Garden National Bank of Philadelphia, Pa.

Public notice is hereby given that the mining properties known as the Bunker Hill and Mayflower Gold Mines, situated near Amador, in the County of Amador, State of California, on what is known as the "mother lode," belonging to this trust, will be sold at public auction, together with all water rights and privileges, mill sites, hoisting works, railroads and rolling stock, buildings, machinery and appurtenances belonging thereto, at the United States Custom House, San Francisco, California, THURSDAY, June 8, 1899, at 11 o'clock A. M.

Circulars containing general description of the property and particulars as to conditions of sale etc., furnished on application to

J. FRANK ALDRICH, Receiver,
Room 33, Wyatt Building
Washington, D. C.

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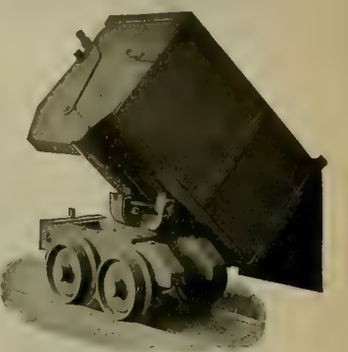
ANACONDA SELF-OILING WHEELS AND AXLES. SIDE AND END DUMPING.



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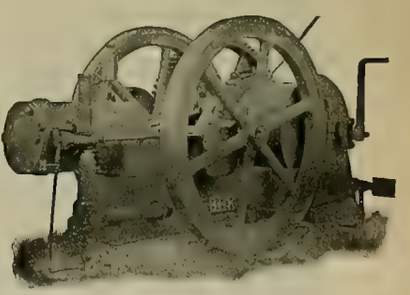

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WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

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Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

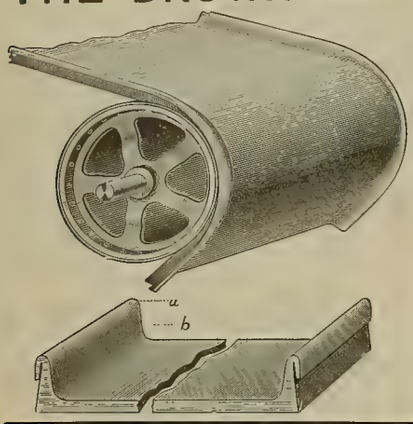
Dearborn Boiler Compounds.

TREATMENT PURELY VEGETABLE.

WATERS ANALYZED FREE—PREPARATIONS TO SUIT—ALL KINDS OF ANALYSIS—OILS A SPECIALTY—WATERS FREE—FINEST AND LARGEST LABORATORIES IN THE WORLD.

Dearborn Drug & Chemical Works,
WM. H. EDGAR, President.
29, 30, 31, 32 and 33 Rialto Bldg. - - - - CHICAGO.

THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.



It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

ORIGINAL EMPIRE MILL & MINING COMPANY,
GRASS VALLEY, NEVADA CO., CAL., Feb. 20, 1897.

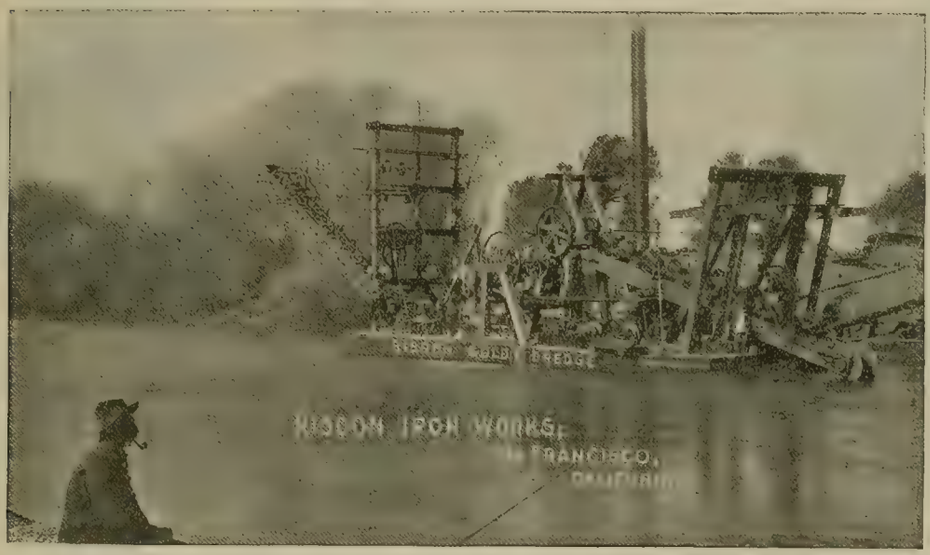
JAS. S. BROWNELL, ESQ., San Francisco, Cal.—DEAR SIR: The Brownell Patent Lip flange belt for ore concentrators, which I bought of you nearly two years ago, has been in constant use and is in good order and gives us perfect satisfaction. We have several other kinds of belts in the mill, and your belt and flange I consider the best of all. Yours respectfully, ROBT. WALKER, Superintendent.

ROANOKE MINING COMPANY,
MOKELUMNE HILL, March 4, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: We have in our 20-stamp mill at this place five Frue vanners; three of these are equipped with the Patent Lip flange belt and two with the plain flange belt. We certainly consider the former a great improvement on the latter. They will certainly wear much longer, as cracking now seems out of the question. Any one purchasing the Frue vanning machine should see that it is equipped with the Patent Lip flange belt. Very truly yours, ROANOKE MINING COMPANY.
Per G. M. WILDE, Acting Superintendent.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.
(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.



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Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines
OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.
We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.
Send for Dredging Catalogues Nos. 15 and 16.

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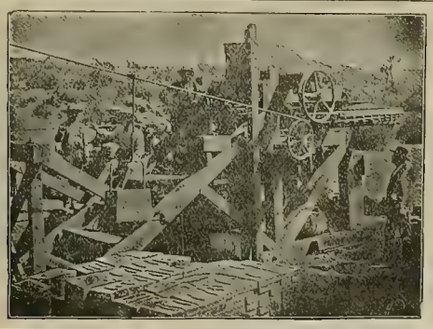

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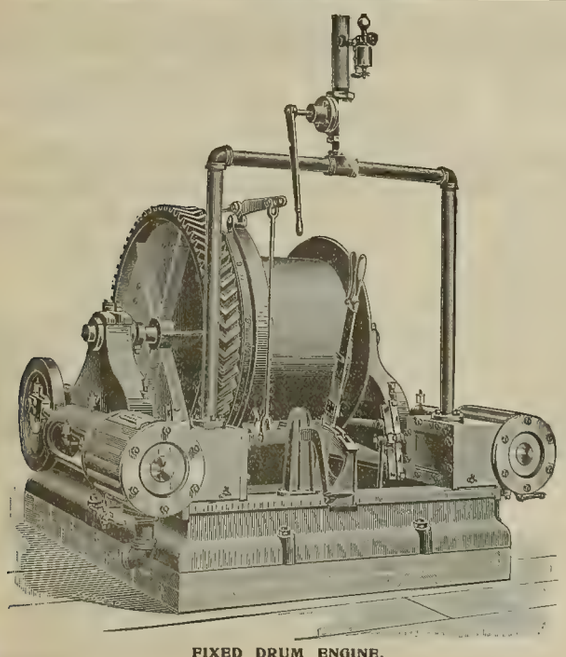

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MINING AND SCIENTIFIC PRESS.
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No. 2029.—VOLUME LXXVIII. Number 21. SAN FRANCISCO, SATURDAY, MAY 27, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A New Logging Engine.

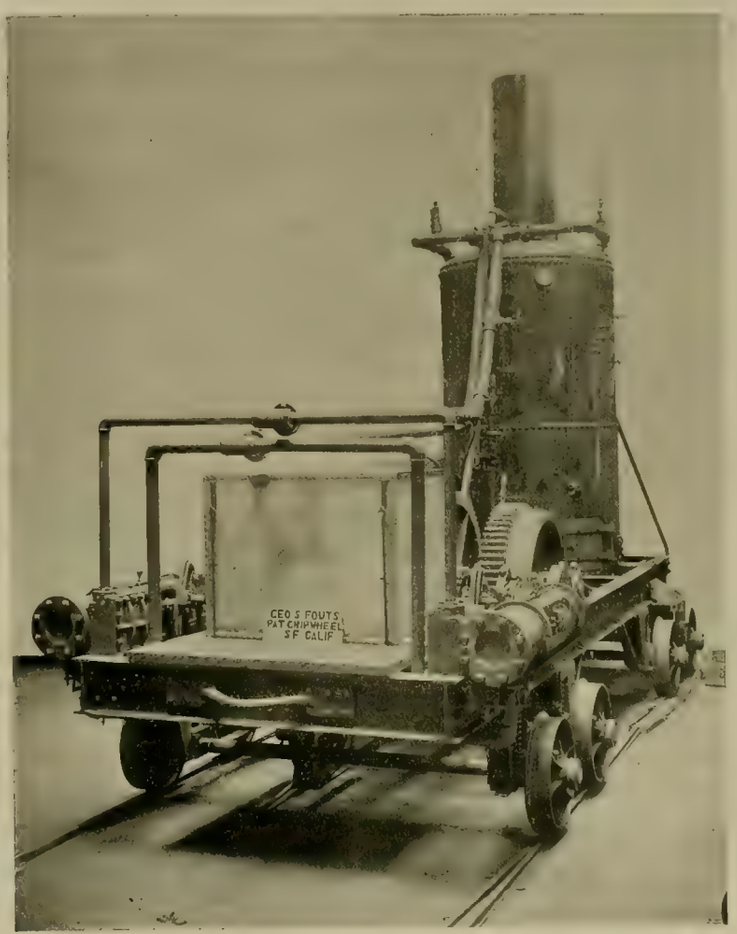
The latest designed machine for logging is the Fouts patent grip wheel for hauling logs or other heavy material where traction engines fail to do the work. What is claimed is a positive grippage of the cable without injury to it and without any slippage whatever. The accompanying cuts represent a logging locomotive for hauling on a skid road one and a half miles in length and very crooked.

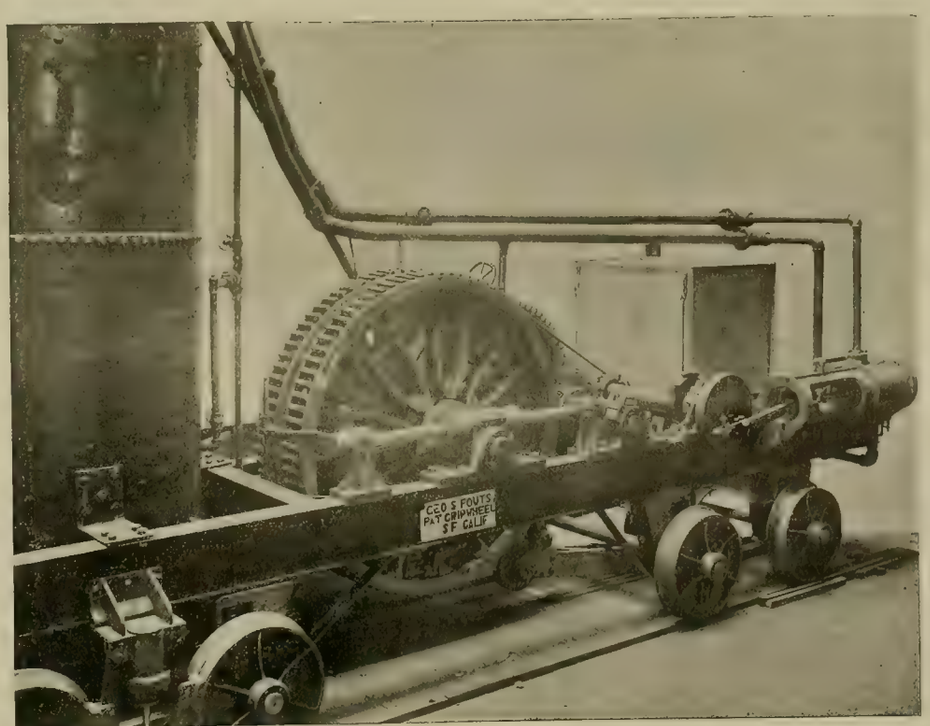
This machine is designed to run on T rails and to haul a train of logs which slides on the skids. There is a 1¼-inch crucible steel cable, one and a half miles long, which is anchored at each end, there being one turn taken around the grip wheel. The cable is first passed under a guide sheave, then over the governor sheave, once around the grip wheel and over the governor sheave, then under the guide sheave. These guide sheaves keep the cable always at the bottom of the rails and in rounding curves the cable is held in place by knees or fore masters.

The grippage of the cable is automatic—that is, the heavier the pull the tighter it grips, the lighter the pull the less it grips. There are eight grips in the wheel, of 10 inches each, six of which are on all the time and two are off. The two that are off are at the point where the cable enters and leaves the wheel. The grips are moved to and fro from a cam, which is held while the wheel turns with the grips. This cam is moved longitudinally on the shaft by a lever or arm which connects with the governor sheave over which the cable runs and the tightening cable pulls the sheaves down, and through the lever or arm pulls the cam out and increases the grippage in proportion to the strain on the cable.

The wheel is made of very hard iron and is chilled, like a car wheel, where the cable runs; the grips, sixteen in all, are made of chilled iron and easily replaced. The movement of the grips is at right angles to the cable; they are moved to and fro by the cam. The grips are made to fit the cable, and under heavy pressure tend to keep the cable round. They grip the cable after it has been placed in the wheel and release it before it is ready to leave the wheel—that is, automatically taking hold and letting go of the cable at the proper time.

The locomotive as shown has a 5-foot submerged tube boiler 10 feet high with 240 2-inch tubes, with 3 foot firebox, 4-foot tubes and 3-foot steam dome, and furnishes steam to a double 9x12-inch reversible engine under 150 pounds pressure.





GRIP WHEEL AND LOGGING ENGINE.

The gearing as shown is designed for two speeds, one at one and a half miles per hour and the other at three miles per hour. This machine will climb a 45% grade. What is claimed for these machines is that they will climb any grade, and that they will pull all the cable will stand without injury to the cable; that they will make a great saving in the grading of roads for their use over traction engines.

This machine was designed to run on a thirty-pound T rail with 8-foot gauge and with equalizer springs for running over an uneven track. The frame is made of 12-inch steel I beams and are well braced and riveted.

The machine was built to take the place of seven yoke of oxen which were hauling about 25,000 feet of logs per day a distance of one and a quarter miles, and it is estimated that it can deliver 200,000 feet per day with a haul of one and a half miles. It is now hauling logs at H. S. Colvin's logging camp, Marshland, Columbia Co., Oregon, about sixty miles below Portland on the Columbia river, and is hauling 15,000 feet of logs per trip, and from five to six trips a day.

The machinery is built for George S. Fouts by the Electrical Engineering Co., 509 Howard St., San Francisco, Cal., under their guarantee as to quality of work and material and satisfactory operation.

KANSAS CITY, Mo., is taking steps to secure the establishment of a mint in that city. They claim 27% of all the gold produced in the United States and adjacent territory is minted in San Francisco, Cal.; New Orleans 3%, and Philadelphia 70%. It is also stated that 50% of the gold is refined at Kansas City, Denver, Deadwood and Omaha, and at least a portion of this should be minted in the central section of the Union.

STATE Commissioner of Mines of Colorado Harry A. Lee has issued Bulletin No. 3 of the State Mining Bureau of Colorado, being a copy of the Act passed by the recent State Legislature creating the Bureau of Mines, and providing for the appointment of the State Commissioner of Mines, defining his duties and stating clearly the relation of mine owners and operators to the State.

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San Francisco, May 27, 1899.

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STEEL gallows-frames and mine buildings with steel frames are coming into use quite prominently, and in a few years they will no doubt become common.

AS INDICATING the feeling of the public toward the Amalgamated Copper Co., it is stated that during the recent panic in New York, with securities of almost all kinds falling, the Amalgamated Co. remained firm and has since advanced somewhat.

THE newly discovered diamond fields about Pretoria, S. A. R., are being extended by the discovery of new claims in almost every direction. The total yield from this field during the first quarter of the year was 6000 carats. These mines may become important competitors with the Kimberly fields.

COLORADO smelting companies declare they have reduced smelting charges to the lowest possible figure and that further reductions are impossible. On concentrates, particularly, it is claimed they positively can go no lower. They have been seriously considering the employment of their men by the hour.

THE copper situation is practically unchanged. The price remains at 19 cents and stocks are quiet and dull. Manufacturers find the demand unchecked by the price and the immediate future seems promising. The visible supply gained slightly during the first two weeks of May, reported from London to be 628 tons.

THE usual fate of mining camps has visited Dawson City, Alaska. A fire recently destroyed the greater portion of the town. Jerome, Arizona, the town at the United Verde copper mine, was also destroyed last week by fire, being the second time within a few months. There are few mining towns which have not had a like fate. Leadville, Colo., is one of the most fortunate in this respect.

INCREASE in output of Western copper will probably soon make itself manifest in the Eastern market. The whole mining world is being stimulated to an increased output of the metal urged on by a price higher than has obtained in many years. The result may be to lower the price somewhat, and should this occur electricity will also take a new impetus and will probably absorb the production, whatever it may be. What the future has in store for copper one can only surmise. At present it looks promising for the miners.

DO GOLD nuggets grow? is a question that has been asked many times. Under certain circumstances they undoubtedly do. Several years ago a propspector picked up a nugget in a California gravel mine which weighed $600. Ever since that time this nugget has steadily grown until now when reference is made to the finding of the lump it is usually stated that it weighed $1600. In a few years it will probably have grown to $6000 and possibly in time it may reach $60,000. There is no real evidence to indicate that nuggets grow in any other manner than above described.

SOME miners in southern California are now having trouble over the use of water for the purpose of hydraulic mining. Some time since Judge Allen of Department 6 of the Superior Court of Los Angeles county enjoined Chas. Hagan from using the waters of the San Gabriel river for the purpose of hydraulic mining in the San Gabriel canyon; and recently Mr. Allen, disregarding the injunction of the court, resumed operations, for which he was fined $250. While the disobedience of an injunction of the court in any case is almost certain to bring punishment in the way of a fine for contempt, it would seem that a hearing in the case and, if necessary, an appeal from the decision of the court might have served the miner better, for the gold-bearing gravels are twenty miles up the canyon from the lands at its mouth, where the farmers claim to be damaged by the debris. The San Gabriel canyon has its mouth near the village of Azusa, and the large boulders strewn over hundreds of acres of the land near the mouth of the canyon is sufficient evidence of the torrential character of the stream. In summer and fall the bed of the canyon is almost dry and in spring it is often a raging torrent, carrying everything before it. How, under the existing conditions, hydraulic mining (which must necessarily be limited in its character) can possibly injure the farm lands of Azusa, Covina and Duarte is difficult to understand, particularly when it is considered that the lands of the two latter villages are a mile or more from the stream.

As a great many inquiries concerning the recent repeal of the State laws of California relative to the location and recording of claims continue to be received the bill is published below in full. It is known as Assembly Bill No. 140, and repealed the local mining laws of California, enacted March 27, 1897. It passed the Assembly March 3, 1899; passed the Senate March 15, 1899, and was signed by Governor Gage March 20, 1899, upon which it became a law and took effect at once. The full text of the bill is as follows:

An Act to repeal "An Act prescribing the manner of locating mining claims upon the public domain of the United States, recording notices of location thereof, amending defective locations, and providing for the deposit of district records with county recorders, and prescribing the effect to be given to recordation of notices of location and affidavits," approved March 27, 1897.

The people of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. An Act to repeal "An Act prescribing the manner of locating mining claims upon the public domain of the United States, recording notices of location thereof, amending defective locations, and providing for the deposit of district records with county recorders, and prescribing the effect to be given to recordation of notices of location and affidavits," approved March twenty-seventh, eighteen hundred and ninety-seven, is hereby repealed.

SEC. 2. This Act shall take effect immediately.

Approved March 20, 1899.

THE production of pig iron in the United States has steadily increased until it is authoratatively stated the output now reaches 13,000,000 tons of pig metal annually, which is the largest production of iron ever made in the United States or any other country. The demand continues and a constantly rising price does not appear to diminish it. A question of great importance is, where is the supply for the future to be found? The "inexhaustible" beds in the Lake Superior region are rapidly proving that they are far from inexhaustible, so vast have been the inroads on these deposits. Even such enormous masses as those of the Lake Superior region are far from inexhaustible. An increased output is predicted for mid-summer, but this only means the quicker exhaustion of the mines. The demand is not only on the Lake Superior region, but also in the South and Missouri. If this condition lasts much longer it must eventually turn attention to the iron ore deposits of the West. There are large iron deposits in Utah, California and elsewhere, and though not at present commercially available they must soon become so. A few years hence will probably see iron ore valued as highly and as much sought after as copper now is. The fuel question, in the light of recent discoveries in electricity, seems much less important than that of the iron supply of the future.

CALIFORNIA each year is getting further from the old-time methods in mining, and the latest ideas in electricity, compressed air, metallurgy and mining methods are being adopted. The old-time ideas were good in the old time, but new methods must meet the constantly changing conditions. In newer mining communities they are not handicapped by the old-time ideas and methods, and, as a result, mines in some cases outside of California are leading this State in progressive work. California has in a measure been spoiled by the facility with which gold was obtained in the earlier days, when great fortunes were taken from the mines at comparatively little expense. That era to a great extent is past. The old mines are deep, and only the latest labor-saving devices and the best machinery of all classes should now be employed. The new mines are imitating the newly resurrected older ones and are getting the latest and best of everything. They realize that mining is a business and that the mines are deep, and, in order to derive the greatest benefit and to work to the best advantage, old-time ideas must give place to the new.

STORIES of the fabulous richness of the newly discovered placers in Lower California are beginning to find their way into the daily papers. The mines are reported to exist over a tract of country twenty miles square. There is absolutely no water, no means of obtaining supplies within several hundred miles and the chances are that the Mexicans in whose country these gold deposits are found will secure the best of the ground and, no doubt, have already done so. Still the rush has commenced and it may assume large proportions, dependent somewhat upon the continued success of those now in the field. Reports of large and fabulously rich ledges, mother lodes and other like fanciful deposits of gold galore, may now be looked for from the same source.

IT is doubtless a good, safe plan to permit your neighbor to do the experimenting, but a misplaced conservatism is quite as bad as a foolish practice of undertaking to adopt every new idea which is promulgated. Some one must do the experimenting or the world would practically come to a standstill. Well-planned experiment, based on the lines of common sense, is very often productive of great good, and experiment of this kind deserves to be encouraged. Old methods are often good, but as often new methods are much better. In the mining business new ideas are valuable, and great advancement has been made in several branches of the industry within recent years.

WHEN a notice is read in a newspaper stating that a new corporation has been formed for the purpose of operating a certain mine or mines, generally with a capital stock of a million or two with but $50 subscribed, it does not signify that the company is without funds and that sufficient money is not available for the purpose for which the company was organized and incorporated. They have simply complied with the requirements of the law which demands that the directors shall hold at least five shares each of the capital stock of the company. Many corporate companies take advantage of this to keep their business affairs secret.

ALL of the large and successful mining enterprises in the country were small concerns in the beginning of their history. A mine must be made, and it requires usually a vast amount of money, much time and planning to bring about the desired result; but no amount of money or scheming will make a mine where the values do not exist in the ground. Some great mines require much less money and less time than others to achieve greatness, and in some instances the promoters of mining schemes attempt to "thrust greatness upon" the mines they are endeavoring to sell.

Concentrates.

AN alternating current is one which rapidly changes its direction.

ON the earth's surface 52,000,000 square miles are land and 196,000,000 square miles are water.

HORN SILVER and silver chloride are synonymous. The technical or chemical name is cerargyrite.

AN anode is the positive terminal of an electric source, the cathode being the negative terminal.

AN accumulator is an apparatus employed for storing electrical energy, produced by another apparatus.

HIGH pressure steam is over fifteen pounds to the square inch; under fifteen pounds it is called low pressure.

W. S. STRATTON, who recently sold the Independence mine at Cripple Creek for $10,000,000, discovered the mine in 1891.

GOLD-BEARING gravel deposits occur in New Mexico along the valley of the Rio Grande which are from 50 to over 600 feet deep.

UNDERCURRENTS in sluices are for the purpose of relieving the sluices of the finer material, thereby aiding in saving the gold.

A GREASY piece of machinery may be quickly and perfectly cleaned by means of steam, directed by a hose attached to the boiler.

THERE is no formula which has been generally accepted for determining the velocity of water in open channels like a ditch or flume.

THE quantity of water fed to the battery must be determined by the character of the ore and the freedom with which it amalgamates.

THE best water to use in a boiler is rain water. All waters containing mineral in solution will deposit scale in greater or less quantity.

BOLIVIA is credited with having produced more than $200,000,000 in gold. New Grenada is said to have produced more than $800,000,000 in gold.

ALDER GULCH, in Montana, is said to have produced in three years $30,000,000. The total output of the gulch is placed by some as high as $70,000,000.

THE placer mines of the Black Hills, South Dakota, were mostly gulch mines. Hydraulic operations were carried on in a number of places, but on a limited scale.

A PARTIAL ECLIPSE of the sun occurs June 8, visible in Alaska near sunset. A total eclipse of the moon will occur June 23, visible in the Pacific about Honolulu.

IT is claimed Mexicans washed gold from the placer mines in western Los Angeles county, Cal., many years before gold was found at Sutter's Fort, in El Dorado county, Cal.

A FLUME is preferable to a ditch where the rock is either very hard or soft and crumbling. Where the absorption and evaporation are great, flumes should be built in preference to ditches.

RUSTY steel may be cleaned by a mixture made of tin putty, 10 parts; prepared bucks horn, 8 parts; spirits of wine, 25 parts. Mix to a paste, apply and rub off with a piece of blotting paper.

THERE appears to be no falling off in the value of the banket in the Witwatersrand, in great depth. A late interesting discovery is that of a sandstone stratum containing gold in paying quantity.

ONE of the largest if not absolutely the largest gold ore body in the United States is that in the Homestake mine, South Dakota, which on the 800-foot level is said to be 450 feet wide, all pay ore.

THE fact that a shaft has been sunk 425 feet through gold bearing gravel without reaching bedrock need not deter the owners from sinking still deeper as bedrock must lie at some point below.

OPAL is a variety of quartz in which the silica appears to have a different molecular arrangement. The hardness and specific gravity are less than ordinary quartz. It is soluble in a hot alkaline solution.

THE quantity of iron or steel worn away in mortars of quartz mills varies greatly with the varying conditions, but particularly with the hardness of the quartz. Some ores wear away much more than others.

DIAMONDS have been found in a number of localities in the United States—in California, North Carolina, Georgia, Virginia, Colorado, Wisconsin, Oregon, and, it is reported, also in Idaho, Arizona and Montana.

IN the Black Hills of South Dakota, coarse gold has been found lying on the surface of the ground 3 to 4 feet above bedrock. This was not of infrequent occurrence in the region of Castle Creek in Pennington county.

UNDER favorable circumstances stamps with a low drop may be dropped 110 per minute. There is danger at this speed of camming, that is, the tappet striking the cam. Ninety-five drops is the average speed of stamps in California mills.

NO PERSON is permitted to cut timber on the public lands of the United States for sale to others. The smallest tract of timber or agricultural land which may be filed upon is forty acres. Timber land is paid for at the rate of $2.50 per acre.

WHEN a curve occurs in a flume line, the outer side of the curve is raised somewhat in order to prevent irregular currents and splashing. Where the flume runs through a cold country this is particularly necessary, as splashing often results in the formation of ice.

THE methods for determining amount of sulphur in carbonate or other ores and substances as employed by assayers and smelting works will be found in a manual of practical assaying by Furman, and also in Fresenius system of instruction in qualitative chemical analysis.

DRY WASHING was carried on in California at first by the Mexicans and Indians and later taken up by the Americans, who substituted machines for the slower primitive method of tossing the dirt up in a blanket or pan in a current of wind. A large amount of gold has been obtained in this manner.

WHEN planning a canvas plant and chlorination or cyanide works, place the canvas plant nearest the mill and the cyanide or chlorination plant below it, arranging, where possible, so that all the pulp passes from one operation to the next by gravity, as far as possible avoiding pumping.

AS the work advances in the face of a hydraulic claim, avoid cutting in the shape of a horseshoe. When this is done the workmen soon find themselves surrounded on three sides by high banks and can no longer work to advantage. The face should be kept square across the stream.

UNDER native management the gravel mines of Chili are reported to have produced an annual average of $600,000. Americans attempted to work the mines, but without success, the yield being too small and the quantity of water scarce. The natives evidently were satisfied with small returns.

LIGHTLY cemented gravel can often be disintegrated by charging in a large arrastra run by water or steam power, where the drags will break up the material so that it may be washed readily. These arrastras should have open discharges, and, when properly arranged, should disintegrate fifty tons daily.

THE specimens of pink rubellite occuring in lepidolite in radiated crystals, found in California, are from Riverside county, near Pala Mission. Rubellite and other varieties of tourmaline, other than black, occur at Mesa Grande, San Diego county, and near Strawberry valley, in the San Jacinto mountains, in Riverside county.

IN southern California are gravel and sandy deposits of great thickness which near the surface are gold bearing. The gold occurs in a semi-cement, consisting of gravel, sand, cobbles and clay. The gold is fine and none of the deposits are rich. The deposits near Newhall in Los Angeles county are of this character.

BLACK SAND which assays in gold but contains no free gold which may be amalgamated should be sent to a smelter, if the assay shows it to contain sufficient gold to pay cost of collecting, transportation and treatment and a profit besides. Some recent shipments of this character of material are said to have yielded very satisfactory returns.

THE atmosphere in the deserts of California and in Arizona and the great basin is remarkable for its clearness when no sand storms are blowing. From Stockton hill, Arizona, Snow peak in the State of Nevada may be seen clearly—a distance of 175 miles. A more distant object could be seen as readily, as under favorable conditions there is no haze at all.

GROUND SLUICING is the term applied to the method of mining gravel by means of pick, shovel and bars, the gravel being washed in trenches cut in the bedrock. A stream of water is often brought to the top of the bank which is being caved down and assists in carrying away the debris. The material cleaned up from the bedrock in the trenches is usually washed in rockers or short sluices.

THE method of timbering mines by means of square sets was first introduced in the Ophir mine of the Comstock lode at Virginia City, Nevada, whence it came to be known as the Nevada square set. The inventor was Ph. Deidesheimer. The history and method of framing and constructing square sets is fully set forth in Bulletin No. 2 of the California State Mining Bureau—"Methods of Mine Timbering."

WHEN laying the floor of a canvas plant, dry, well-seasoned lumber should be used. Planed 4-inch boards make a good floor. They should be laid ¼ inch apart; the subsequent swelling, due to water passing over the floor, causes them to close tightly in a few days. If laid too close, the floor will "buckle up" and make an uneven surface, which would completely destroy the usefulness of the plant.

IT is claimed that there is more efficiency in a single heavy stream—2000 to 3000 inches under a high head—than can be obtained from the same amount of water under like head divided into two streams when directed against a gravel bank. The proper method of using two streams at a hydraulic mine is to use one stream to cut the bank down and the other to wash the loosened gravel into the sluices.

TOUCHSTONE, also called Lydian stone and basanite, is a variety of jasper (silica), is velvety-black in color, and, owing to its hardness and color, is often used for the purpose of testing the purity of precious metals. This is done by making a streak of the metal on the stone by rubbing. Experts can judge closely the fineness of gold by this means. Sometimes the streak is compared with that made by alloys of known fineness.

ONE reason why gold is seldom found in pot holes in auriferous streams is probably due to the fact that swift currents plunging into the depression sweep the golden particles out, redepositing them at a point lower down the stream. Another reason is that those pieces or grains that are not swept out in this manner are ground among the rocks and sand which are constantly scouring in these pot holes and are in consequence actually worn out by attrition.

WHEN selecting a site for a tunnel to develop or work a mine, do not go so low that the ore cannot be run from the tunnel directly into a mill on the breaker floor, from which the ore would descend by gravity through the various processes until it passes out of the mill. If there is a heavy fall in the canyon or gulch below the proposed tunnel site, the tunnel may be started lower and the mill may be built some distance down the gulch, in order that the ore may be trammed into the top of the mill.

BEFORE determining upon a site for building a mill the relation of the site to the mine should be carefully studied, not only for the present need but for the probable future requirement of the mine. A mill badly located is always thereafter a source of trouble and expense. Where convenient, select a site where the several floors may be graded out and cut to bedrock. Never leave a high face on a cut in the rear of a mill without building a retaining wall in front of it, unless the face be solid rock, which will not cave.

A GLASS water gauge may be cut with a new file. Wet the file and run it two or three times around the place where it is desired to cut the glass. Then grasp the tube firmly with the thumbs about an inch apart and at equal distances from the file cut, bend the tube and if the cuts have been properly made it will break where desired. Another method is to tie a cotton twine around the glass at the point it should be cut off. Saturate the string in coal oil or alcohol and light it. After it has burned a minute plunge into cold water and the tube will snap off where the string was tied.

IT is said that the women of Honduras washed gold from the sands of the Guayape river and from the proceeds of their labor paid for the construction of a church at the town of Juticalpa. The gold was gotten by washing the auriferous sands in bateas. They seldom took gravel from bedrock and often waded into the stream, dipping up the gravel and sand from under the water and dexterously separating the gold from the wash. A large number of women engaged in the work, which was continued over a period of years before sufficient gold was obtained for the purpose.

SCHEELITE is calcium tungstate of pale yellowish, brownish, reddish or greenish shades, sometimes white. It is from transparent to translucent. Its hardness is 4.5 to 5, about the same as apatite. Its high specific gravity is a notable characteristic, being from 5.9 to 6.1—considerably above that of baryta (heavy spar), which is about 4.3 to 4.5. It is the heaviest mineral which is transparent and glassy, excepting lead compounds, such as cerussite and anglesite. It is sometimes found associated with wolframite, an iron-manganese tungstate, in granitic and other crystalline rocks.

THE extremely fine slimes floating on the surface of the wash boxes of vanners and elsewhere about mills may usually be settled by allowing the current carrying the floating material to pass through a piece of pipe, the lower end of which is bent downward, and discharging under water. The greater portion of the slimes will remain under the surface and settle to the bottom. All current must be avoided as far as possible. When this floating mineral passes from one box to another through a pipe or otherwise, and is allowed to discharge even a short distance above the surface of the water below, the material rises to the surface and floats as before.

RUBY SILVER is of two kinds, antimonial and arsenical. Pyrargyrite is dark red silver ore, occurring in crystals and also massive and compact, brittle and soft, luster adamantine metallic, color black to grayish black, streak purplish red; sulphur 17.8, antimony 22.3, silver 59.9. Proustite is light red silver ore, which also occurs in crystals and massive to compact; color scarlet vermilion; sulphur 19.4, arsenic 15.2, silver 65.4. Polybasite is also an antimonial silver ore containing sulphur 15, antimony 9.4, and silver 75.6. Sometimes part of the silver is replaced by copper and the antimony by arsenic. The color of this ore is iron black, luster metallic.

ONYX is a name applied to a kind of agate arranged in bands. The colors are usually clear brown and white. The so-called Mexican and Arizona onyx is almost pure carbonate of lime, the variety known as aragonite containing a low percentage of silica. The colors are due to iron oxides. These rocks have resulted from a long-continued deposition of calcium carbonate from calcareous springs. The Big Bug, Ariz., deposit covers about eighty-five acres in a tract of 200 acres, and varies from 1 foot to 50 feet in thickness. Aragonite occurs in California at a number of places—in San Luis Obispo, Solano and San Bernardino counties, and also in Inyo and elsewhere.

ANY person locating a mining claim in California after the repeal of the local (State) laws by the recent State Legislature relating to the location and recording of mines, by which the locator now acts under the federal statutes, and who has fully complied with the requirements of the former State laws, need have no fear of the validity of his location for the reason that the State law required more of the locator than was required by the federal law and the State law was at no time in conflict with the federal law. Necessarily the locator, who, unaware of the repeal of the law of March, '97, locates his claim in accordance with that law must be within the requirements of the United States law.

LOWER CALIFORNIA was discovered in 1534 by an expedition sent out by Cortez. It is a hot arid region in which there are few living streams. There are here and there fertile spots in the valleys, and should sufficient water be obtained for irrigation many places would become fertile. The gold mines occur throughout the length of the peninsula, beginning at the international boundary. It is not unlikely that the discovery of placer fields at Santa Clara, called by the Mexicans Cerro Pinto or Painted Hill, may lead to the discovery of other fields in the vicinity. Some of the mountain ranges in the interior rise to a height of 11,000 feet or more, one of the principal mountains being San Pedro de Martin.

WHEN a mining claim is located it is subject to any prior rights which may exist—as a claim which is crossed by a ditch which existed before the claim was located. In this case the ditch may be maintained. In the event, however, of failure to cause the water to flow through the ditch, or to use the water for a period of years, it might be looked upon as an abandonment; but how the court would construe this cannot be anticipated. Their act in cleaning out the ditch every two years may hold their claim to the water. There are, in cases of this kind, many things which only appear when the case has reached the courts. There are no features of the mining law more perplexing than those relating to water. This case would probably have to be tested in the courts.

SWELLING GROUND can not be held in place by timbers. In drifts heavy posts should be placed having a wide spread at the foot, and heavy caps should be provided. Lagging 2½x8 inches is heavy enough, and these should be driven at the sides not closer than 10 inches. The ground will press through the open space and can be cut out, relieving the pressure temporarily, but later the same thing must be done again. The lagging will bend considerably before it will break, thus giving indication of the increasing pressure. The ground should be relieved at once, whether it is working through the spaces between the lagging or not. The foot of the post should not be spragged across the drift, for it will result in the crushing of the sprag and also probably the breaking of the post. If the foot of the post is crowded in by the shifting ground, set up false sets on either side; if necessary, cut out the ground back of the post and replace it in its former position.

Some Characteristic Mines of the California Gold Belt.

Written for the MINING AND SCIENTIFIC PRESS.

The most important mine thus far opened on the east lode of the gold belt in Mariposa county is the Hite mine at Hite's cove, on the south fork of the Merced river. The mountains are very steep and rise from 2000 to 4000 feet above the river. The hills are densely clad with chaparral and greasewood and the higher ridges and slopes support a growth of yellow pine and a few oaks. There is but one road into the region, that from the direction of Mariposa, made at great expense. The rock formations exposed in the vicinity are those characteristic of the Calaveras formation, consisting of clay slates, mica schist, quartzite, crystalline limestone and more or less silicious beds of slaty structure. These rocks are greatly folded, shattered and crushed, and indurated by pressure and intruded by dykes of diorite, granite and felsitic rocks.

The Hite vein strikes N. 70 W. and dips northeasterly at about 75° in the clay slates. It maintains a remarkably straight course for a long distance, but is accompanied by numerous branches, mostly into the hanging wall side. The slates are foliated, metallic and lustrous, usually soft and often crushed to a gouge-like condition. Rock of this character is very heavy and necessitates frequent repairs to timbering. Whenever this rock presents a smooth, perfect slaty cleavage it is always at a distance from the fissure. The latter condition gradually changes to that of the foliated mass above described upon nearing the crevice, whether it be ore-bearing or not. One remarkable phenomenon connected with the Hite vein is the splitting off of a large vein which makes out into the foot wall side in a sweeping curve and returning to the main fissure again in a distance of about 600 feet from the point of departure. In depth it also reunites with the main vein at a depth of about 600 feet. The enclosed mass of slate has the form of a large plano-convex lense, having a diameter of 600 feet and a thickness at the center of 45 to 50 feet. The segment of slate is enclosed between two veins of quartz, each of which is gold-bearing, and, as the results of operations showed, was rich in gold. The surface croppings of milk-white quartz a few inches to 12 feet in width were studded with dull yellow gold, and from the day of its discovery the owner was practically a rich man, for, though almost penniless at the time, he soon had pounded out in a hand mortar enough gold from the rich quartz to supply every necessity and later to build a mill. The vein has since produced nearly $2,500,000.

The fissures have been extensively developed to a depth of 900 feet below the croppings through crosscut tunnels, the lower of which reaches the vein at a depth of 600 feet, and is nearly 1400 feet long, driven through hard slate of the foot wall country. A large dyke of felsitic rock accompanies the vein, lying in the hanging wall, and is usually in contact with the vein. In the lower workings the vein varies from 4 to 25 feet in width, the latter obtaining at the union of the hanging wall vein with the branch split off in the foot.

The quartz commonly includes more or less slaty material, a feature common to veins in slate rock everywhere. A banded appearance of the quartz, probably induced, in part at least, by the original slaty structure of the rock which has been replaced by silica, is very noticeable and persistent throughout the mine. This banded or ribbon structure may possibly have been intensified by pressure. The physical appearance of the quartz is not always a safe index of its value, for two pieces of rock may be alike to all appearances and still differ greatly in value. The mine has not had any development worthy of mention in the hanging wall side, but there are abundant indications that good shoots of quartz may be found there. It is a mine well suited to prospecting from the old workings by means of the diamond drill.

The mine has been idle for some time and is presumed to be worked out. The fissure is still strong, with all the physical conditions which characterized it at the higher levels, and it is only reasonable to anticipate a repetition of these ore shoots at greater depth. Should they not occur in the same fissure, they may be found to have lapped, as is frequently the case.

Another important mine in this county which also occurs in black slate is the Princeton, on the Mariposa estate, at Princeton. It was worked in the '60s and is reported to have produced more than $4,000,000 to a depth of 600 feet. Little at this time is known of the old mine workings other than that the gold was derived from a single large shoot presumed to be worked out. The last operations conducted at that mine were not creditable to the management, as the workings and shafts were filled up with waste rock in the process of gutting the mine, and there is no probability that it will ever be reopened through the old openings. A dyke of light gray felsitic rock also accompanies the Princeton vein, lying in the hanging wall side and often in contact with the vein. The longitudinal continuity of the vein has never been satisfactorily established beyond the workings—at least no pay rock in quantity found on an extension of the vein.

On the foot wall side for a width of several hundred feet there are a number of gold-bearing veins which possibly belong to the Princeton system. Should the mine ever be reopened it will probably be by means of a vertical shaft sunk in the hanging wall at such a distance that the vertical will strike the vein at great depth and far below the deepest old workings. W. H. S.

Mining Towns of the Lake Superior Copper Region.

The copper country of Michigan never knew the meaning of hard times. Year after year there is plenty of work, profitable work, too, both to the miner and the stockholder. Practically isolated from the rest of the world, the people are about 100 years behind the times. They have no push, none of the ambition which characterizes the average American. They are a contented lot, and in their isolation they feel secure from hard times, panics, etc. Most of the miners are Cornishmen, who have not been affected by the American way of doing things. When once assured a position in the mines, the Cornishman has no more worry about work, for on the average the miners work all their lives in the same shaft, at the same work and on about the same pay.

There are few places where the effects and consequences of paternalism are better manifested. The mining companies, to all intents and purposes, adopt the miners; the company's physicians look after the physical welfare of the men; the miners must buy their goods at the company's store; indeed, the company takes charge of the employe in all the various relations of life. And the miner is contented, too. Very seldom is there any trouble, and all the difficulties are readily adjusted.

There are no cities in the copper country—the companies do not care to pay the cost of maintaining city governments. All the mining centers are governed under village charters; all such institutions as water works, electric light plants, etc., are built by the mining companies; they build the churches, the schools, the library buildings; in short, the destiny of the miner is entirely in the hands of the mining company. The employe, whether Cornish or Italian, realizes this and works accordingly.

The Calumet & Hecla Company is a great mining company, whether judged from the standpoint of machinery used or dividends declared. Since the mine was first operated in '71, under its present name, over $60,000,000 has been paid in dividends, and there is now over $7,000,000 in cash in the treasury. The company owns its water plant, its smelting plant, practically the whole village of Calumet, its coal docks, railroads, twenty-six churches, as many schools, hospitals, and the village officials—for no one can obtain such a position without the approval of the company's agent.

The stock of this company once sold at $3 to $4; last February it sold at the enormous sum of $890 per share. In Calumet there is a drayman named Peter Kaus, who owns 700 shares of the stock; all the dividend money is immediately invested in shares of the stock as fast as he receives it, and he takes great pleasure in carrying a satchel for 25 cents. In fact, he lives from the proceeds of his business as drayman, notwithstanding that he is worth three-quarters of a million. Up to the present time this company has produced 1,260,000,000 pounds of refined copper.

The stamp mills on the shore of Torch lake crush 2,000,000 tons of ore yearly, and the pumping capacity of the plant is up in the hundreds of millions daily.

The mineral vein on this property is 35 feet wide and its depth is yet a matter of conjecture. One shaft has been sunk to a depth of over a mile, and the ore still continues. It is stated that nothing but a high temperature consequent to a great depth would ever stop work in the mine. The engine driving the cable to the shafts on this property has a horse-power of 35,000, is built in duplicate, and was designed and built by the Krupp Company, Germany. The cars are drawn and lowered the whole length of the deepest shafts in about two and one-half minutes, and the sensation of a person taking a ride in one of the cars is indescribable. You seem to be falling right through the earth and the time seems to be hours.

REPORTS of mining engineers and copper experts familiar with recent developments of the copper regions of Arizona say there is no doubt that that Territory will speedily become one of the chief mineral producing regions of the country, the main mining interests being in the production of copper. There is great activity in all branches of mining throughout the Territory, and parties are constantly coming in, looking for investment. The mines are generally from 4000 to 5000 feet altitude.—Iron and Steel.

Some Experiences of a Working Miner.

NUMBER XVII.

Written for the MINING AND SCIENTIFIC PRESS.

One day C—— and R—— came trudging down the steep mountain side near C—— and one of them picked up a nugget weighing nearly $2. They looked about on the ground for half an hour, but found no more and continued on down the mountain to their cabin near the mouth of the gulch. During dinner they talked of the finding of the nugget and concluded there must be more where that came from. They felt sure they would be able to take out considerable gold at little cost if they had sluice boxes; but they had no sluice boxes, and none could be obtained nearer than six miles. They determined to bring the necessary boxes and accordingly the following morning they started out with two pack animals and finally brought over three lengths of sluice box which they had used at another mine. They spent three more days in building a dam in C—— creek and another day and a half in cutting a roadway up to the place where the nugget was found. At the end of a week's hard work they were ready to mine and started in early Monday morning. They picked dirt half a day and at noon cleaned up, and got just one 10-cent color. Now, all this work might have been saved them if they had done a little preliminary prospecting.

When R—— staked M—— at the B—— mine he thought he would make a fortune. For a month or two reports from the B—— mine were favorable and R—— was elated. Then a week passed and no report. A little later he heard a rumor that the B—— mine had pinched out, and later news convinced him that this was so. The next step was to try and sell out before any one learned of the failure. R—— hunted up H—— and after deftly leading up to the point said that he wanted to go East again, being tired of living in the wilderness. He was getting old and should have rest and ought to live in a place where he could go to church, etc. He then asked H—— to bid on a half interest in the B—— mine, and H—— offered a small sum, which R—— accepted with apparently great reluctance, but with secret pleasure. A few days later H—— heard of the misfortune that had overtaken the B—— mine, and meeting R—— asked him about it. In reply R—— promptly offered him the remaining half interest, which, to his surprise, H—— took, at a still lower figure than had been paid for the first half. Two days later G—— came into camp from D—— and inquired for R——. He stated his business and offered a good round sum for the B—— mine, not knowing R—— had sold it. R—— made every effort to buy the mine back from H——, offering all kinds of prices below the handsome offer of G——, but H—— expressed himself satisfied and would not sell. It is not always safe to believe all one hears of the development of a mine, whether favorable or not.

In the same camp was another prospector who had a claim, which he held very high. He worked in a dry gulch placer to obtain the necessary funds to work the quartz mine. Eventually he worked out the placer and, having no surplus, made an effort to sell the quartz mine at a high figure. As he was unsuccessful he continued his effort, lowering the price from time to time, until he offered the once valued claim for a grubstake. Two young men came along about this time and made an examination of the vein, did some prospecting and took away with them a quantity of the ore. Two weeks later they returned and after some preliminary talk offered $6000 for the claim. The owner became at once indignant and refused to sell at any price. As far as I ever heard he never had another opportunity to sell.

The term "apex" is a simple one physically. It means the top or summit of an object, as a cone, a pyramid or hill. Legally it is the term applied to the "croppings" of a mineral vein or deposit; that is, that portion nearest the surface of the earth whether actually being exposed along the surface or lying beneath it and covered with soil, gravel, rocks, water or anything else. The term, however, is not as generally understood as might be supposed.

During the progress of the great D—— vs. D—— case, one of the lawyers connected with the trial called Mr. W——, a practical miner and a man who had seen considerable of the mining world. The attorney, during the course of his examination of Mr. W——, evidently realizing that the term "apex," which had become so familiar in the case was not fully understood, wished the jury to have this fact thoroughly impressed on their minds.

"Now, Mr. W——," said the attorney, "will you kindly explain to the court and the jury the common acceptance of the meaning of the term "apex" among miners and prospectors generally?"

Mr. W—— looked thoughtful for a moment and then said: "I have been about among the mines of the Rocky mountains and Pacific coast a good deal, and, of course, know a great many intelligent miners and prospectors; but really I don't think more than one in twenty of them would know an apex if he should find one lying dead in the road."

These instances serve to show that mineralogical

and legal terms in mining are not always thoroughly understood or interpreted.

When the K—— Mining Company built their pan mill they concluded to build an ore chute and thus obviate the necessity of packing ore down the steep mountain trail. The chute was built of wood, 2 feet wide and 18 inches deep. It extended from the lower dump to an ore bin directly back of the mill. When the first carload of ore was dumped into the head of the chute there came a roar and a rattle as a ton of ore rushed 500 feet down the steep slope. When the ore bin was reached large chunks of ore knocked the gate out and half a dozen boulders of rich chloride ore went through the roof of the mill, narrowly missing the man on the breaker floor. After repairing the damage the pack train was brought into use again.

When B—— was superintendent of the S—— mine he went up into the open cut one evening and directed the men to drill several deep holes and one short one—about a foot—and leave it. They did as they were directed, but naturally had a curiosity to know what was to be done with the shallow hole. The following morning B—— went to the cut and sent the men at work there to a distant part of the mine, underground. He then got the stable man and proceeded to get drill and hammer and go to work. The stable man took the drill and ran it down into the hole while B—— grasped the double-handed hammer firmly with both hands, gave a tremendous swing and missed the drill, plunging forward and falling over the stable man, who assisted him to his feet. "Catch hold of the drill, Ben," said B. But Ben, for some reason, seemed to lack confidence in B——'s ability to hit the steel bar, and so expressed himself. "Boss," said Ben, "you hit too hard; take it easy at the start and work up to it." So B—— started in easy and made better headway. Between each blow of the hammer Ben would timidly reach forward and give the drill a turn, and then hastily pull away as he saw the hammer descending. After awhile this pastime became work, and B—— put on his coat and he and Ben went down to the office, and the miners silently drew back into the dark recesses of the mine and when B—— was out of hearing groans and suppressed yells of merriment reverberated through the dark galleries. MINER.

Increasing Trade With China.

Exports of merchandise from the United States to China in the fiscal year about to end will be larger than those of any preceding year in our history. A decade ago the exports to China were less than $3,000,000, and to China and Hongkong combined were little over $6,000,000. In the fiscal year 1899 our exports to China will be more than $13,000,000, and to Hongkong more than $6,000,000, making a total to China and Hongkong of over $20,000,000, or more than three times as much as that of a decade earlier. That the bulk of the exports to Hongkong may properly be considered as ultimately destined for consumption in China is shown by the fact that the official reports of the imports into China show that over 44% of their imports are from the port of Hongkong. The 1899 exports to China and Hongkong combined will show a gain of nearly 25% over those of last year, while the total exports from the United States for the fiscal year 1899 will be little if any in excess of those of last year, thus showing a more rapid growth in our exports to this particular part of the world than elsewhere.

Among the things which will form an important addition to our exports to China in the future will be mining and milling machinery of every description. Already American mills and machinery are finding their way into that land, and the outlook for the coming year is more than promising in that direction.

The Great Lead Mines of Missouri.

In St. Francis county, Mo., within an area of nine miles square, are located the largest lead mines in the world. The ore in St. Francis county occurs disseminated in the lowest of the magnesian limestone series, particularly in that stratum which immediately overlies the sandstone. Beneath that is found granite and porphyry. This formation occurs in a general course from northeast to southwest. Ore chambers have been found two miles long, the vein varying in thickness of from 10 to 100 feet, from 30 to 50 feet thickness is by no means an exaggerated average. The average rock now being mined throughout the district contains from 8% to 15% of metal—although as high as 40% has been found. The mines require no timbers except around the top of the shaft. In large ore bodies pillars of ore, with smaller rock pillars, are left standing. There are two kinds of deposits, one in the vicinity of faults, and the other at a distance from the faults. The rock near to the breaks is more slab-like, and contains heavy ore, but the general dissemination is smaller. More care has to be exercised in the extraction of this ore to prevent caving of the walls. In the other case the ore occurs disseminated in the massive lime. Here roof and pillars stand as firm as the best constructed bridges.

The Rise in Zinc Due to More Extended Use of Electricity.

With the advent of the horseless carriage and other improvements to which electricity is applied, has come prosperity to the miner who delves into the earth to get out the rusty-looking stuff, which, after being crushed, is put upon the market as zinc ore.

Several important features have added to the prosperity of the zinc miner. One is the great strike in Belgium, which closed the zinc smelters of Europe and increased the American zinc export, and the other is the increased use of galvanized iron in this country. From $26 a ton the price of ore has jumped to $55 within a year, and this is said to be due to the exhaustion of important zinc mines in Belgium, the strike of the coal miners, the increased consumption of brass, which is made of copper and zinc; the expansion of the electric field, which relies largely upon zinc; the increase in the gold output and the development of the cyanide process of gold extraction, in which zinc plays an important part.

Zinc mining has an advantage as a rule over mining for other metals, for the reason that most of the mining is through ordinary earth and by means of shafts sunk to a depth varying from 25 to 100 feet. Not infrequently there is a layer of limestone to drill through, but the bane of the zinc miner is the water. Large pumping plants are necessary, and as a consequence it costs considerable money to get out the ore.

One thing is peculiar to zinc, and that is there is no such article on the market as scrap zinc. This metal is eaten up or vaporized and probably is more thoroughly consumed than any other metal. Thus, whatever goes into the market for use never again appears to be worked over, as is often the case with other metals.

The demand for zinc has tripled the last few years. There is more galvanized iron used now than ever before, and this, with the increased use of brass and the expansion of the electrical field and the development of the process for the treatment of gold ores, has naturally increased the demand for zinc in America; but added to this is the great foreign demand, and as a result the price has gone up rapidly. It is estimated that in the production of $40,000 in gold by the cyanide process two tons of zinc are consumed. It is said that South Africa alone uses over 400 tons of zinc in the extraction of gold through this process.

Zinc ore has been going upward in price with bounds that have surprised even the oldest and most sanguine miner. From a price that would hardly permit of its being mined at a profit three years ago it has gradually climbed upward until within a year, when it received an impetus from the great coal strike in Belgium, which virtually closed down the zinc smelters.

In '74 zinc sold for $10 a ton, and the total amount sold in the new zinc fields which were discovered in southwest Missouri and northern Arkansas that year amounted to less than 5100 tons, while ten years later the output for this district was 114,300 tons and the price had jumped to $18. In '94 zinc ore had reached $22 a ton, but not until it had fallen as low as $5 during the panicky times of '92 and '93. At one time in '92 zinc sold to the smelters at $27 a ton, and it went even higher at times when the weather was unfavorable to mining. But when the financial depression was affecting the business world zinc suffered a severe slump, from which it took years to recover, and even as late as '95 and '96 it had scarcely reached the point attained before the slump.

The production increased, however, and in '94 301,455 tons of ore were put on the market. Four years later the output had grown to more than double this amount, but the price of ore had dropped to $21.50. While this does not represent the entire zinc output of the country, it does represent the principal district, and the early years show almost the entire output.

In the electrical field zinc is only a negative metal, and yet no substitute has been found for it. The smelting process is expensive, as it usually requires three tons of coal to smelt it. This is done by vaporizing the ore and then condensing it, and there are few ores as volatile. The world's production of zinc is estimated at about 400,000 tons of ore, of which this country produces 265,000 tons each year. The output last year was 235,000 tons, which was an increase of more than 50,000 tons over the previous year. It is estimated that three-fourths of the zinc ore comes from the Missouri-Kansas-Arkansas fields, where the ore runs about 50% metallic zinc. Shrewd zinc buyers estimate the production this year at 270,000,000 pounds, which is the amount of copper produced by the American mines a few years ago.

It is an interesting fact that America controls the markets of the world in the two metals used in the electric field. Copper is the positive metal and zinc the negative. A few years ago this country exported no zinc in ore, but in recent years matters have changed. In '95 the exports of zinc ore reached 48,000 pounds, while 3,060,805 pounds went out in form of pig metal. This has gradually changed, until last year the reports show 21,040,000 pounds of zinc ore exported to 20,998,413 pounds of pig metal.

A prominent smelter says of zinc: "I believe the rise in zinc is due chiefly to the great strike in Europe, the increased use of galvanized iron and the development of the gold-extraction process. I do not believe the ore will go much higher, but you cannot tell. It is about $55 a ton now, and less than a year ago it was only $26, so you see how rapidly it has gone up. The mines in southwestern Missouri are being worked to the limit, and new fields are being opened in adjacent territory."

Transporting Power of the Wind.

Written for the MINING AND SCIENTIFIC PRESS.

There are few people, aside from geologists, who realize the transporting power of the wind in the geological sense. This ability of the wind to shape the topography of the earth's surface is known as Æolian erosion. In many places it has manifested itself by piling up mountains of sand in great dunes, and in other places the drifting sand has scoured the rocks into fantastic shapes and polished their exposed surfaces like an artificial sand blast. At the mouth of the San Gorgonio canyon, on the line of the Southern Pacific Railway, in Riverside county, Cal., not far from Whitewater station, the rocks on the west side of the road are carved in deep ruts and polished by the sand and gravel driven before fierce blasts of wind, which rush down through the narrow pass between the San Bernardino and San Jacinto mountains onto the Colorado desert, to fill the space made by the rapidly rising air which ascends from that heated land. Near Palm station, where the wind loses much of its force, the sand is piled up in great dunes, some of which rise 200 or 300 feet above the desert plain. Still farther down toward Pilot Knob, near the Mexican boundary, the winds which rush across the Salton Basin have piled up miles of sand dunes. These are ever shifting, always changing. On almost any clear day scores of whirling columns of sand, mounting often over 1000 feet into the air and visible for miles, may be seen over the vast expanse of this desert. These instances are only mentioned as characteristic of many other places on the Colorado and Mojave deserts of California, and in hot, dry, sandy countries everywhere. Along the sea coasts and lake shores, where not rocky, sand dunes are of very common occurrence. A large portion of the city of San Francisco, Cal., is built on sand dunes, formed by the drifting of sand from the shores of the Pacific, driven by a prevailing southwesterly wind. In places these piles are 100 feet or more in thickness. In some places growing forests have been enveloped by drifting sand, and in after years the sand blown away again exposes the dead forest.

The Kramer Stampede.

The Kramer bubble has bursted. The rich strike of a month ago has dwindled to the insignificant proportions of an ordinary prospect. From a great zone of gold ore rivalling the famous stories of Buffalo Hump in Idaho, it has come down to a few inches of ore of good grade, but nothing fabulous. The trouble with this last stampede is that it was located too near the railroad and too easy of access. To make the best of a "strike" of this kind and to secure a genuine rush, the new discovery must be many miles from a railroad and difficult of access. Telegraph and telephone communication must not exist within 100 miles, for these are means which will be promptly used to check the army of prospectors and adventurers which would otherwise be sure to join the stampede. There are prospects in the region of Kramer and also not far from Hinkley, a little farther east on the same line of railroad, and again near Barstow, but up to this time nothing has been discovered there which would justify a stampede of the smallest proportions. When news of these rich strikes is first received, the first impulse of those who are restless and anxious to go some place or to do something is to rush to the new field, in the hope of making a fortune suddenly either by finding a rich mine or by taking advantage of the existing excitement to turn an honest dollar otherwise; but the percentage of rich strikes that prove worth stampeding for is small indeed.

Many rich strikes are made which are good enough in themselves, but often it proves to be confined to a single mine, or perhaps two may result. Those at a distance usually have a poor chance to get a claim, unless the district proves to be a large one, as was the case at Cripple Creek and Leadville and in numerous other camps; but these are the chances a prospector must take, and he usually takes them.

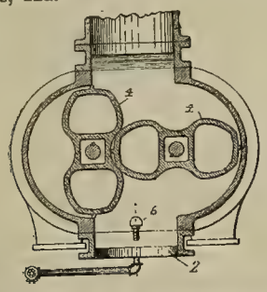
It is claimed and shown by expert evidence that parallel telephone wires, even though on opposite sides of a country highway, will interfere with the transmission of messages unless a return circuit is provided.

Latest Mining and Metallurgical Patents.

Patents Issued May 16, 1899.

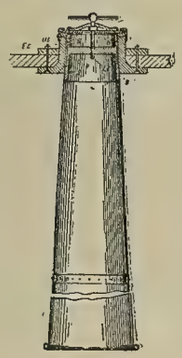
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ROTARY BLOWER.—No. 624,943; E. D. Johnston, Connersville, Ind.



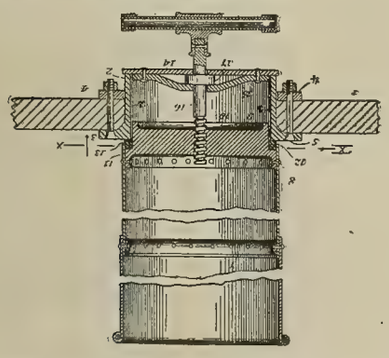
In a rotary blower, the combination of a casing having a bottom fluid inlet and a fluid outlet, a pair of intermembering impellers mounted within casing between inlet and outlet, a pipe leading to casing from source of supply of liquid under pressure and spray head connected with pipe and disposed within casing below impellers and above fluid inlet and adapted to spray and diffuse liquid upwardly into the uncompressed fluid on its way to impellers, whereby the fluid inlet serves also as the outlet for the rejected liquid; a fluid compressor, the combination of a case provided with a fluid inlet and a fluid outlet, rotary impellers above level of inlet, a liquid spraying device disposed below impellers and above level of inlet, fluid inlet being arranged to receive surplus liquid as it gravitates to the bottom of the case.

TANK BOTTOM DISCHARGE DOOR. — No. 624,957, L. H. Mitchell, Salt Lake City, Utah.



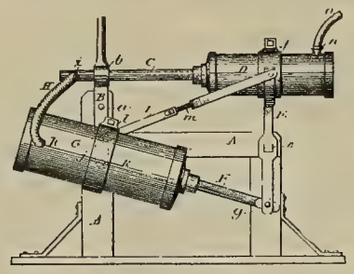
A discharge apparatus for tanks provided with a hollow upper portion, base attached thereto within lower end thereof and provided with spider or diaphragm, a casting adapted to receive base and means below casing co-operating with spider and supported by castings for disengaging base and upper portion from casting; a hollow portion, a frusto-conical base having integral bearing zones connected thereto within lower end thereof and a frusto-conical casting adapted to receive base and carrying means for unseating the same; a crossbar carrying a screw adapted to operate with said spider to unseat base and means for supporting crossbar.

TANK BOTTOM DISCHARGE DOOR.—No. 624,958; L. H. Mitchell, Salt Lake City, Utah.



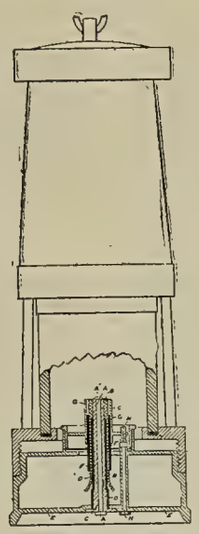
A discharge apparatus for tanks provided with a casting having a depending rim or edge, a funnel adapted to partially enter said casting and a plate or bar adapted to bear against said depending rim or edge having engagement with funnel to retain the latter in position; a straight plate or bar provided with means to detachably engage said funnel and force said plate or bar against said edge or rim; a ring below the tank around the casting and means for securing rim and ring in position, a funnel above casting, a base connected with lower end of funnel and provided with an annular offset or shoulder, a packing ring within offset and adapted to rest upon rim of casting, a plate or bar bearing against rim of casting, a nut-carrying screw in plate or bar adapted to engage base and draw same within casting, a brace or clamp connected to plate or bar, above nut on the screw and means for rotating the screw.

COMPOUND AIR COMPRESSOR.—No. 624,998; G. W. Wallick, Sturgis, Mich.



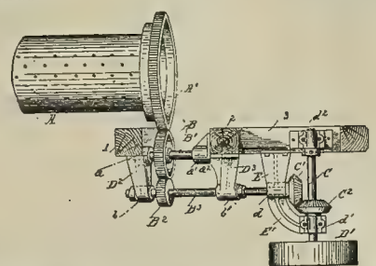
In a compound air compressor the combination of a cylinder *G* having solid piston *r* and rod *F*, and clamp *j* encircling cylinder *G* pivoted to lower end of lever *B*, a smaller cylinder *D* with hollow piston rod *C* and valvular piston *c* and outlet check valve *n*, the adjustable clamp *f* encircling cylinder *D*, the lever *E* fulcrumed on frame *A* connecting cylinder *D* with piston rod *F* and flexible pipe *H* connecting upper end of cylinder *G* and piston rod *C*, with a lever *B* fulcrumed on the frame *A* by bolt *a* and pivotally connected to sleeve *b* encircling piston rod *C*, the adjustable rod *I* pivotally connected beneath fulcrum *a* to lever *B* and to upper jaw of lever *E*, whereby lever *E* is operated.

APPARATUS FOR ELECTRICALLY IGNITING MINERS' SAFETY LAMPS.—No. 625,014; William Best, England.



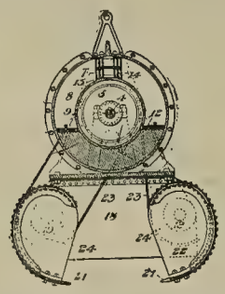
A miner's lamp having a metallic base, a wick and means for adjusting the same, a central conductor *A* and means for insulating same, in combination with a ring for receiving base of lamp, a central spring contact, an induction coil and connections therefrom to central contact and a contact for lamp base, a push switch actuated by lamp for closing an electric circuit to primary of induction coil so that spark from induction coil is directed across the wick to the metal of the lamp; a tubular wick *B* carried on a tube *D* securely attached to lamp bottom *E*, and an adjustable wick tube *G*, in combination with a central conductor *A* insulated from lamp bottom by an insulating tube *C* and carrying a cap *A'*, together with suitable apparatus for passing a current from cap *A'* across wick *B* to the wick tube *D*.

DRIVE MECHANISM FOR ROTARY GRIZZLIES OR SEPARATORS.—No. 625,274; R. H. Postlethwaite, San Francisco.



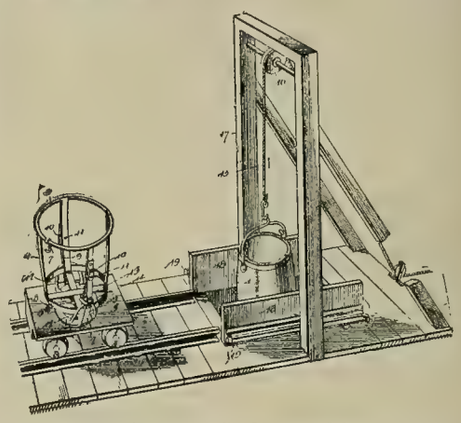
The combination with an inclined rotary grizzly or separator having a cog ring attached thereto, of an intermediate gear meshing with ring, a shaft for gear, a second parallel shaft carrying a pinion meshing with intermediate gear, an inner bracket formed integrally with two bearings, one for each shaft, an outer bracket formed integrally with two bearings, one for each shaft, a bevel gear on second shaft, a cross drive shaft, a bevel gear thereon meshing with other bevel gear, and a bracket formed integrally with two bearings arranged at an angle to each other for cross and parallel shafts.

EXCAVATOR.—No. 625,110; I. P. Lambing, Denver, Colo.



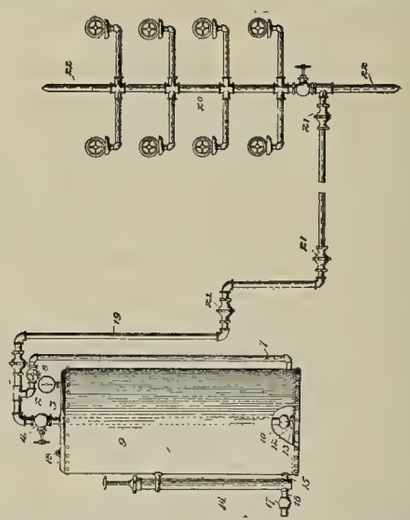
An excavator, a pair of swinging buckets, and mechanism arranged to swing ends of buckets inwardly and upwardly past each other; buckets eccentrically mounted, so that when swung inwardly their ends rise toward each other, and a rotary motor connected to and arranged to actuate buckets; rotary shafts, a disk secured to shaft and connected to an oscillatory piston, and an arc-shaped chamber in which piston oscillates.

BUCKET CAGE FOR MINING CARS. — No. 625,035; Willis Knapp, Salt Lake City, Utah.



A device of class described comprising a support designed to be mounted on a car and arranged to rotate on vertical axis, and tilting bucket receiving cage carried by support, whereby contents of a bucket may be discharged in any direction; receiving cage provided with opposite standards, braces supporting standards, a cage adapted to receive a bucket and pivotally mounted between standards, and a substantially U-shaped locking device hinged to one of standards and provided with arms arranged to engage the cage and supported in its engaging position by the adjacent brace.

PORTABLE DEVICE FOR THAWING FROZEN GROUND.—No. 624,945; L. L. Kendall, Williamsburg, Ky.



In combination, supply tank and burner battery flexibly connected therewith, the alined handles 22, 22 fixed to battery and a controlling valve fixed intermediate one of handles and burner.

Electrolytic Corrosion.

In our issue of January 19, 1898, says *Electricity*, referring to the equipping of the elevated railways in New York City with electricity, we incidentally called attention to the fact that these structures were none too strong for the number of trains they were carrying or would have to carry when the proposed change of motive power was effected, and added: "If the Brooklyn bridge is in danger of being destroyed by electrolytic action, as several newspapers would have us believe, there would seem to be no reason why the elevated structures should not likewise be affected."

That electrolysis is going on in certain portions of these structures is now shown to be the case by an examination recently made by an electrical engineer representing the State Board of Railroad Commissioners. The report submitted says:

"I have made 867 tests, covering all portions of the city where the Manhattan Railway Company's structure is located. These tests were made from the supporting columns of the structure of the elevated road to the water pipe, gas pipe and rails of the surface under it. All tests were made with a standard Weston voltmeter, with scale divisions reading to thirty. One side of this instrument was connected by wires and clamps especially made for this purpose with a column of the elevated structure, the other side with a water hydrant and gas post and also with the rails of the surface street railroad. A reading of the voltmeter was taken after each connection was made, making three separate tests at each point where a test was made. These were commenced on January 24 and completed on April 20, 1899. All were made while the ground was frozen. The results of these tests were given in a table accompanying the report.

"These show that at the time of making the tests the maximum difference of potential between the elevated structure and the water pipe near it was found at the Manhattan end of the Brooklyn bridge, where there was a difference of potential of two and a half volts. The next highest potential was found in the neighborhood of the Union Railway Company's system at 135th street. At these two points of maximum difference of potential, the elevated structure was positive to the metal conductors in the earth near it, showing that a current of electricity was flowing from the elevated structure to them."

This electrical examination of the Manhattan Elevated Railroad's system in behalf of the State Railroad Commission would seem to corroborate the tests made some time ago by Mr. A. A. Knudson, who incidentally found that the pillars of the elevated road at 135th street were positive to the water mains in the vicinity from one-thirtieth to one-third of a volt, depending on the hour of the day, and that likewise the elevated structure at the New York entrance of the Brooklyn bridge was undergoing electrolytic action. In a paper read about a year ago before the American Institute of Electrical Engineers, referring to this subject, Mr. Knudson said:

"The tests were continued at the New York entrance of the bridge, and at the pillars which stand in the street just west of the Third avenue cable railway I found the readings as follows: At one pillar a maximum of three volts, average one and a half volts, pillar positive to Third avenue cable rails. At another, practically the same reading. Further up Park Row, at the corner of Chambers street, pillar positive to cable rails, one volt maximum; water positive to cable rails, one-half volt; pillar positive to water, one-third of a volt.

"All of these tests were nearly a year and a half ago. A few days ago tests were made over this same ground, and at the places where a difference of potential of three volts maximum existed at that time it is now found to be 3½ volts, pillars positive as before to rails of Third avenue cable and also to water pipes, showing in all probability that this current has been during all this time actively and unceasingly passing down the pillars which support the 'L' station at this place, as well as the bridge crossing the street, and out from their foundations to other metals, as stated, with now a fifth of a volt more for good measure.

"In the light of present knowledge on this subject the very serious question presents itself to any practical mind here present, in what condition would we expect to find the anchor bolts and iron foundations of these pillars if excavations were made at their base.

"In Mr. Farnham's excellent paper, read before this Institute four years ago, he showed that but a small fraction of a volt was necessary to establish electrolytic action between metals."

In view of the last statement in the above paragraph, the truth of which is now generally conceded, having been only too forcibly substantiated by experience, it is rather difficult to see how all danger of electrolysis to the elevated system will be averted by the adoption of the following recommendation made by the Board of Railroad Commissioners' expert:

"That the Manhattan Railway Company immediately put their structure in such condition that at no point will it be positive to other conductors in the ground more than one volt and at this point be maintained."

Personal.

VICTOR M. CLEMENT has gone to Europe.

W. S. WEBBER has been appointed foreman at the W. Y. O. D. mine, Grass Valley, Cal.

JEROME B. FRANK of Denver, Colo., has gone to Hailey, Idaho, where he has mining interests.

MR. WETHERLY, a mining engineer of Chicago, has been visiting mining sections of Shasta county, Cal.

JOHN DAGGETT has returned to San Francisco, Cal., from a visit to his mining property in Siskiyou county, Cal.

W. A. WATSON of Deadwood, S. D., is now at Victor, Colo., and will be Supt. Economic Gold Extraction Co.'s chlorination plant.

SAMUEL HARTLEY, who was recently appointed Mgr. Burnt Creek mine, Victoria, has assumed the duties of his responsible position.

PATRICK HOLLAND, for some time past foreman at the Empire mine, Grass Valley, Cal., has resigned. He is succeeded by James Seymour.

CLARENCE KING, E. M., has been inspecting mines in Shasta county, Cal. He was accompanied by C. A. Hamilton and L. A. Scowden of San Francisco.

JOHN W. MACKAY, who with W. R. Eckart has been making examinations of property owned by Mr. Mackay in Arizona, has returned to San Francisco.

R. D. GRANT, who for three years has been Mgr. of the Parrot properties at Butte, resigned that position May 11. Mr. Grant will visit Arizona and Mexico, where he holds large mining interests.

RALPH NICHOLS, at one time Supt. Sutro Tunnel at Virginia City, Nev., and now Mgr. of mines at Kalgoorlie, Western Australia, has left New York for Australia, having purchased mining machinery for the property under his charge.

D. E. THORNTON, Gen. Mgr. Tararu Co., in New Zealand, has appointed R. Tierney Mgr. of the mine, to succeed the late Mr. McLean. Mr. Tierney has been managing the Ethel Reefs G. M. Co.'s mine in the Hape creek district, and he is succeeded at the latter place by G. Gill.

Industrial Notes.

—The Company Industrial has established a steel works in Chihuahua, Mexico, which when completed will have cost $250,000.

—The National Steel Co., which has two furnaces and two steel mills at Mingo Junction, W. Va., has bought 110 acres of land adjoining its Mingo Junction property, on which two furnaces of 500 tons daily capacity are to be erected, besides another steel plant and a finishing mill for bars, sheets and merchant iron. The improvements, including real estate, will cost nearly $1,000,000.

—Boston News Bureau: At no period within fifteen years has the iron trade of the country been in such a booming condition as at present. The chief trouble seems to be in getting material, either crude or finished, with which to fill orders. Furnaces and mills in all sections of the country are declining to take business for delivery in the near future, and some companies are even refusing orders requiring delivery during the current year.

Recently Declared Mining Dividends.

Tamarack M. Co., Mich., quarterly dividend, $4; payable June 27.

Mt. Shasta G. M., Ltd., dividend No. 1, $6000; payable June 1.

Homestake M. Co., South Dakota, regular monthly dividend, $62,500; May 25. Total for 1899, $312,500; total to date $7,493,750.

Recent Mining Incorporations.

Confidence Oil Co., Fresno; capital stock $48,000, all subscribed; J. P. Vincent, W. Helm, F. Cleary, E. A. Walrod, E. W. Risley, all of Fresno.

Hudson M. & M. Co., San Francisco; capital stock $200,000, subscribed $500; G. E. Faw, J. W. Morrell, J. D. Beggs, J. L. Green, J. H. Peters.

San Emedio Oil Co., Selma, Fresno county; capital stock $250,000, subscribed $150,000; H. F. Peters, E. M. Stevens, W. I. Roberts, M. McWhorter.

Minnehaha G. M. Co., San Francisco; capital stock $100,000, subscribed $50; S. W. Payne, R. Payne, J. Osborne, B. Lomond, R. E. Payne, C. S. Payne.

Con. Pacific Co., Ltd., Redding, Cal; capital stock $100,000, subscribed $67,200; R. M. Mooer, C. A. Farnsworth, S. J. Gray, C. Rossi, R. Rusconi.

Fresno & Hanford Oil Co., Fresno; capital stock $180,000, subscribed $100,000; H. Nathan, J. R. Walton, C. J. Woodward, A. Goldstein, L. L. Cory.

Commercial Paragraphs.

JAS. MACBETH of New York City, manufacturer of electric blasting supplies, etc., has established a San Francisco agency at 308 Market street, in charge of Newton I. Steers.

THE Jeanesville Iron Works Co. of Jeanesville, Penna., have recently shipped a large mining pump to Leadville, a No. 9 B. sinker to Webb City and a No. 5 sinker to Empire, Colo., also a mine station pump to Independence, Colo.

Books Received.

"*Wonderland in '99.*" A handsomely illustrated descriptive pamphlet has been received from the Northern Pacific Railway, illustrating the scenic features along the route of that road. It is written in itinerary style and is very pleasing from several points of view. It will be mailed to any address on receipt of 6 cents in stamps by addressing Chas. S. Lee, Gen. Pass. Agent, St. Paul, Minn.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING MAY 16, 1899.

625,020.—FASTENING FOR CYCLE SEATS, ETC.—E. H. Chappuis, Marysville, Cal.
624,912.—COPY HOLDER—W. Cord, Los Angeles, Cal.
625,292.—VALVE—D. C. Demarest, Angels, Cal.
624,925.—LOTION—C. E. Grapewine, San Diego, Cal.
625,300.—BRAKE—G. B. Heath, S. F.
625,040.—DOOR MAT—C. Kuhn, Fruitvale, Cal.
625,041.—TREE TRANSFERRER—L. H. & H. S. Landis, Orangevale, Cal.
625,048.—BOOK HOLDER—A. Marks, S. F.
625,053.—SHIPPING CAN—D. J. McKay, S. F.
625,050.—LOOSE LEAF BOOK—L. M. Morden, Portland, Or.
625,191.—LOOMS—J. H. Northrop, Tustin, Cal.
624,965.—SIFTER DRUM CLEANER—C. H. Oester, S. F.
624,967.—HARROW—H. Paulson, Sumner, Wash.
625,200.—VEHICLE WHEEL—T. Pinard, Clackamas county, Or.
625,274.—DRIVING MECHANISM—R. H. Postlethwaite, S. F.
624,988.—BOOM OR GAFF—H. B. Smith, Fruitvale, Cal.
625,320.—CURRENT MOTOR—W. Turner, Wenatchee, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SHIPPING AND DELIVERY CANS.—Donald J. McKay, San Francisco, Cal. No. 625,053. Dated May 16, 1899. This invention relates to a can which is especially designed for shipping such goods as coffee, tea, and other dry solids of a like nature and to a means for drawing or delivering substances therefrom. It consists of a vessel having a hinged closing top, a false bottom inclining downwardly from the rear to the front and made concave, a discharge spout extending in line with the inclined bottom having when in use an unobstructed open end, a cap adapted to cover the open end of the spout, and a closed housing with a gate guided vertically for the purpose of opening and closing the discharge spout.

DOOR MAT.—C. Kuhn, Fruitvale, Cal. No. 625,044. Dated May 16, 1889. This invention relates to a mat, and consists essentially in the combination of the main exterior frame having compartments, one of which is occupied by inter-locking metal plates, the edges of which are pressing backwardly to form a preliminary scrape or cleaning device, and the other, by a fibrous or other suitable mat which serves for cleaning, and having an independent frame and adapted to be removably fixed in the other section, so that it can be taken out at any time for cleaning, or for replacing. The two form a serviceable mat for cleaning the feet, the main portion of the dirt being removed by grating through which it falls, and the cleaning being completed by the fibrous portion.

TREE BALLING AND TRANSFERRING DEVICES.—L. H. and H. S. Landis, Orangevale, Cal. No. 625,041. Dated May 16, 1899. This invention relates to a device for performing the operation known as "balling" in the transportation of trees and shrubs. In consists essentially of a sheet-metal cylinder having the meeting edges disengageably connected, a means for placing the cylinder around a tree or shrub to be removed, and forcing its sharp lower edge into the soil around the roots of the tree, and a bottom adapted to be slipped in beneath the cylinder to enclose the tree, with means for securing it to the cylinder, so that the whole device, with the enclosed tree, may be lifted from the hole and removed to some ohter point without disturbing the roots or interfering with the growth of the tree.

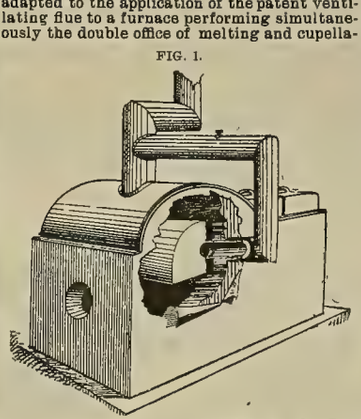
CYCLE SEAT AND HANDLE-BAR FASTENING ATTACHMENTS.—E. H. Chappius, Marysville, Cal. No. 625,020. Dated May 16, 1899. This invention relates to a means for securing the saddle, saddle-post, handle-bar steering posts, and handle bars of cycles, by the employment of cam locking devices with a means by which they are directly operated without the use of screw-threaded bolts and nuts or wrenches. The parts which are movable over each other have interlocking corrugations formed on their contiguous faces, these being separable to allow of the movement and adjustment of one of the parts, and they are locked at any point of adjustment by means of a cam operated by a handle, or otherwise so as to force the two corrugated faces to interlock with each other, thus holding them firmly in place; they are disengaged for any other adjustment by simply turning the cam in the opposite direction.

A New Assay Furnace.

The "L. & C." patent combination furnace, owned and manufactured by F. W. Braun & Co., Los Angeles, Cal., is the result of a close study of the requirements of the practical assayer, and, with the patent muffle ventilator attachment—one of its special features—is the most efficient and satisfactory furnace ever placed on the market.

By reference to the accompanying illustrations, it will be seen that it has the novel feature of a muffle lying transversely to the melting compartment, which arrangement is adapted to the application of the patent ventilating flue to a furnace performing simultaneously the double office of melting and cupellation a forced draft throughout the entire length of the muffle, the fresh air thus supplied furnishing abundance of oxygen, so that cupellation is both rapid and complete in all parts of the muffle.

FIG. 1.



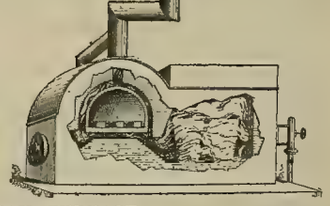
The furnace is supplied with a center pivot, by which it may be revolved, thereby enabling the operator to introduce the flame at either end at will from the one burner.

The melting compartment has a hinged bottom, which is covered with a mixture of coke and fireclay. In case of a bullion spill the trap can be opened and the bottom removed without disturbing the brick work of the furnace.

The standard size takes a muffle 6x10 inches and has a melting compartment 7x7x7 inches which will hold four crucibles, each with a capacity of two assay tons of pulp, and weighs complete about eighty pounds. With this size furnace it is possible to make 100 assays in a twelve-hour run.

Since coming into the hands of the present owners, the L. & C. furnace has been greatly improved in effectiveness as well as general appearance, changes having been made that render its working perfect in all its parts, so

FIG. 2.



THE L. & C. ASSAY FURNACE.

tion. The ventilator promotes rapid oxidation throughout all parts of the muffle, carries off the fumes of cupellation and enables the operator to work with a degree of comfort not possible heretofore with this class of furnaces.

The ventilator referred to is a separate outside connecting pipe between the muffle and the stack, as shown in the illustration. The heat arising in the main flue creates by induc- that its convenience, compactness and economy of operation appeal to every practical assayer.

In the illustrations Fig. 1 is a view of the furnace showing the oxidizing bonnet and muffle draft; Fig. 2 shows melting and cupelling carried on at the same time. In both views the front is broken away to show the interior construction. *

California Redwood.

The habitat of the redwood is peculiar, says Henry Gannett in the *National Geographic Magazine*. It is found only in a narrow strip, closely hugging the Pacific coast, stretching from the southern boundary of Oregon or just across the boundary—for there are perhaps 1000 acres of redwood in Oregon—southward through northern California, nearly to the bay of San Francisco.

The closest and finest growth is in Humboldt county, near the northern end. That portion in Mendocino and Sonoma counties is not as heavy or continuous, nor are the trees as valuable for lumber, as they branch lower down. The wood is, however, of slower growth, is denser and harder, and perhaps more durable. The best lumber and the heaviest growth are everywhere in the valleys and on the flats. On the hillsides the trees are smaller and not so close. Nowhere is there any young growth. The youngest trees, which are found only in the northern portion of the belt, are several hundred years of age.

This is probably the densest forest on earth, as measured by the amount of timber per acre suitable for the sawmill. It is not the size of the trees alone which produces this, although they are exceptionally large, even in this State of large things, but it is the great number of trees, the closeness of their stand. In a redwood forest the sun never shines—it is always twilight. You are, as it were, under the roof of a vast temple, a roof of foliage, supported by great tree columns.

The area of the redwood belt has been carefully mapped, and is, as nearly as can be estimated, 2000 square miles, or 1,280,000 acres. The stand of timber on this area is not so easy to ascertain, but may be computed thus:

	Feet.
Del Norte county	4,000,000,000
Humboldt county	42,000,000,000
Mendocino county	28,160,000,000
Sonoma county, say	1,0.0,000,000
Total	75,160,000,000

The annual cut by the mills is 250,000,000 feet. At the present rate of cutting, therefore, the supply will last 300 years. In Mendocino county there is nearly nine times as much timber on an acre as in the Southern pineries; in Humboldt county, upon 96,443 acres, the average stand is 84,000 feet per acre, nearly seventeen times as great as in the Southern States.

There is one cause of destruction from which this tree is entirely exempt—that is fire. Containing no pitch, but, on the other hand, a large amount of water, it will not burn when green. No fire can run in a redwood forest. It is the only one of our coniferous lumber trees which is thus exempt.

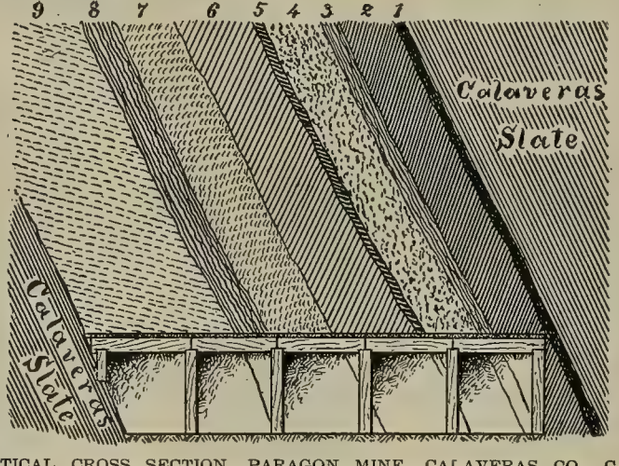
Redwood is in almost universal use on the California coast. In the construction of houses little other timber is used, even as far south as Los Angeles and San Diego. It is exported as far south as Valparaiso, Chili, and westward to Japan and Australia. Indeed, considering its cheapness—$14 per thousand feet in Eureka for the best—it seems strange that it has not found its way in quantity to the Atlantic coast. Certain it is that before many years redwood will supply the now vanishing white pine in Eastern markets.

The above article was evidently written from a commercial standpoint, as it is a well-known fact that the redwoods extend southerly along the Pacific coast in California as far south as northern Monterey county, and, although the trees are in many instances of gigantic size, the area covered by the growth is relatively small, and is not considered as of any commercial importance by lumbermen. The redwoods growing in the Sierra region are of different species, being the *Sequoia gigantea*, the coast variety being known as the *Semper-virens*.

Redwood has been used extensively in numerous California mines, notably in the quicksilver mines of New Almaden in Santa Clara county, and it has given entire satisfaction. While its resistance to crushing is less than that of some other woods, and it is more brittle than pine, more timber is being employed and, being cheap, costs no more than pine and is found far more durable. Redwood has not been used in the mines of the gold belt, but there are many places where it could, no doubt, be used to good advantage, particularly in those mines where, owing to damp, close air, pine timber decays rapidly. It would, no doubt, be better also, from a sanitary point of view, as decaying timber in mines produces foul gases and disagreeable odors.

The Paragon Mine, Calaveras County, Cal.

An interesting development has been made in the Paragon quartz mine, on the Licking Fork of the Mokelumne river, near Railroad Flat, in Calaveras county, Cal., by the Paragon Con. Gold Mining Co., of which Percy L. Shuman is manager. The mine is on the east lode of the gold belt, and in it has been developed one of the largest veins on that belt. The formation in which the vein occurs is the black slate known as the Calaveras formation, which appears so frequently along the east lode. The accompanying drawing illustrates the interesting succession of rocks making up the pay zone or vein proper.



VERTICAL CROSS SECTION, PARAGON MINE, CALAVERAS CO., CAL.

The hanging and foot walls, as stated, are the black slates of the Calaveras formation. No. 1 is black gouge; No. 2, black quartz; No. 3, ribbon quartz; No. 4, a mass of brecciated quartz, intermingled with slate; No. 5 is gouge; No. 6, gray quartz; No. 7, black and white quartz; No. 8, ribbon quartz; No. 9, gray quartz, heavily impregnated with auriferous sulphide. The latter is the richest portion of the mineral zone, the total width of which is about 30 feet. The relative width of the several strata is about as indicated in the drawing.

The property is equipped with a 10-stamp mill and other accessory buildings. It is worked through tunnels with several hundred feet backs, and is one of the newest of the prominent mines of Calaveras.

Anti-Darwin.

TO THE EDITOR:—I lately had the pleasure of reading an article by Talcott Williams, which, while not intended apparently as an anti-Darwinian argument, bears so strongly that way, that I beg to present to your readers a short note thereon. Mr. Williams thinks it not only unscientific but improbable to assume that modern savagery is at all like the primeval savagery. The low, modern savages are the products, probably, of degradation; certainly, of unfavorable circumstances—wars, bad climate, struggle for food (which is the flat antithesis of the Darwinian idea that a struggle for food improves the race, and, in my opinion, the former is good sense and the latter is not), the presence of surrounding people, etc. He thinks it far more probable that originally various tribes, being separated by empty spaces and under easy conditions of existence, had none of those vices and superstitions created by wars and other evils consequent on a greater population. "If we think of the empty earth as early bearing separate centers of civilization, too far apart to vex his neighbor," the conception is certainly more in accord with early records and known facts, and with what seems to me just deductions. I have no space to go into further details of this sensible paper, and only add one remark of my own.

I consider it fairly plain, under any theory, that mankind has originated from several originals; but whether one or several, it must necessarily be that for a time the conditions assumed by Mr. Williams did exist: that life was easy, no crowding within, or war, or any interference whatever from within, no slavery or polygamy, and no superstition—because that is born of fear, and that from oppression, products of later times—and, hence, that no theory is of any value which is based on the common idea that modern savages are like the original ones, or that civilization was evolved from such.

W. S. PROSSER.

Auburn, May 18th, '99.

The Copper Deposits of La Sal District, Colorado.

A correspondent of the *Western Miner and Financier* describes the new copper mines of Montrose county, Colorado, in La Sal mountains. as follows:

The Angel and Red Chief mines—or, as they are known, the La Sal mines—are located so as to give a good opportunity to study the geological formation, as there is but little slide or debris covering the solid rock, the canyons rising from 100 to 300 feet perpendicular, and above that rising in rocky benches to a height of from 500 to 800 feet. The ore was first discovered in the Red Chief in the face of the cliff about 100 feet in height and 75 feet above the water level in the gulch. The vein was heavily stained with copper and contained some copper glance at the surface. For some distance from the original location of the Red Chief through to the Angel mine the vein shows good width in its croppings.

The formation is white sandstone from near the bottom of the gulch to a height of between 400 and 500 feet. Underneath the white sandstone is red sandstone, the strata being nearly level. At different elevations in both series of sandstone are found what appear to be contact veins, which lie nearly flat and are heavily stained with copper, but so far as yet seen little development has been done on them. One of these contacts was followed for a distance of six miles, and the contact veins seem to be continuous for a great many miles in every direction. The contacts vary in thickness at different intervals, but wherever work has been done they are usually 6 feet in thickness. At the intersection of the contacts and fissures the largest and richest ore bodies occur. This particularly is true in the Red Chief.

A Native Iron Works in Africa.

On nearing the village, little streaks of smoke could be seen, and the tinkle, of hammers could be heard, accompanied by a humdrum song. On approaching, every inhabitant seemed to be a blacksmith; children carrying charcoal; elder children, men, and women blowing the bellows, accompanying and timing the stroke with measured chant and much apparent banter; but, whether smelting iron or forging hoes or other simple agricultural implements, fishhooks, arrow heads or knives, the stock in trade was essentially the same.

The bellows looked like two large, rude golf sticks, secured together, the stick proper being about 3 inches in diameter, and the striking end about 10 inches in diameter by 8 inches deep. A better comparison might be imagined if two banjo heads were knocked to one side, one to the right and the other to the left of the fingerboard, and strapped together. The blast hole, 1 inch in diameter, ran up the length of the fingerboard, and the open end of the banjo head had loose, soft pigskin strapped around it to give a lift of 6 inches or thereabouts, there being a center knob to hold on by; a rude inlet valve, consisting of a square frame and soft leather facing, was at the outer rim, and a like outlet valve at the bellows end of the fingerboard. Each stroke gave an effective air flow of about 400 cubic inches, and each blower made from thirty to sixty strokes per minute.

These bellows betokened probably the improvements of some half-caste Portuguese, as other bellows have no valves, but blow into an enlarged funnel-shaped tuyere, drawing the air up and down the tube alternately. These latter are most common and very inefficient. Monteiro says he never saw any other bellows than the latter, and he identifies them with the bellows of the ancient Egyptians.

The fireplace was, in all cases, a simple cavity, scooped out of the ground, and the fuel was charred wood. The smoke, noticed in approaching the village, came from burning wood heaps. Knives and spear or arrow heads were incased in clay cases, containing charcoal and some substance—I could not learn what—and baked in the fire for a number of days, and then the fire was allowed to gradually die out. Unquestionably, therefore, the natives must have had some knowledge of a cementation process, or an approach to it, for the improvement in the quality of their iron. Final tempering was effected by immersion in palm oil. Whether smelting or forging, the furnace was the same, viz., a hole scooped out of the ground, charcoal used as fuel, and a mixture of clay added as a flux for smelting. The heaviest smeltings I saw in block were not more than four or five pounds in weight; but much heavier ones were occasionally undertaken, as the heavier anvils were apparently smeltings run into moulds, and were afterwards bedded into blocks of hard wood, weighing about twenty-eight pounds.

Malleable iron was derived from the castings by repeated smelting, and finally by heating and reheating to a spongy mass and working under the hammer. I did not see this process carried through; but it must be a slow, tedious one, as I saw no native malleable iron lumps of any appreciable weight. I was surprised to find such a resemblance between the mechanism of our own fire tongs and those used by the ironworkers in Cazengo; but one of the Roman Catholic priests of Ambaca, whose acquaintance I made, assured me that they were entirely of native origin. In heavy smelting a number of bellows surrounded the fireplace and led into a number of tuyeres, each bellows blowing into its own tuyere, and every three bellows leading into a central tuyere.—J. M. Nisbet, in Cassier's Magazine.

Mining Summary.

ARIZONA.

Phœnix *Republican*: C. C. Bean of the Ajo mines says his ore is good grade, but he has been unable to find a water supply. The Shotwell camp near there is the same kind of proposition as the Ajo. The owner has succeeded in getting a water supply and new machinery has been ordered. The ore is running 55% copper and $18 in gold per ton of concentrates.

Bisbee *Orb*: The new shaft at the Copper Queen has reached a depth of 100 feet and miners are cutting the station. The donkey hoist has been running some time and cages have been placed in the shaft. The collar of the new shaft is 140 feet above that of the Holbrook. It will be some time before connections can be made with the 100 level of that shaft.

Prescott *Journal-Miner*: The sale of the Buster and Standard group of mines has been consummated and $33,500 paid to J. A. Forbes and J. McKenzie. The purchasers are Baltimore people, represented here by Hooper & Williams. The property is in the Bradshaw mountains near the Crowned King and is opened by a shaft 125 feet and a tunnel 500 feet in length, besides other openings. The lead runs from 3 to 7 feet, the ore going as high as $40 per ton. A mill is to be placed on the mine having a capacity of forty stamps. —— Another deal was closed in which G. Rhopeter disposed of the Lone Pine property in Big Bug district. The mine is three miles from Huron on the P. & E. railroad. The ore is said to carry 29% copper and gold and silver. Wm. Claypool of the Arizona Ore Co. secured an option from Mr. Rhopeter. The price is stated to be $25,000, 10% down and the balance within a year.——Reports are received that a strike has been made in the Congress mine on the 2000-foot level, where ore running fourteen ounces per ton has been found and on the 1700 level the ore body has widened to 12 feet.——At the Polar group of mines, adjoining the Crown Point group, the new mill is ready to steam up. It has ten stamps with extension for twenty. Mr. Belcher says work on the Polar group has resulted in a satisfactory showing. Work will soon be suspended pending the purchase of a steam hoist. The deepest shaft on the claims is 100 feet.

CALIFORNIA.

Amador.

The South Spring Hill mine is being made ready for operations. Men are at work cleaning out and repairing a tunnel which runs into the shaft from the hillside above the road. The mine has been idle for a long time.

Sutter Creek *Record*: Operations have been suspended at the Douglas mine, near Volcano, and the pumps taken out. The prospect work has been carried down to a depth of 400 feet. The last work done was 180 feet of crosscut by hand-work in twenty-eight days on the 400 level.——S. K. Thornton of San Francisco has bonded a mine near Plymouth from G. Easton and is erecting a hoist and other machinery. ——The Allison mine, two miles west of Plymouth, is being operated by Stockton parties. They have ore on the 100-foot level.—— J. Bernardis, who has the F. Werner property bonded, is getting good prospects.

Amador *Republican*: The selling of the Bunker Hill and Mayflower mines north of Amador City, under the control of the same company, will take place in June.——Supt. D. Fisher is sinking a new shaft at the Spagnoli mine. The shaft is down 20 feet. A 10-stamp mill is to be built. This mine is near the Clinton Consolidated on a ledge which runs east and west.——Negotiations have been in progress for some time for the purchase of the Little Amador mine at Amador City.——The Keystone is running both mine and mill. Hottenger & Bro. are operating the sulphurets plant.

Butte.

The Butte Creek G. M. & P. Co., near Nimshew, after a long period of litigation, has resumed operations.

Oroville *Mercury*: J. McClung has let a contract to A. Hamilton for the removal of a quartz mill from the Sunnyside mine, near Robinson Mills, to the Lydia mine, also known as the Lawton mine, near Powell creek, in the Enterprise district. The hoist and an engine are to be left at the Sunnyside, on which Mr. McClung intends to sink.

Oroville *Register*: The Golden Trout mine, on the South Fork of Feather river, between Lumpkin Mills and Strawberry valley, employs twenty-three men. South tunnel No. 12 is in 100 feet to the ledge, 8 feet wide. The rock is reported to be rich. It is proposed to bring a ditch from Rock creek, on the west side of South Fork canyon, three miles, giving a supply of water at the mill with a pressure of 400 feet.

Calaveras.

The Fellowcraft mine, east of San Andreas, is to be operated by a new company, with C. C. Clark as Supt. and Mgr.

The Boston Stock Exchange has listed the Melones G. M. Co., with a capital of 200,000 shares of $10. The property is located on Carson hill. The directors of the company are W. E. C. Eustis, C. M. Weld, G. H. Morrill, Jr., J. Parker, J. C. Whitney, C. N. Felton and W. C. Ralston. In the upraise above the 600 level the last assays show $12.40.

The Prussian Hill mine has made its first cleanup, which is said to have been satisfactory. This property is owned and was reopened by C. & B. C. O'Neill of Jackson.

The directors of the Boston mine, near Mokelumne Hill, held a meeting May 5th and decided to sink to 1500 feet. The present depth of the shaft is 1000 feet. A compressor and pump were ordered put in.

San Andreas *Citizen*: W. H. Clary, Jr., will begin development of the Flamm property, near San Andreas. A hoist will be erected and sinking begun.——The machinery is being put in place at the Sheep Ranch mine. ——At the Ford mine a large pump is needed to clear the 700-foot level of water. The necessity of enlarging the milling capacity is apparent.

El Dorado.

Placerville *Republican*: A. J. Crain, Supt. of the Plymouth ditch and other property owned by Hayward & Lane, near Indian Diggings, says Hayward & Lane are preparing to do hydraulic mining in the gravel hill east of Indian Diggings, and have bought land of Mr. Koblert for a debris dam, which is now completed, and they are waiting the inspection of the Debris Commissioners before commencing work. There is a large body of gravel, which they have been prospecting by means of tunnels. It is an ancient river channel. The wash from it supplied most of the gold taken out of the shallow placers of Indian Diggings. Mr. Crain will superintend the work and O. Ball will be foreman. They have twelve men employed. The company owns its own ditch, which takes water from the Cosumnes river above Pl Pl valley.

Placerville *Nugget*: W. R. Pearson, owner of the Mt. Hope mine near Grizzly Flat is making arrangements to open the mine.

Kern.

Randsburg *Miner*: The Kinyon mine has cleaned up a run of thirty to forty tons of low-grade ore, which went $10 per ton. This was screenings from the dump. They are now running rich ore from the mine.——A large flow of water was struck a few days ago in the drift from the shaft at the Yellow Aster water wells. The increase for the first twenty-four hours after was noticeable, and 30,000 gallons more water were sent to the mill than ever before in one day.

Madera.

J. A. Fersom of Stockton has sold the Ne Plus Ultra copper mine, nine miles from Madera, for $125,000, to New York capitalists. It is reported that the company which bought the mine in Madera will put up a $150,000 smelter.

These mines are in the Buchanan belt, about five miles from Raymond, the terminus of the branch railway from Barenda, on the Southern Pacific Railroad. The copper mines of this locality were opened to a depth of 100 feet or more and some stoping done years ago. The formation is mica schist.

Mariposa.

(Special Correspondence).—The Quail M. & M. Co., incorporated by business men of Sonora, has taken over the bond held by Kendall & Whitney on the Quail mine of D. Bruschi, on Indian gulch. They have bought the boilers, hoist and 4-stamp mill now on the Louisiana, and will erect them on the Quail, where a considerable amount of ore is blocked out. Heavier machinery will be placed on the Louisiana later.

The Mt. Gaines plant, west of Hornitos, is running with electricity from Merced Falls, eight miles distant. The mill is run by one motor, while a second operates the air compressor, whence the drills, pumps and hoisting engine are operated.

The Columbus M. Co. is drifting in good ore on Horseshoe Bend mountain.

The 6-stamp mill on the Porter mine is running on ore averaging $10.

At Boston, on the 3rd inst., the directors of the Merced G. M. Co., authorized an increase in capital stock of 50,000 shares, of $15 each, raising the capitalization to $2,250,000. The stockholders will ratify this action at Butte on June 27th. The proceeds, according to a Boston interview, will be used to build an electric power plant, increase the milling facilities and do development work. Work on the electric plant will begin at once, and outstanding cordwood contracts are cancelled. The contest with the Eagle-Shawmut Co. in Tuolumne county over the Oak Flat ditch is settled, and this will be used for power. Water will be taken from the South Tuolumne at Hardins, carried ten miles in the rebuilt ditch to Colfax and returned to the river with a fall of nearly 2000 feet. The distance thence to the mines by air line is about fourteen miles. There will be installed an excess of power over the needs of the company and the surplus will be sold throughout Mariposa and Tuolumne counties. The furnishing of cheaper power than steam will be of great benefit to Mariposa county mining. Including the unpaid $3, which has been called in on the old stock, Merced will have available for this work $1,050,000.

Groveland, May 21st, '99.

Nevada.

The new mill of the Pennsylvania Co. at Grass Valley is running.

The Grass Valley Expl. Co. have completed at the W. Y. O. D. mine a plant for saving concentrates, built under direction of G. G. Gates. It is located east of and adjoining the mill, and will concentrate the slimes.

Oroville *Mercury*: C. C. Bitner of Spenceville has sold his quartz mine located near that place to New York capitalists. The mine is named the Mineral Hill. It has been developed, but there is no mill on it. The price is said to be $25,000.

Grass Valley *Telegraph*: The new 10-stamp mill at the Pennsylvania mine has started up. The mill was built by W. S. May. Three new concentrators are being put in. The power used is electricity, generated by an 80 H. P. motor. The mill will be in charge of W. Wheeler.

Grass Valley *Union*: At the Reddik mine a new shaft is being sunk directly over the old one, 140 feet from the bottom, to overcome the difficulties experienced by the influx of water encountered some time ago, which caused ground to cave.——At the Home mine at Blue Tent Supt. Logan has cut a station in the shaft. A new office building has been erected and other improvements made.

Orange.

Santa Ana *Standard*: The development of oil has commenced on the mesa between Westminster and the ocean. On the Northam ranch a well is down 900 feet. On the Bolsa Chico Gun Club game reserve a well has been started, the first work being done this week. Other test wells are talked of in that section. Much secrecy has been observed and endeavors made to keep the plans for development quiet. The development commenced is due to that at Newport beach.——Several locations of mining claims have been filed in the county records lately and it is said prospectors are numerous in the mountains. J. Yeager, C. Duessort, J. Hanson and F. Gomez have filed a claim in Lucas canyon named the Four Nations. The ore is reported to carry silver.——The Lone Horse mine was filed May 15th. It is in the same canyon; the owners are Yeager & Duessort.——The Three Nations mine, in the same locality, fifty-three acres, was filed a week ago. The partners are F. Gimea, S. H. Finley, R. McFadden, A. Deface, D. Serey, J. Serey, W. Schermer and J. J. Schermer.

Placer.

(Special Correspondence).—In the Eureka Con. drift mine near Forest Hill the prospect work has resulted in striking the rim of the channel at a lower point than that reached several weeks ago. The wash contains many large boulders and much water. It will be several days before much definite information can be had. This work is in charge of F. Chapellet Jr.

Forest Hill, May 20th, '99.

Auburn *Republican*: C. F. Hollen of San Francisco recently leased the Boulder mine of C. C. Handy of Ophir, and leased the Line mine on Auburn ravine, below Auburn, of J. Malmburg. Mr. Hollen is representing the Alliance Experimenting & Mining Co. of San Francisco.— B. F. Hartley is in charge of the Bear River G. M. Co.'s property, on Bear river, above Colfax. A hydraulic elevator is being put in and work will be done on the river this summer. The company is composed principally of Englishmen who have purchased several miles of river bed.

San Bernardino.

Yuma *Sun*: J. E. Doan of Los Angeles is making arrangements for opening a copper mine near the Colorado river, twenty-five miles above Parker. The group of mines consists of fifty-six claims, on which several hundred feet of development work has been done. ——C. H. Gray, L. Gray and B. Gray are about to build a mill on the Arica mines, in the eastern part of this county opposite Ehrenburg, Arizona. There is a quantity of ore on the dump.

San Diego.

L. E. Aubury is at Picacho, where he is putting in a cyanide plant, which will be ready for operation in about two weeks.

San Diego *Union*: The seventeenth report of Receiver C. W. Pauly of the Golden Cross mines has been filed in the Superior Court. The report covers the operations for the month of March and states that the cleanup on March 31 from the 100-stamp mill amounted to $18,817.07, the expenditures to $30,656.27, which included a payment of $11,500 to J. Spiers in accordance with a stipulation filed in court. The payroll for the month amounted to $6000. After making all payments the balance on hand amounted to $22,078.78.

Santa Barbara.

Santa Barbara *Press*: The report that the Carpinteria and La Patera asphalt mines are to close down is denied. The Sisquoc-Alcatraz refinery will not be able to fill all of the orders now in, until the new machinery is placed and in working order. When the Sisquoc plant is established the company will be able to produce asphalt at less cost than at present from the Carpinteria and La Patera mines. La Patera will be abandoned this fall, unless new deposits are found closer to the surface, as the working level is now down 400 feet and must go deeper. During the winter rains it is almost impossible to work in the shafts because of water. The Carpinteria mines and refinery are not likely to be closed down for several months. It is reported that the plant at Sisquoc and Alcatraz will be increased to four times the original capacity.

Shasta.

(Special Correspondence). — At a regular meeting of the Board of Directors of the Mt. Shasta Gold Mines Co., Ltd., held May 15th, a dividend of $6000 was declared, being the first dividend of the company. The mines are located at Shasta and comprise thirteen claims, about 250 acres of land. The capital stock of the company is 100,000 shares, of a par value of $5 per share. The mine is working from sixty-five to eighty men and ships its ore to the Keswick smelter. The ore has averaged $40 per ton to a depth of 300 feet. Stoping is in progress on the 200 level, and a station has been cut out on the 300 level from which drifts are being run. The mine has earned $26,000 over operating expenses since the present owners purchased it in July, '98, $20,000 having been invested in equipment and development of the property and in paying the balance of the purchase price. The mine is now free from debt and on a regular dividend-paying basis. The officers of the company are: O. O. Howard Jr., Pres. and Treas.: F. E. Ware, Vice-Pres. and Gen. Mgr.; H. A. Ladd, Sec. Howard & Ware own nearly all of the stock of the company.

San Francisco, May 18th, '99.

A retaining dam built on Harrison gulch to impound tailings from the Midas gold mine broke on the 18th inst. and a large amount of tailings, estimated to contain $60,000, ran down the canyon and were lost.

Sierra.

A. Jacobson has leased the Berger mine and has been following a small streak of ore. A couple of weeks ago it began to widen; it is now 3 feet wide and rich. He has six men employed.

It is reported that more extensive works will be added to the Butte mine.

W. Thompson is working his brother's gravel mine in Ladies' canyon.

Downieville *Messenger*: L. Morrison is working his gravel claim in Hog canyon.—— At the Comet mine in Jim Crow canyon seven men are employed.——It is reported more extensive works will be added to the Butte mine.——I. Copeland has completed cleaning and enlarging the Gold Bluff ditch, has started up the mill and resumed work in the mine.

Siskiyou.

Yreka *Journal*: Mr. Plummer has discovered a vein at the head of Dutch creek which assays in copper, with little gold and silver. It is capped with iron. Dutch creek has produced considerable gold, especially at its junction with Klamath river. In the Klamath, where it empties, the richest pay was found in the bedrock gravel, supposed to be the output of Dutch creek.

Yreka *Journal*: Mr. Lewis has made a strike in quartz on a hill near the Goodale ranch at the lower end of Scott valley. The extent of the ledge has not been developed. Claims have been located all around that section. It is near the Sheba mine of Patterson creek, and mining fields of Oro Fino, Mugginsville and Quartz valley.——The Yreka M. Co., successors to the Blue Gravel Co., at Greenhorn creek, a mile south of Yreka, took out $500 the last cleanup. The upper riffles are cleaned up every day, and on Sundays upper and lower riffles are taken up. J. Garvey is foreman.——The Directors of the Golden Star M. Co., working the Spencer quartz mine on North Fork of Humbug creek, have levied an assessment of 1 cent per share. The prospects since striking the ledge in the lower level are encouraging.——Hunter & Co. intend running a tunnel 1500 feet into their Cherry Hill quartz mine on Cherry creek, and will use power drills.——Owners of patented land between Yreka and the Forest House are endeavoring to join in prospecting the quartz ledge lately discovered. This ledge is on the hillside west of the Scott valley road, and runs towards the North Fork of Greenhorn.

Solano.

The St. Johns quicksilver mine, five miles from Vallejo, is to be reopened, after years of idleness, by a company organized by A. Tregidgo, formerly of Grass Valley. He is to be Supt.

Trinity.

Redding *Free Press*: G. L. Carr has a lease on the Yellow Rose of Texas mine, situated on the head of Union creek, at an elevation of 7000 feet. Union creek is a tributary of Coffee creek. The Yellow Rose is owned by Amos Hill. He expects by June 1st to commence shipping ore to Selby.——H. C. Woodrow, who has bonded the Trinity mine of the Bank of Shasta County, has a force of men at work.——Landers & Fisher shipped a carload of ore to the Keswick smelter last week and are ready to ship another.——Hicks & Co. of Castle Garden are making improvements in their cyanide plant and will soon be ready to run. They have completed two 40-foot tanks. They have let a contract for running a 100-foot tunnel on their ledge.——Moore & Nordstrom at Bragdon have received returns of gold taken from black sand of $36.07 per ton.—— Johnson & Kirke on McCall gulch are keeping a Huntington mill running. Mr. Chris of San Jose is amalgamator.

Tulare.

The asbestos mine recently discovered in this county and owned by Drouilard & Helm, promises to be a paying property. It is reported a New York firm has offered $75 a ton for all the asbestos the mine will furnish.

Tuolumne.

(Special Correspondence).—The Miners' Association of Tuolumne county, a branch of the California State Miners' Association, was organized, with headquarters at Sonora, on the 20th inst. The meeting was called to order by W. C. Ralston, Vice-Pres. of the State Association. W. H. McClintock of the Goldwin M. Co. was elected temporary chairman and C. R. Thorburn temporary secretary. The chair appointed a Committee on Organization, which reported later, and the following officers were elected to serve for one year: W. H. McClintock, Pres.; C. R. Thorburn, Sec.; J. McCormick, Treas. An executive committee of twenty-one was appointed by the Pres. Addresses were delivered by E. H. Benjamin, Sec. State association, and W. C. Ralston, and telegrams were received from Hon. Jacob Neff and John F. Davis of Amador county, regretting their enforced absence. All of the prominent mother lode and east belt mines were represented, and seventy-five members were enrolled. The meeting was largely attended and it is predicted that the association will number 1000 members before the next annual meeting. C. R. THORBURN, Sec.

Sonora, May 20th, '99.

The Junction mine, near Soulsbyville, has been closed down and the pumps withdrawn. The development of the vein to a depth of 300 feet with drifts and crosscuts, aggregating about 1000 feet, has failed to disclose anything of value.

COLORADO.

GUNNISON COUNTY.

(Special Correspondence).—In the last three weeks many good strikes have been reported. The strike in the Venable has now been far enough determined to say that it is one of the most notable strikes ever made in the State. The rich ore is 9 feet in width, and from numerous tests made is found to average $200 per ton. Drifts have been run each way on the vein. This mine has 20 feet of good mill ore beside the 9 feet of high-grade.

The Comet, on the east end of the Venable property, has had several good offers of purchase, ranging from $20,000 to $50,000, with only a 20-foot hole on the same vein as the Venable.

The Iron Cap comes next, east of the Comet, and will command a good price. It is as promising as the Venable was, has two patented claims and 650 feet of development work, consisting of 135-foot shaft and three levels, beside a good shafthouse, hoist, 5-stamp mill

and other improvements. The property is under option for $15,000, which is one-fourth of its value.

The Woodland Co. own several promising claims north of the Iron Cap which they are preparing to develop. Numerous new locations have been made since the strike on the Venable, and many of them make an excellent surface showing.

The Diamond K has sent out a carload of ore, being its first shipment.

Word has come of a strike on the Humboldt, near the Vulcan. The value or extent of it has not been learned.

Some rich ore was brought in to-day from the Good Hope, showing sylvanite, and worth several dollars per pound. This ore was struck in the 300-foot level, and is the finest ore shown in this camp. Other properties working will also make records for themselves soon.

This week I visited the Riley property, where ore on the dump and in the bins amounts to seventy-five tons, and they expect to sort it roughly, making two grades, one for mill and the other smelting. It is thought the latter will run $200 per ton and the mill rock $20. I found the vein opened for a distance of 3000 feet at various places along the vein, which has a width of over 1 foot. The vein matter is white quartz, with a small amount of iron and copper and considerable nagyagite, a sulpho-telluride of lead and gold. Many pieces of ore show free gold. The quartz is found in a large mass of changed quartzite, which is soft and the cleavage faces stained with iron oxide. This property is one of promise, on account of the large bodies of rock, which make good milling ore, adapted to cyaniding.

The Midland is one-half mile farther to the south. They have started up with twelve men and are developing rapidly. They have 3 feet of shipping ore that will run $100 per ton, beside 20 feet of low-grade mill ore.

Mr. Chinoworth has arrived and will start work on his property at Du Boise, where he has a tunnel 150 feet and a crosscut which shows 40 feet of ore running from $4 to $7. He says he has not cut the other wall and does not know how much wider it is. At almost every property being developed in the gold belt of this county large bodies of low-grade mill ore are associated with high-grade streaks.

Gunnison, May 16th, '99.

LAKE COUNTY.

(Special Correspondence).—After a winter of considerable depression occasioned by snow blockades, the mining industry at Leadville is again assuming its normal condition, with prospects of a tonnage output for '99 far greater than that of '98.

The down-town mines, comprising the Weldon, Bon Air, Penrose, Bohn Shaft, Starr, Sixth Street, Coronado and Northern, which were full of water for two years, are now unwatered and have pumping facilities to keep them dry. The Weldon is to be operated by the Weldon M. Co., who are the owners; the Bon Air, Penrose and Starr by the Home M. Co. of Leadville, as lessees; and the others likewise by lessees. It is estimated that within six weeks from now the entire group of down-town mines will be at work producing 300 to 600 tons of ore per day. These are the original lead-carbonate mines, whose shafts are from 400 to 600 feet deep. The workings pass through a stratum of oxidized iron ore, thence into the carbonate contact 8 to 20 feet thick on the average, trending northeasterly and southwesterly and dipping about 15° toward the north and east. This carbonate contact is between porphyry and lime. At greater depth, below the carbonates, it is believed sulphide ores will be encountered. While these mines have been closed down the production of lead carbonates has been limited to 600 to 800 tons per day for the district.

Farther up the hill the Mab, Mahala and R. A. M. are beginning to produce their normal tonnage. The ores from these are largely sulphides, the values being in gold, silver and lead.

On Breese hill, higher up toward the crest of the Mosquito range, is the Ibex group, the central figure in the sulphide gold belt of the district. This is now under the management of S. W. Mudd. The Ibex, locally known as the Little Johnny, is producing about 300 tons per day, and it is claimed the purpose is to raise this to 500 tons, as they have the ore and facilities to do so. The Breese hill gold-belt ores generally carry values aggregating $25 net per ton, of gold, silver, lead and copper, these metals being named in the order of their importance as here produced. The Ibex ores are silicious.

On Little Ella hill, across Evans gulch, are the Resurrection, Sedalia and others, whose ores are largely lead carbonate. The Sedalia is not working. The Resurrection is operating and will increase its output to 200 tons per day. The owners are to erect a concentration mill.

On Fryer hill several properties are being worked by lessees. At the head of Big Evans gulch the Dolly B. is shipping fifty tons per day and the Lydia and Monarch are at work. In California gulch the A. Y. and Minnie is shipping its usual quota under lessees; the Moyer is shipping 200 tons per day. The ores from this part of the district are low-grade sulphide, carrying iron and silver. From the same gulch the Yak tunnel, now in 1¼ miles, is driven with three shifts. Its destination is the grounds of the Ibex Co.

On Printer Boy hill, in Iowa gulch, shipments by lessees amount to considerable. The Nisi Prius, on Rock hill, between Iowa and California gulches, recently made a strike of high-grade carbonate ores.

The daily production in Leadville district, not including the prospective output of the down-town mines, aggregates about 2000 tons.

Leadville, Colo., May 20, '99. WASCOTT.

TELLER COUNTY.

(Special Correspondence).—L. O. Byrer and others, operating the Guess on Squaw mountain, recently took out forty tons of four-ounce ore.

The Ajax, on Battle mountain near Victor, is operating and shipping with a new hoist, compressor and shaft house over a 450-foot shaft.

The Economic Gold Extraction Co., a subordinate concern of the Gold Coin M. Co. of Victor, is making progress with the construction of the chlorination plant on the Arequa side of Squaw mountain. The plant is being built in two sections, the machinery for one section being on the ground. The plant, complete, will have 600 tons per day capacity. The site of this mill is near the entrance of the Columbine tunnel which cuts through Squaw mountain and passes into the Gold Coin grounds on the opposite side. The tunnel is 3700 feet long, through which Gold Coin ore will be delivered to the Economic Extraction mill by electric haulage. By track this mill will be connected with the Uinta tunnel and other properties in upper Arequa gulch which are controlled by the Woods Investment Co., principal owners of the Gold Coin mine.

The Independence Town & Mining Co., owners of a thirty-eight-acre tract on the southern slope of Bull hill, originally known as the Hull City placers, are completing improvements costing $75,000, consisting of heavy abutments and stone filling, ore house, shaft house, hoisting and compressor machinery. Their new steel gallows-frame and steel frame shafthouse are the first of the kind in the district. The main shaft is 560 feet deep, there being five other shafts on the property. The vein opened for 1000 feet runs north and south. It is stated that $800,000 has been produced from this property within the last eighteen months and that the average value of the ore has been $60 per ton. It is estimated the property will produce 100 tons of ore per day when the new machinery shall be set to work.

Dr. Crane of Cripple Creek is operating one of his washers on the dump of the Garfield-Grouse on Bull hill. It operates as a sizer, screener and washer, and handles about 100 tons per day of the material that runs $5 to the ton. The motive power is gasoline.

The Damon tract of twenty-one acres, on the northern slope of Bull hill, was brought into prominence by the Alert G. M. Co. which had a lease on a portion of the tract. This company struck the vein 7 feet from the surface some time ago, since which time they have shipped several cars of high-grade ore. The vein is sylvanite ore from 1 to 12 feet wide. Now the ground is all leased and that part of the district is looked upon with favor. The Damon belongs to J. R. McKinney, Woods Investment Co., W. Lennox, J. M. Hawkins, and others.

The Teutonic, which adjoins the Damon, is in the hands of active lessees and has fine prospects. WASCOTT.

Victor, Colo., May 18th, '99.

(Special Correspondence). — The Midget mine on Gold hill is being developed under the superintendency of R. A. Trevarthen. It is shipping 100 tons per month to the cyanide mills at Florence. It is stated the ore averages three ounces gold to the ton. The main shaft is 500 feet and No. 2 shaft is almost as deep. The two are to be connected at the 600 level and a heavier hoist put in. By cross-cutting from the main shaft at the 400 level four other veins have been opened.

The Work M. Co.'s properties comprise four claims on Raven and two on Gold hill, aggregating forty acres. There are sixteen working shafts. Ore shipments have amounted to 600 tons since Jan. 1st, '99, all of which have been taken to the cyanide mills, the average values being $30 per ton. The deepest workings are 450 feet from surface. L. A. Hayden is Supt.

The cyanide and chlorination mills at Colorado City, Florence and in Cripple Creek district handle 23,000 tons of ore monthly and it is estimated that 8000 tons per month are shipped to the smelters. The mill ore averages $28 per ton and that treated by the smelters not less than $100 per ton. This indicates for the smelting ore a valuation of $800,000 and for milling ore $644,000; a total value per month of $1,444,000.

It is learned that some mills get a higher grade ore than others. It is asserted that the ore handled by the Metallic Extraction Co. averages $20 to $23 per ton; that of the Colorado-Philadelphia plant at Colorado City, $35 to $40 and that of mills in the district $28 per ton.

The reduction works of the National Gold Extraction Co. at Florence will soon be in operation. This plant was formerly known as the Kilton. Its capacity is 100 tons per day. The mills handle ores as low grade as $8 per ton. It is believed that the general values of ores of the district are running about the same now as they did three years ago—they are not lower. WASCOTT.

Cripple Creek, Colo, May 19th, '99.

IDAHO.

Hailey *Times*: The Tip Top mill is nearly completed, it has twenty stamps of 850 pounds each, will make ninety drops a minute and crush fifty to sixty tons of ore per day. The process will be free-milling and automatic.

Wardner *News*: The Bunker Hill Co. is employing 120 men. The ruins of the mill have been cleared away and the erection of the new mill will be commenced as soon as possible. T. Mitchell, formerly of Gem, is preparing the plans for the new concentrator. The ground is covered with frame timbers.

Boise *Statesman*: E. N. Clark, who spent the winter in Mallick district, says it will be an important sub-division of the Buffalo Hump section. The Star group, upon which the De Lamar Co. has an option, is the best developed mine in camp. The croppings assayed $15.45 a ton. At a depth of 70 feet the ore runs as high as $70 in gold and forty ounces silver. Thirty-six feet of ledge matter has been cut without a wall. There are a number of claims that give promise. Mr. Clark has an extension of the Star; 150 to 200 locations have been made. On Bull creek, three miles down the river, some good mines have been discovered.

MONTANA.

There is activity at Libby owing to increase in the force at the Libby Creek M. Co.'s property on Shaughnessy hill, heretofore known as the Buzz Saw group, which have been operated by the United States & British Columbia M. Co. under a bond for six months, and the first payment of the price paid. The company has erected a sawmill on Granite creek, a mile from the lower tunnel on the Buzz Saw mine, and is cutting lumber for the concentrator, offices, bunk house and stables, and for a three-mile flume from Granite creek to the concentrator. The flume will develop 500 H. P. at the mill. The concentrator will have a capacity of 100 tons and will be running by August. The mine is developed by seven crosscuts, has 2000 feet of work and the longest tunnel is 550 feet. The ore body is 1300 feet in length and the vein is 4 feet. The values are in gold, silver and lead. The average of the ore is $11 a ton. The mine is eight miles from Libby and thirty men are employed at the mine. J. M. Dikeman is Supt. The company will spend $80,000 before the mill is started.

At the Snowshoe mine the force is being increased. There are now employed 100 men. The tunnel is in 1500 feet and being driven at the rate of 8 feet a day. An air compressor has been put in.

Work has continued on the Silver Cable the past winter and 500 feet of tunnel has been run. This claim is operated under bond by F. M. Leonard of Libby. The mill has a capacity of 100 tons a day and is ready for operation.

Eastern parties who have an interest in the Brick & Brannagan properties on the West Fisher are making arrangements for transportation of a mill which is on the way from Libby to their mines. Twenty miles of wagon road must be built before they can get their machinery from Libby to the mines.

There is other work going on in the Fisher district and arrangements are being made for another mill on an adjoining group.

NEVADA.

The Robust mine, near White Pine, is preparing to ship ore to Salt Lake. A body of copper has been found in the 70-foot and 100-foot levels, from which a shipment was made to Salt Lake. This ore is a separate vein, crossing the gold vein, and carries from 25% to 50% copper. Little work has been done below the 70-foot level, owing to inadequate hoisting facilities. The company has acquired several additional claims adjoining the Robust group, on which they have two men prospecting.

The Rocco-Homestake M. Co. has been incorporated in San Francisco, Cal., to operate the Homestake lead mine in White Pine mining district, with their head office at San Francisco. Deeds have been recorded for the transfer to the company of a one-quarter interest in the Homestake mine by O. J. Smith and M. D. Smith for $3000; one-twelfth interest by R. M. Clark for $1000, and the remaining two-thirds interest by Rocco Cragnaz for $8000.

OREGON.

A discovery of gold has been made in Jupiter gulch, on the east fork of Upper Althouse creek, adjoining the Frank Houston mine. Jupiter gulch is a part of the Jupiter G. M. Co.'s property on Althouse creek and is located at the foot of French peak, a porphyry mountain. The porphyry is seamed with small stringers of gold-bearing quartz and manganese, and this newly discovered gulch, like Houston's, derived its gold from pockets in the porphyry. F. R. Wardle, Mgr. of the Jupiter Co., has been having this ground prospected and has opened a body of fine wash and gravel 1000 feet in length, 5 feet depth and considerable width, all of which prospects.

SOUTH DAKOTA.

Deadwood *Pioneer Times*: The Golden Reward Con. M. & M. Co. has purchased all of the Black Hills holdings of the Deadwood & Delaware Smelting Co. The Golden Reward Co. secured a bond upon the Deadwood & Delaware property over two months ago for sixty days. Dr. F. R. Carpenter, Supt. Deadwood & Delaware Co., and H. Franklin, Vice-Pres. Golden Reward Co., have been in Chicago for two weeks on business connected with the transaction and conferring with the stockholders of the two companies.

UTAH.

Salt Lake *Tribune*: The first carload of copper from the Highland Boy smelter has been started for the refinery of Lewissolm Bros. in New Jersey. The bars contain copper, gold and silver. The shipments of bullion will be made weekly.——The washing of gravel at the property of the Bingham Placer M. Co. in Bingham canyon has begun under the direction of Mgr. Schenck, the raising of dirt to be from a depth of 125 feet, where the upper channel has been opened. It is the intention to handle 200 yards daily. —— Sam Gilson has found the lost vein on the Buckhorn mine at Dugway in the Deep Creek country, and is again raising high-grade ores. The Buckhorn is among the earliest of the mines of Deep Creek. Its ores yielded hundreds of ounces in silver per ton.

WASHINGTON.

At the properties of the Okanogan free gold mines, formerly known as the Allison group, near Oro, on the surface the ore is a soft sugary quartz, and is oxidized to a depth of 30 feet, as shown in the workings. It is honeycombed in places, and in the cells the free gold is visible to the eye. The specimens of this class of ore lose much of the gold, as the metal is loose in the cells and easily drops out. There are stringers of sylvanite running through the quartz. The average in the pay chute will run $50 to $60 in gold.

WYOMING.

The Wyoming Development & Transportation Co.'s mines are in southern Wyoming, north of the Colorado State line. The company owns fourteen lode mines and 235 acres of placer ground at Gold Hill, which has been developed since December, '95. One of these, the Acme, is a gold mine. The company also owns and is interested in a number of copper properties in the same locality.

A smelter for the reduction of the copper ores and milling facilities at Gold Hill will be erected.

It is reported the Amalgamated Copper Co. have offered $900,000 for the Ferris-Haggerty mine, near Grand Encampment. The mine is producing and shipping fifteen tons of ore daily.

FOREIGN.

AUSTRALIA.

For the purpose of proving the deep deposits of stream tin which are believed to exist in the Deepwater and Emmaville districts, the N. S. W. Minister for Mines, Hon. J. Cook, has decided to offer the miners assistance as an inducement to proceed to work. Previous attempts have been unsuccessful, owing to need of pumping machinery, beyond the reach of prospectors. The shallow ground is to a large extent worked out.

The gold production of Australia for the first quarter of 1899 has reached 836,295 ounces, an increase of 133,362 ounces over that of the same period last year. Of this amount, West Australia produced 316,752 ounces; Victoria, 213,847 ounces; Queensland, 205,542 ounces; and New South Wales, 100,153 ounces.

BRITISH COLUMBIA.

Sandon *Mining Review*: The Manitoba claim at Silverton has a 6-inch paystreak.——The lead has been struck on the Lamont claim at Silverton.——No. 2 tunnel on the Emily Edith is in 500 feet and in good ore.——They have fourteen men at the Wonderful and a lower tunnel has been started.——The Arlington at Slocan City will begin operations.——The Queen Fraction on the Noonday lead of the Galena Farm is looking well.——T. Mitchell, now at Wardner, Idaho, will commence work on the Ruth mill.——P. J. Hickey's gold mine at Camp McKinney is proving to be one of the best silver-lead properties in the country. It also carries good values in gold.——The contractors are working at the Selkirk. Good mineral——gray and peacock copper—has been found.

CANADA.

Copper is found cropping on the surface over a tract of land in Chandos, Province of Ontario. It is reported that it gives promise for deep and permanent mining on a large scale. The Colonial Copper Co. has secured 416 acres of this land, situated in Peterboro county, township of Chandos.

LOWER CALIFORNIA.

The new placers 400 miles south of San Diego, until now known as the Santa Clara diggings, cover twenty square miles and are said to be rich. The principal workings have been upon and around a mountain called Cerro Pinta, and by this name the placers are known to the Mexicans. The pay is found 6 inches to 2 feet beneath the surface, and in all directions from Cerro Pinta hundreds of Mexicans are reported to be taking out all the way from $4 to $20 a day with dry-washing machines. Water in any quantity is twenty-one miles distant. The gold is .982 fine. There are many little nuggets in the gold. It is reported that $10,000 has been received at San Diego. Water is found in small quantity six miles from the placers. Heretofore miners wishing to take a claim at the placers have had to send or go across the peninsula to Mulege, but an agent of the Government from Mulege will locate at the camp.

San Diego *Union*: A large consignment of machinery has been shipped by way of Tia Juana for La Fortuna and La Republic M. Cos. The principal stockholders of La Fortuna M. Co. are Eastern men, with H. A. Howard of San Diego Mgr. The mines are at Agua Dulce, 100 miles southeast of San Diego and sixty miles east of Ensenada. La Republica M. Co. was recently organized by Mr. Howard and A. L. Wright of San Diego, with Mr. Wright as Mgr. The mines are near La Huerta, in the Agua Dulce district. The value of the machinery and supplies cleared through the Tia Juana custom house was $20,000.

MEXICO.

Samples of gold-bearing ore have been brought into Yuna from a group of mines in the Cocopa mountains on which General Andrade is having development work done. The ledge is large and close to wood and water. It is reported a mill will be built.

SOUTH AFRICA.

Johannesburg *Mining Journal*: A strike of conglomerate is reported in the Knight Central, which runs 11 pennyweights.——The capacity of the Van Ryn Gold Mines Estate is to be increased forty or sixty stamps.——In the Alexandra Estate at Johannesburg an important strike in a sandstone reef is announced.——Twenty stamps are to be added to the mill of the Aurora-West, united.

TASMANIA.

Australian *Standard*: Six smelters are now in operation at the works of the Mount Lyell M. & R. Co., the sixth being blown in last week. —— A satisfactory development has taken place at the North Mount Lyell Con., where good ore is exposed on the eastern sections of the property.——The Lyell Proprietary mines, known lately as the Great Southern, have prospected a deposit of native copper on their northern lease, near the Mount Lyell Consols.——At Mount Jukes and Mount Darwin a number of local companies are prospecting. The King Jukes crosscut is in ore, and work is being pushed in the Mount Jukes Proprietary, where high-grade ore is showing.——A discovery of copper similar to the ore in the Prince Lyell is reported in the Mount Lyell Reserve, on the section north of the North Mount Lyell Con.'s lower block.

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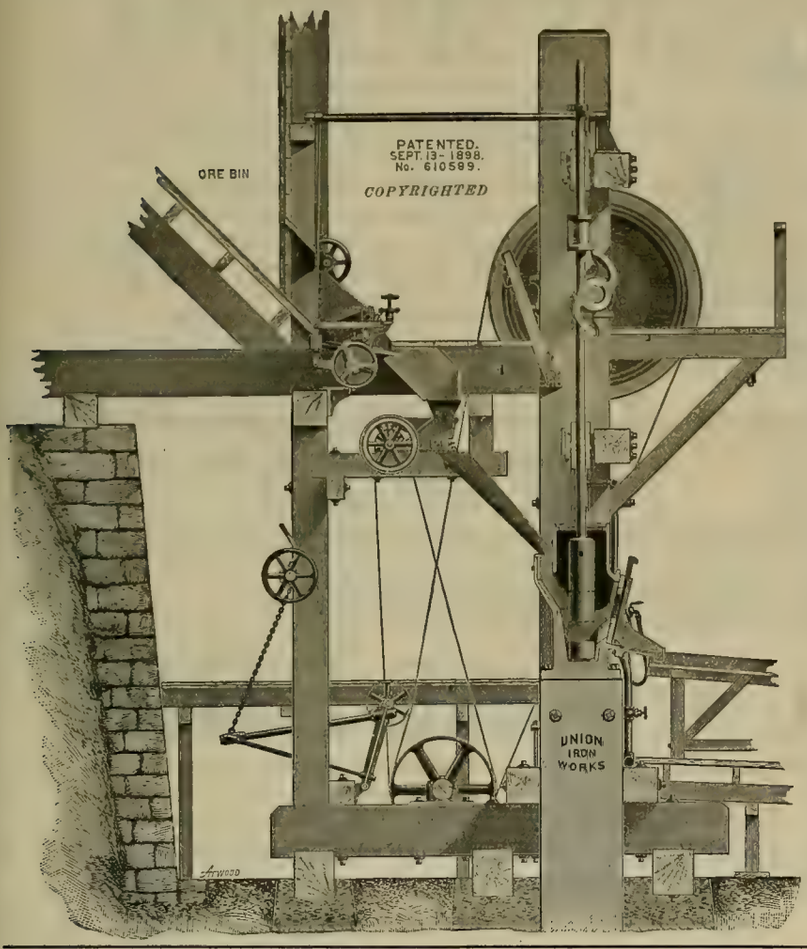

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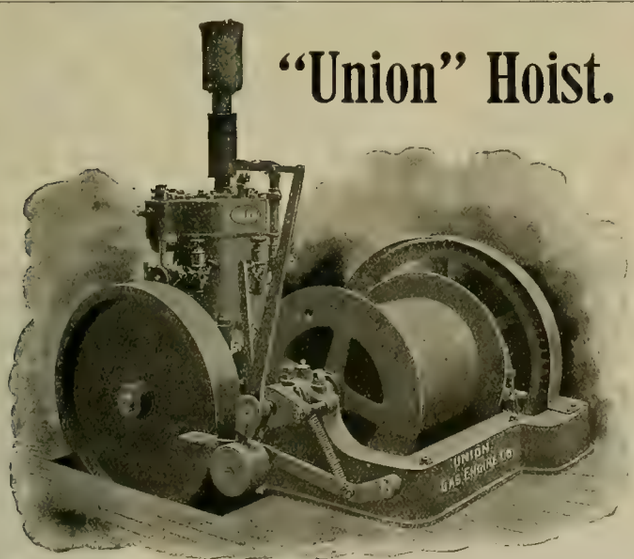

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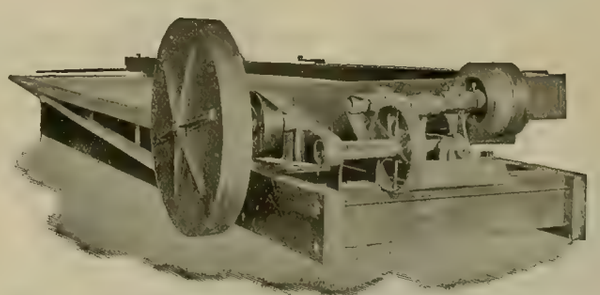

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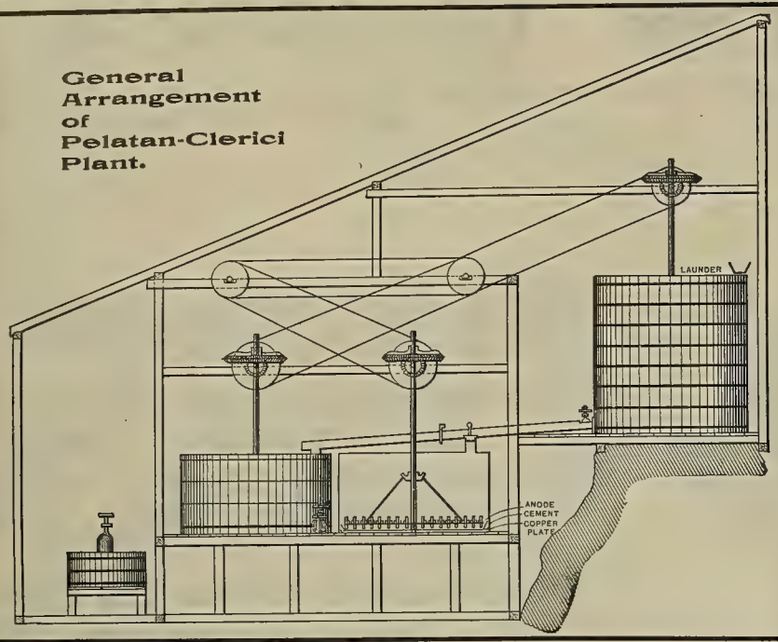

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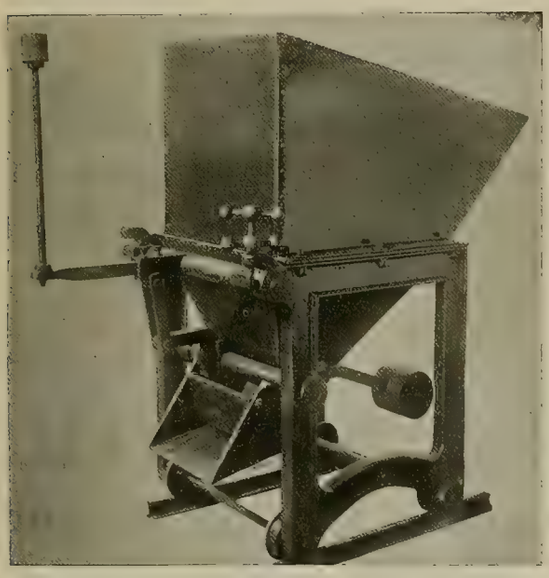

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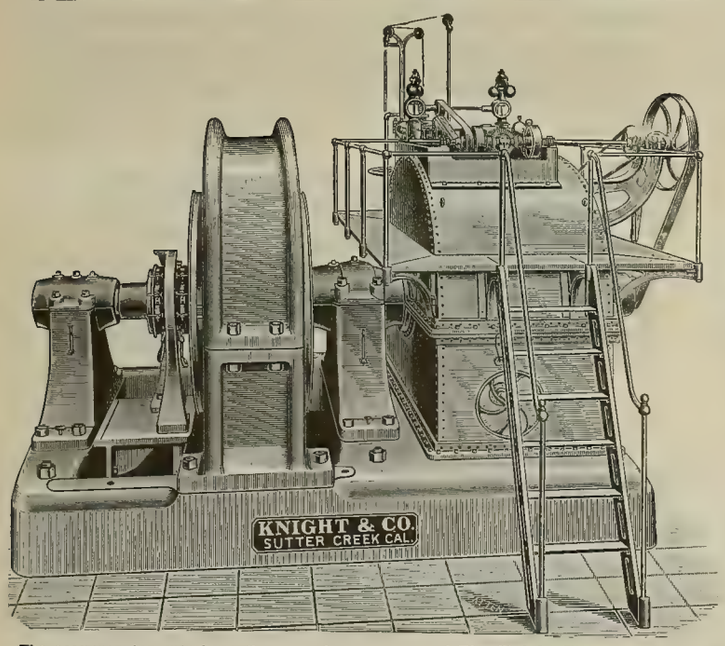

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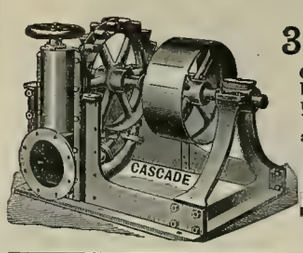

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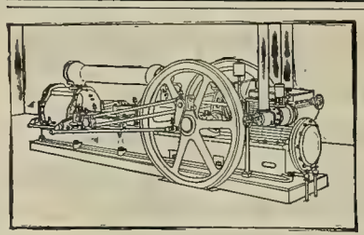

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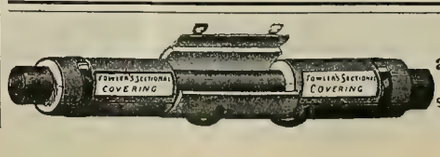

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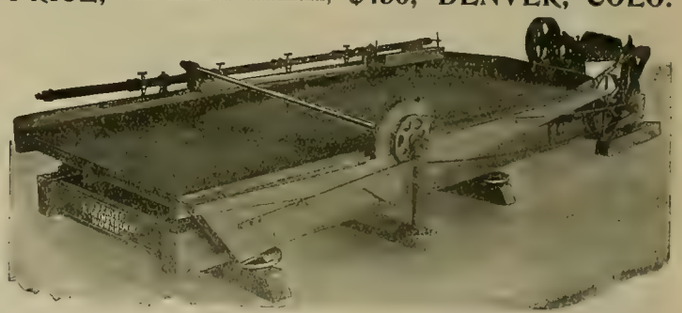

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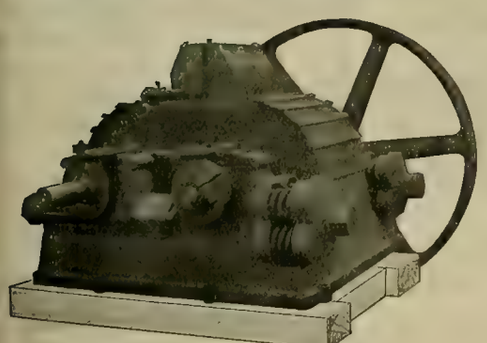

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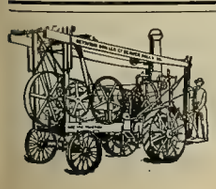

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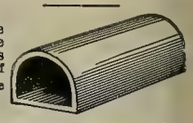

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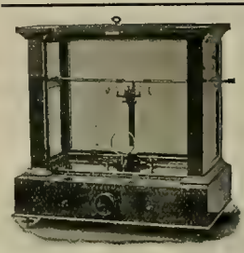

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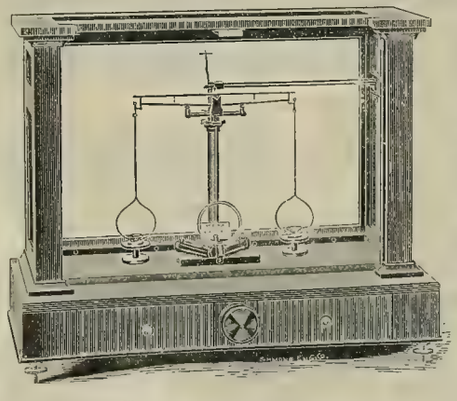

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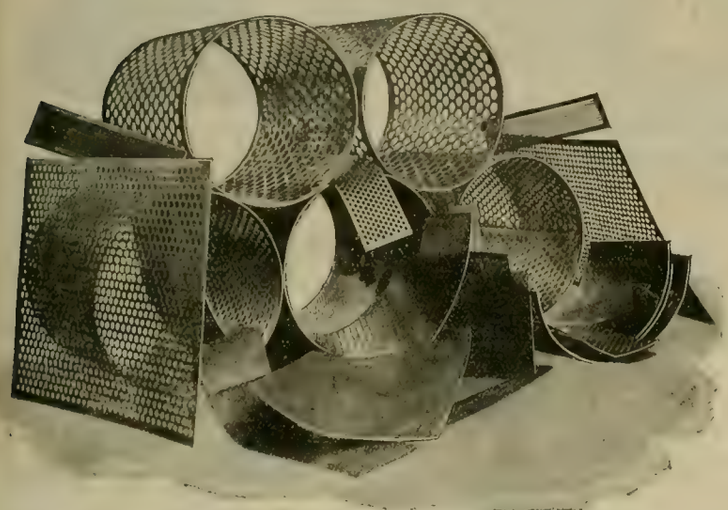

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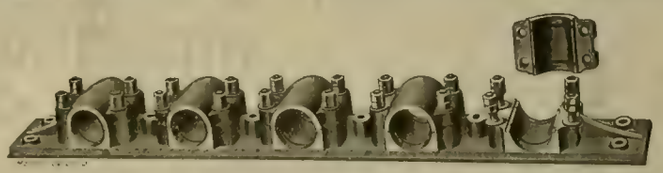

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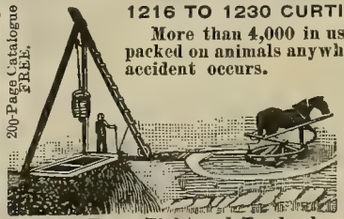

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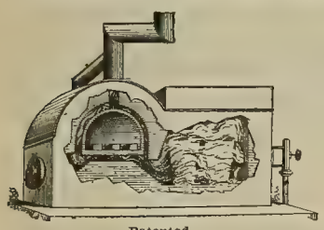
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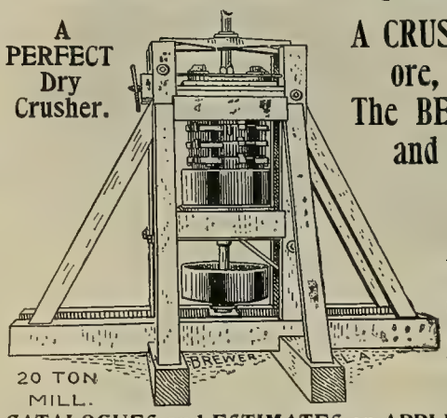

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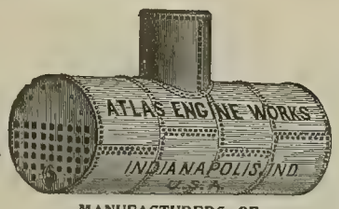

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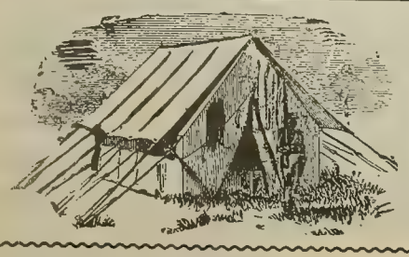

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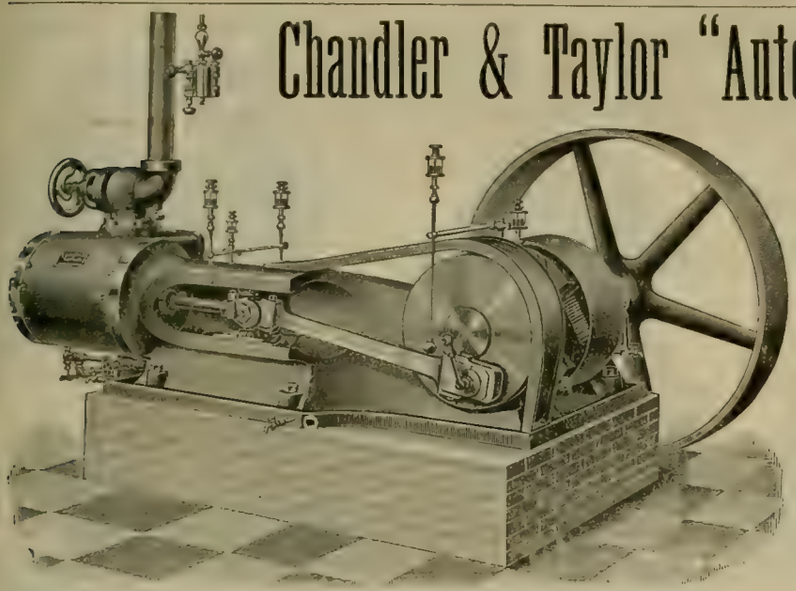

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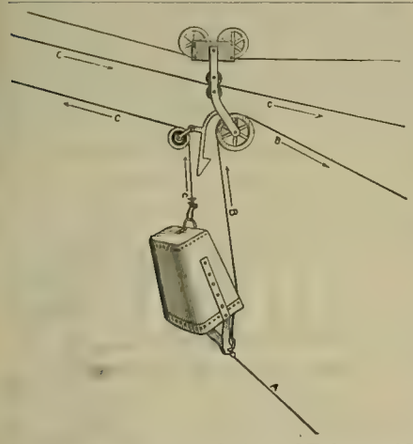

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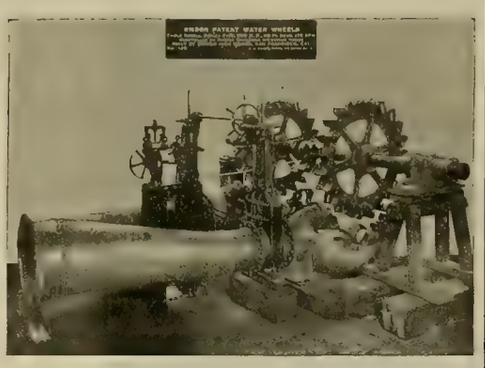

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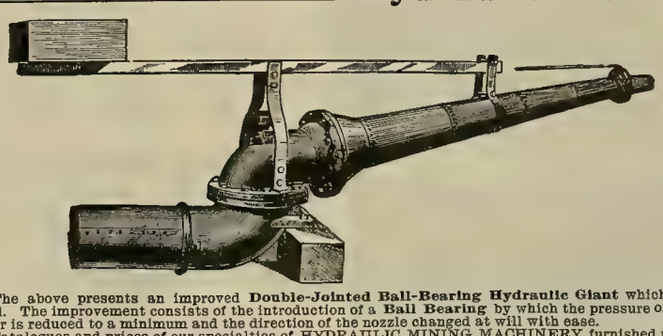

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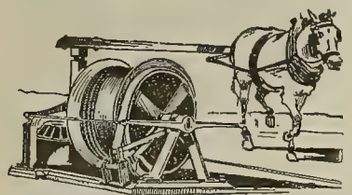

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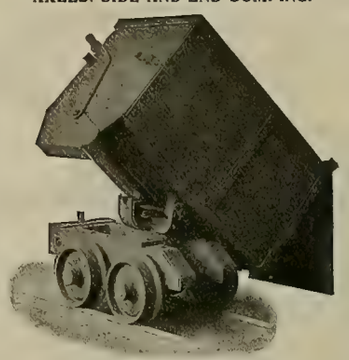

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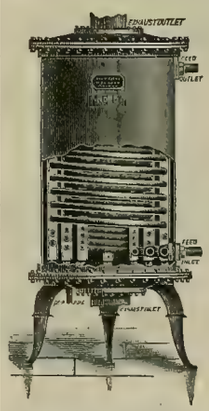

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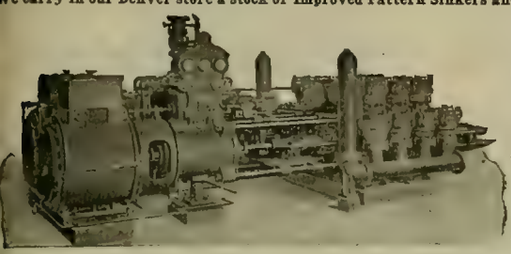

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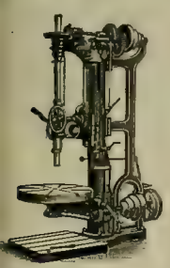

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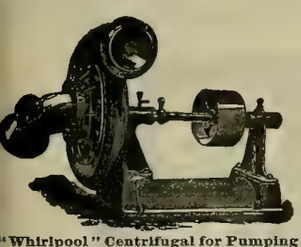

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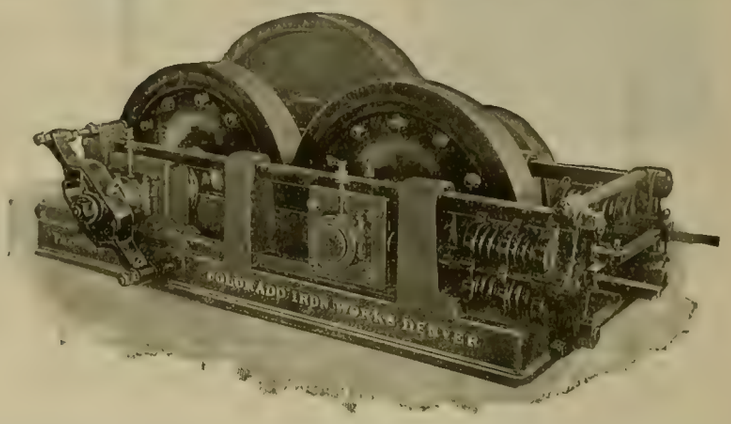

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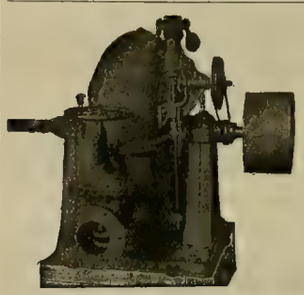

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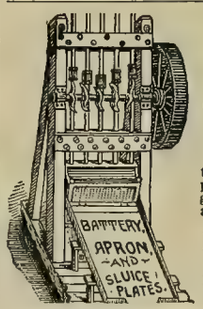

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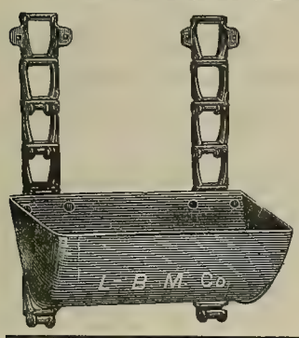

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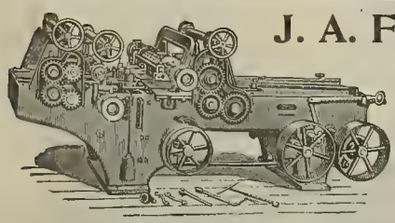

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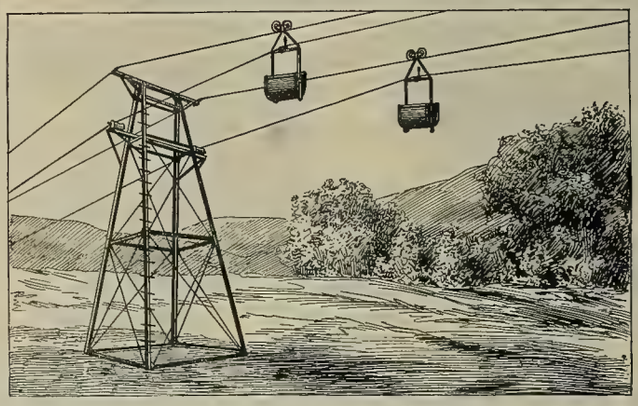
AUTOMATIC LOADING AND DUMPING APPLIANCES



AND OTHER ROPE HAULAGE SYSTEMS.

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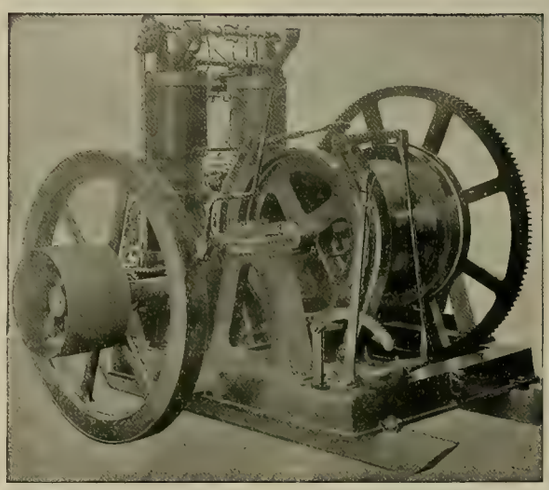
Improved Mining Hoist.



THE
Golden Gate Gas Engine
THE MOTIVE POWER.

Will Raise More Ore at Less Cost Than Any Other.

MANY IN USE
Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power Etc.

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ADAM SCHILLING & SONS, 211 & 213 MAIN STREET, SAN FRANCISCO, CAL.

P&B ROOFING

ROOFING is to a building what clothing is to the body. It must protect and it must wear well. To put money in an interior and to save it on the roof of a building is poor economy.

P & B ROOFING possesses all the requirements of a first-class roof covering. It is waterproof, durable, inexpensive, easily laid. Ask your dealer for a circular, or address the makers.

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MALLEABLE IRON BUCKETS, Electric Coal Mining and Haulage Machinery, Luhrig Patent Machinery for Washing and Classifying Coal, Shafting, Pulleys, Bearing Rope Sheaves, Clutches, Etc.

Machinery designed and erected to suit existing conditions and available space.

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Engineers, Founders, Machinists. CHICAGO, U. S. A.

Denver, 1328 17th St.
A. E. LINDROOTH, Manager.

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Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

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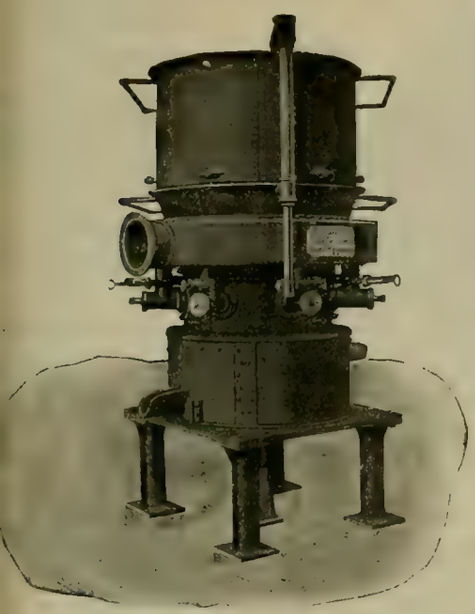
Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.



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THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO.

MANUFACTURERS OF

Smelting Furnaces and Equipments

For the Treatment of

GOLD, SILVER, LEAD, COPPER and PYRITIC ORES.

THIS CLASS OF WORK IS A SPECIALTY WITH US.

We also manufacture all kinds of Ore Milling Equipments for Amalgamation, Concentration, Cyanide and Chlorination Processes.

(SEE PAGE 571.)

THE MINE AND SMELTER SUPPLY CO.,

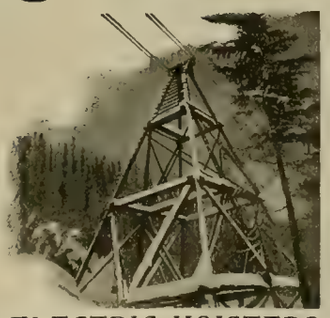
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

The latest and best system of double-rope automatic aerial tramway in the market. If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



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Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Etc.

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THE MINE AND SMELTER SUPPLY CO.,.....Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO., No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

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ENGINEERS AND DEALERS IN

BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES, HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES, GREEN'S ECONOMIZERS, WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS, HOPPES LIVE STEAM PURIFIERS, EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS, SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS, GOUBERT FEED WATER HEATERS, ATRSTTON STEAM SEPARATORS, SNOW STEAM PUMPS, QUIMBY SCREW PUMPS.

Watch this Space for Description of the Above Machinery.

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SOLE MANUFACTURERS OF

Anti-Caloric Sectional Coverings and Blocks for Boilers.

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The Best and Cheapest Insulating Plaster in the Market.

Used exclusively by the S. P. R. R. Co., Pacific Mail and other large corporations.

Office, 507 Market Street.

California Vigorit Powder Co.

—Manufacturers of—

Dynamite High Explosives and "Vigorit Low" Blasting Powder.

OFFICE: 208 California Street, San Francisco, Cal.

WORKS: Point Isabel, Contra Costa Co., Cal.

Market Reports.

SAN FRANCISCO, May 25, 1899.

SILVER.—London, 28¼d; New York, 61¼; San Francisco, 61¼; Mexican Dollars, 50@51½. New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.—New York reports quiet, $4.45 bid, $4.50 asked; brokers' price, $4.25.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 7c; bar, 7¼c.

COPPER.—New York reports Lake dull at $18.50; brokers' price, $18.50; mill copper plates, 23¾c.

Copper has dropped slightly the past week without any apparent cause, but it would not be surprising to see a slight advance in the near future. What it may do later can only be surmised.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Pig, 31c per lb.; Bar, 35c. New York dull, $25.65 bid, $25.75 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $42; export, $38.50 @39; carload lots, special rates.

PLATINUM.—London, 6s 3d per ounce; York, $16.25; San Francisco, $16.75.

RED LEAD AND LITHARGE.—One ton and over, at one purchase, 6¼c; 500 lbs. and less than one ton, 6¾c; less than 500 lbs., 7c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c. No. 1** 50%, carload lots, 11¼c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ℔ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19½c; Extra Star, 21½c; Elaine, 23½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire, $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia.)	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, May 25, 1899.

9:30 A. M. SESSION.

200 Alta	6c	100 Justice	20c
200 Belcher	34c	500 Mexican	46c
600 Best & Belcher	51c	500 Occidental	30c
200 Bullion	7c	200 Overman	16c
300 Caledonia	53c	100 Potosi	38c
400 Con. Cal. & Va.	$1 70	100 Savage	25c
200 Crown Point	28c	100 Sierra Nevada	76c
300 Gould & Curry	32c	100 Union Con	44c
200 Hale & Norcross	34c	100 Yellow Jacket	38c

2:30 P. M. SESSION.

300 Ophir	$1 15	400 Yellow Jacket	38c
100 Mexican	48c	100 Belcher	36c
50 Savage	27c	100 Confidence	$1 00
100 Chollar	32c	400 Bullion	7c
800 Potosi	39c	100 Alta	7c
2000 Crown Point	30c		

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed. MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

Cable address Educ. Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.

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MINE PROMOTERS, AND BROKERS.

Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Mine Foreman Desires Position.

Competent and reliable. Understands development work, drafting, assaying. Speaks Spanish. References. Address Box 834, Los Angeles, Cal.

Assayer and Chemist Wants Position.

Expert Cyanide and Mill Man, and experienced in examination and workings of mining properties. Good references.

Address C. W., care Mining and Scientific Press.

A MINING ENGINEER AND METALLURGIST

With American and German technical education, and 18 years experience in Colorado and California in mining, gold milling and concentration, cyaniding, assaying and surveying, is open to engagement with responsible company as manager, superintendent, or assayer and chemist. Four years with last company as superintendent of 40-stamp mill. Will not go above 8000 feet for permanent residence. Unexceptionable references as to ability and integrity. Address "SURDNA," care of Mining and Scientific Press, San Francisco.

OPEN FOR ENGAGEMENT.

A Mining Engineer, Geologist and Metallurgist; associate of the Royal School of Mines, London; first-class Government certificated mine manager, England, (39) is open to an engagement with responsible gold or copper-producing company as General Manager or Superintendent. Has had 21 years' practical experience in all branches of mining work and held the position of Manager at some of the largest and most important mines both in Europe and this country. Highest testimonials and references. Address "QUARTZ," care of Mining and Scientific Press, San Francisco.

WANTED—Stamp Mill Tailings.

Will buy or work on shares. State quantity, value, character and terms. Address C. R. F., care Mining and Scientific Press.

WANTED.

Hydraulic Engineer, competent to construct, install and operate large hydraulic-electric power plant.

Address G. C., this office, giving qualifications, references, etc.

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In a mining town of two thousand inhabitants, an established Assay Office doing a profitable business. This office is thoroughly furnished with all necessary apparatus, furniture and fixtures, and will be sold for cost of same. This is a good opportunity for any one wishing to locate in a thriving town where there is no competition.

Address TUOLUMNE MINING BUREAU, Sonora, Cal.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.

For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

Mining Properties,

Prospects and Partially Developed Claims at Low Figures, Near Good Ore Market.

Also a 50-foot ledge, developed. Ore runs $4 and upwards; free milling. Can be quarried. Water right accompanies.

J. N. ROSA, P. O. Box 5, Shasta, Cal.

..CRIPPLE : CREEK..

FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

DOBLE ROCK DRILLS AND AIR COMPRESSORS.

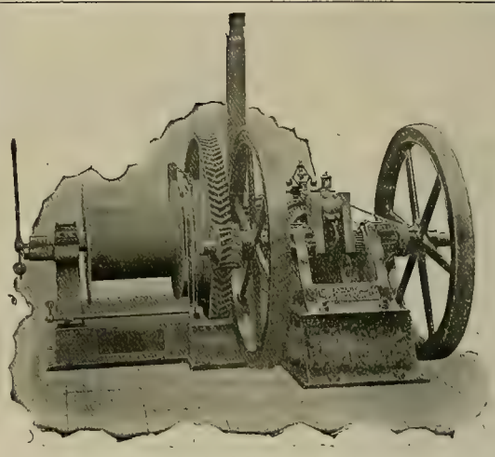
SIMPLEST.

BEST.

Write for Catalogue.

Miners, Investigate!

ABNER DOBLE COMPANY, S. W. COR. FREMONT & HOWARD STS SAN FRANCISCO, CAL.



FRESNO, June 25, 1898

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DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,

305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,

MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,

ALSO REPAIR AND JOB WORK OF ANY KIND.

Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.

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Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

REPUBLIC and ROSSLAND

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—FOR SALE BY—

The Eureka Company,

OF SAN FRANCISCO.

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PACIFIC EXPLORATION COMPANY

Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.

W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.

29-30 Chronicle Building, S. F.

Thousands of engineers can testify to their efficiency. We want your endorsement also. Buy a Lubricator from your jobber. We guarantee it to give perfect service or money refunded. Jobbers on Pacific coast sell them.

The Wm. Powell Co.,
Cincinnati, Ohio.

Assessment Notices.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

BADGER HILL AND CHEROKEE GRAVEL MINING Company.—Location of principal place of business, San Francisco, California; location of works, Cherokee, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of May, 1899, an assessment of Three Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 27th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of April, 1899, an assessment (No. 18) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 17th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of May, 1899, an assessment (No. 13) of Ten Cents (10c.) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of June, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California.

The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

MARINA MARSICANO GOLD MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of May, 1899, an assessment (No. 19) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of June, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3rd day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOYONE, Secretary.

Office—217 Sacramento street, San Francisco, Cal.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1899, an assessment (No. 3) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 11th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson street, San Francisco, Cal.

DELINQUENT SALE NOTICE.

HEAD CENTRE CONSOLIDATED MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. B. Parsons, Trustee	108	100	$20 00
H. B. Parsons, Trustee	112	100	20 00
H. B. Parsons, Trustee	116	100	20 00
H. B. Parsons, Trustee	145	100	20 00
H. B. Parsons, Trustee	152	100	20 00
J. W. Pew, Trustee	348	500	100 00
S. B. Wakefield	361	3	60
J. W. Pew, Trustee	384	100	20 00
J. W. Pew, Trustee	389	160	20 00
J. W. Pew, Trustee	390	50	10 00
J. W. Pew, Trustee	463	100	20 00
J. W. Pew, Trustee	504	5	1 00
J. W. Pew, Trustee	536	50	10 00
G. B. Root, Trustee	564	20	4 00
G. B. Bayley, Trustee	674	50	10 00
J. W. Pew, Trustee	710	100	20 00
J. W. Pew, Trustee	711	100	20 00
J. W. Pew, Trustee	712	100	20 00
E. B. Deane, Trustee	717	100	20 00
S. Iglauer, Trustee	820	100	20 00
H. H. Shinn, Trustee	873	700	140 00
F. A. Benjamin	875	5	1 00
W. Steele, Trustee	890	500	100 00
J. W. Pew, Trustee	898	50	10 00
J. W. Pew, Trustee	905	100	20 00
H. W. Hasselgren	908	100	20 00
H. W. Hasselgren	909	100	20 00
Peter Lane	910	630	126 00
M. Rehfisch, Trustee	917	1,250	250 00
M. Rehfisch, Trustee	918	1,250	250 00
M. Rehfisch, Trustee	922	300	60 00
M. Rehfisch, Trustee	923	200	40 00
M. Rehfisch, Trustee	924	400	80 00
J. W. Pew	946	1,333	266 60
John Sinclair	951	500	100 00
A. W. Foster	957	8.000	160 00
A. W. Foster	958	4.000	80 00
Rehfisch & Co., Trustees	960	100	20 00
Jas. Rolph, Trustee	968	500	100 00
S. B. Wakefield & Co., Trust's	969	1,500	300 00
S. B. Wakefield & Co., Trust's	971	3,833	766 60
J. W. Pew, Trustee	975	400	80 00
J. W. Pew, Trustee	989	40	8 00
A. W. Foster	1010	3.000	600 00

And in accordance with law, and an order of the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 6) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. Rehn, balance	77	1,000	$90 00
G. F. Volz	84	1,000	100 00
G. F. Volz	85	1,000	100 00
G. F. Volz	86	1,000	100 00
J. J. S. Fey	13	500	50 00
F. Baltz	123	500	50 00
F. Baltz	140	500	50 00
S. T. Bernhardt	182	500	50 00
G. F. Schwarz	151	66	6 60
C. Mayer	171	500	50 00
C. Mayer	172	500	50 00
C. Mayer	177	500	50 00
C. Mayer	178	150	15 00
C. Smyth	222	60	6 00

And in accordance with law, and an order from the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, 773 Mission St., San Francisco, California, on THURSDAY, the 1st day of June, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

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DELINQUENT SALE NOTICE.

JUNCTION MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 24) levied on the 3rd day of April, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. E. Howard	8	333	$10 00
H. S. Durden	7	2,000	60 00
J. W. Jesse	10	1,500	45 00
C. C. Duhain	80	125	3 75
C. C. Duhain	100	150	4 50
W. L. Watts	25	2,000	60 00
W. L. Watts	71	1,000	30 00
H. Sylvester, Trustee	185	1,000	30 00
F. C. Mathyas	173	250	7 50
E. H. Hamilton	70	2,000	60 00
J. H. Means	90	200	6 00
J. H. Means	91	500	15 00
Calvert Meade, Trustee	113	2,000	60 00
Calvert Meade, Trustee	115	2,000	60 00
Calvert Meade, Trustee	137	700	21 00
Calvert Meade, Trustee	196	200	6 00
Calvert Meade, Trustee	202	200	6 00
Joseph Adams	14	334	10 00
S. P. Adams	15	333	10 00
A. S. Weaver	17	150	4 50
J. A. Wiles	16	333	10 00
Wm. Wilson	18	600	18 00
John Lathrop	43	250	7 50
Van W. Jacobs	105	100	3 00
Van W. Jacobs	188	300	9 00
H. L. Barker	106	100	3 00
H. L. Barker	189	300	9 00
H. L. Barker	195	200	6 00
G. W. Schell	205	1,000	30 00
L. V. Holmes	201	1,000	30 00

And in accordance with law, and an order from the Board of Directors, made on the 3rd day of April, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 106 Liedesdorff street, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CALVERT MEADE, Secretary.

Office—106 Leidesdorff street, San Francisco, California.

NOTICE.

SALE OF THE BUNKER HILL AND MAYflower Mines, Amador, Amador County, Cal., by the Receiver of the Spring Garden National Bank of Philadelphia, Pa.

Public notice is hereby given that the mining properties known as the Bunker Hill and Mayflower Gold Mines, situated near Amador, in the County of Amador, State of California, on what is known as the "mother lode," belonging to this trust, will be sold at public auction, together with all water rights and privileges, mill sites, hoisting works, railroads and rolling stock, buildings, machinery and appurtenances belonging thereto, at the United States Custom House, San Francisco, California, THURSDAY, June 8, 1899, at 11 o'clock A. M.

Circulars containing general description of the property and particulars as to conditions of sale, etc., furnished on application to

J. FRANK ALDRICH, Receiver,
Room 33, Wyatt Building,
Washington, D. C.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the NATIONAL CON. MINING CO. will be held at the office of the Company, 773 Mission St., San Francisco, California, on MONDAY, the 5th day of June, 1899, at the hour of 8 P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, HAVing received applications to mine by the hydraulic process from J. H. Southwick, in the North Hill Placer Mine, near Milton, Calaveras Co., to deposit tailings in Rich Gulch; from T. B. Bennett, in the Ohio Mine, near Wash. Plumas Co., to deposit tailings on a flat below the mine; from W. E. Duncan, Sr., in the York Ranch Placer Mine, near Spanish Ranch, Plumas Co., to deposit tailings on a flat below the mine; and from Alfred Schofield, in the Klondike Mine, at Whiskey Diggings, Sierra Co., to deposit tailings behind the dam of the Washington Mine in Slate Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on June 12, 1899, at 1:30 P. M.

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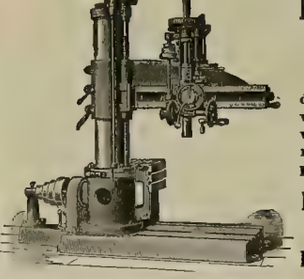

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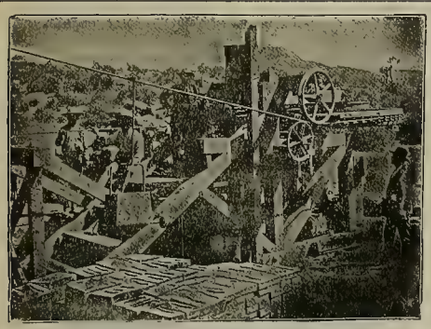

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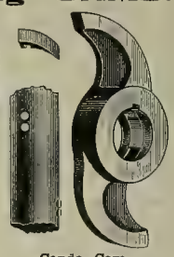

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PERSPECTIVE VIEW OF FURNACE.

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February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.
"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

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AND PACIFIC ELECTRICAL REVIEW.

No. 2030.—VOLUME LXXVIII. Number 22. SAN FRANCISCO, SATURDAY, JUNE 3, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Santa Rosa Mine.

The Santa Rosa hoist and mill, situated six miles west of Perris, in Riverside Co., Cal., are illustrated below. This vein, which occurs in granite, was worked to water level by Mexicans in early days, the ore being crushed in numerous arrastras in neighboring gulches. When the primitive methods of the Mexicans reached their limit the mine was abandoned and remained idle for many years. In 1894 a company was organized to reopen the mine and a large amount of money expended in plant and development, but for some reason the operations were suspended and the mine closed down. It is now reported that the mine is to be reopened under new management, the cyanide process introduced and success is anticipated. Southern California as well as the northern part of the State has numerous monuments to the folly and inexperience of operators of earlier days, and there are already instances of success being achieved under competent management where in former years disastrous failure marked the career of these enterprises. A notable instance is that of the Good Hope, a few miles from the Santa Rosa, an illustration of which appeared in the issue of May 20th, '99. Success is now being made at the Good Hope by leasers where a corporate company failed signally. There is no reason to anticipate anything but success for the Santa Rosa if it is properly managed.

A Mojave Desert Prospect.

On the Mojave desert, several miles from the railroad, in San Bernardino Co., Cal., is the Royal Rock mine, an engraving of which appears on this page. The ingenuity of the owner is displayed in the remarkable looking structure standing in the background. It is a horse whim of home-made design and construction, and with it an inclined shaft was sunk 200 feet deep on a vein of gold-bearing quartz. Prospectors on the desert are sometimes taxed to the extreme limit of their inventive faculty to meet contingencies which arise. In this case the miner seems to have successfully solved the problem of providing a hoisting rig when unable or unwilling to purchase expensive machinery. The whim shown in the illustration is constructed wholly of light lumber and is strengthened by ingenious bracing. His cabin in the foreground is constructed of short boards, poles and desert brush; his fireplace and chimney of rocks, and his blacksmith shop is practically out of doors. A few poles supporting a light roof give shelter from the rays of an unrestrained sun, for clouds rarely appear in that region. The entire camp illustrates simply how a prospector with little or no means, but with a willingness to work, can overcome many difficulties and accomplish his aim—the development of his mine.

THE IRON ROD MILL, SILVER STAR, MONTANA. (See page 584.)

The Iron Rod Mill.

The above engraving is that of the Iron Rod mill at Silver Star, Montana, the first mill in that State in which a success was made in the treatment of auriferous slimes. On page 584 will be found the first of a series of articles on cyaniding slimes, which will give more than a passing interest to the illustration. The ultimate success achieved at this establishment fully demonstrates the necessity for close and careful attention to small details in cyanide experiment and in mill practice. The cyanide process is always an experiment at first. There are no fixed rules which will apply in all cases, due to the great variety of conditions under which the gold is found, which always necessitates a new series of experiment.

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J. F. HALLORAN.....Publisher

San Francisco, June 3, 1899.

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SILVER is again at 61 cents per ounce, having recovered the slight decline of a few days ago.

NEARLY 100,000 persons are directly dependent on the mining industry in the State of California.

SEVERAL mining States now have departments of mines similar to the State Mining Bureau of California, which is believed to have been the first institution of its kind in the United States.

AT Leadville, Colo., the impression seems to be that there will be no trouble over the eight-hour law, as most of the managers will allow the law to go into effect without protest or any attempt to reduce wages.

PRICES of the various kinds of iron have slowly but steadily advanced until the highest price ever paid for some kinds has been reached and no prospect for a lower price. Every furnace in the country that is in condition will be put into operation.

THE past week has seen another generous rainfall throughout the State of California, which will be of general benefit to miners. Up to this time the rainfall and snow in the Sierras has not been sufficient to insure a continuous season's work.

MRS. LELAND STANFORD of San Francisco has transferred all of her vast fortune, estimated at $35,000,000, to the trustees of the Stanford University at Palo Alto, Cal., in trust for the benefit of that institution. This makes that fortunate college one of the wealthiest in the world.

ACCORDING to the statement of English papers, W. S. Stratton did not receive $10,000,000 in coin for his Independence mine, but accepted in lieu thereof 1,000,000 shares of stock in the corporation organized to operate the property, credited fully paid. If this arrangement is satisfactory to Mr. Stratton it should be to all others, who are in no way interested in the mine.

THOSE who make a study of the distribution of gold as it comes into the channels of commerce from the mines year by year are unable to account for the large apparent discrepancy between the coinage of a year ago and the gold produced since then. The only manner in which they can satisfactorily account for this loss of gold is its use in the arts and in personal decoration, in the way of jewelry, etc.

A WELL KNOWN mining engineer says he always goes about the work of sampling a valuable mine "with fear and trembling," realizing the importance of his decision whichever way he may decide. He says he usually asks the superintendent in charge, in a confidential way, to point out the rich places, trusting to his own observation and judgment to discover the poor ones.

NOVICES in mining too often overestimate the value and extent of their own knowledge and ability. When a new company of inexperienced men is organized to operate a mine, and expensive work is to be undertaken, it will always be wise to employ a thoroughly competent man to at least outline the plan to be pursued. Overconfidence of inexperienced managers has cost large fortunes.

VERY often the investor in purchasing stock of a new mining company is taking a greater risk on the character of the men who control the destinies of the company than on the real value of the mine itself. The man who has lost his money in a legitimate effort to open and operate a mine which proves unremunerative is more easily consoled than he who feels or knows that he had been beaten out of his hard-earned coin by dishonest managers.

A WAVE of almost unprecedented prosperity is sweeping over the country. Industrial enterprises everywhere in the United States are prospering. Iron and steel are booming and with no sign of relaxation. Large contracts are being placed, which tend to insure a continuance of prosperity to the iron branch of the mining industry. Copper has fallen slightly in price, but the slight decline has in no appreciable way affected the demand, which was already large. The wages of employes of numerous large concerns have been advanced and the outlook for the future is promising.

NO PRACTICE in mining, or rather mine scheming, is more reprehensible than that of declaring false dividends. Dividends declared that are not actually and honestly earned are not dividends, and the publication of such is always made with a view to deceiving some one. Of course, stockholders who are not on the "inside" are paid the dividend as advertised. In some cases the proceeds from the sale of stock, boomed by these false dividends, are used in paying the dividends themselves, thereby making it possible to sell more stock.

OPERATIONS in the C. and C. shaft at Virginia City, Nevada, continue. Frequent mishaps have not apparently discouraged the managers of pumping operations. It has been demonstrated that the principle of the hydraulic ejector is correct, and it has been known that the water can be forced out of the mine to a depth of 200 feet in greater volume than it flows in, so that eventually it may be expected that this experiment will prove a success. How great increase in depth below the Sutro tunnel level will affect operations remains to be seen.

No metallurgical process has had such widespread success in unexpected places as the cyanide process in its various forms, and still it may truthfully be said that it is still in an experimental stage, judging it from the broad standpoint of general application. In many places the constant experimenting by accomplished chemists is improving the results attained by securing higher percentages of extraction and reducing the expense per ton of material treated. In some localities it would appear that the highest possible results have already been reached; but even at Mercur and in the Cripple Creek district, in the United States, some advancement of commercial value may be looked for, and undoubtedly South Africa will also furnish some additional information on this important and interesting subject.

ALL new mining ventures are necessarily more or less hazardous in their nature, but no one familiar with the business of mining will deny that many prospects are of such a character as to justify a risk. Take as an instance a vein of a width and value, which if maintained upon development would prove largely profitable, surely such a prospect is entitled to the risk necessary to accomplish its development. The cause of many failures lies not in that the operators expended money in the development of a promising prospect, but that large sums of money are spent in trying to develop a rich mine where the prospect is not sufficiently good to justify the expense, or the resources of the individual or company are exhausted in the purchase and construction of expensive surface plant before development has advanced sufficiently to warrant it. The former is usually based on the proximity of a property that is good and the operators are taking a desperate chance—the latter is nearly always the result of inexperience. Each of these mistakes can be avoided by the exercise of common sense.

AN instance has lately come to light in Arizona wherein a company organized in the East has sold a large amount of its capital stock in that section, using the money thus obtained ostensibly in opening a valuable mine in Arizona. Recently a number of the stockholders visited the camp and in most cases were "well pleased" with the ore they found stacked up there—which, by the way, had been brought from mines several miles distant at considerable expense and exhibited as the production of this mine. According to the Phœnix *Republican*, it is a swindle of the grossest kind.

NUMEROUS letters are received from persons who anxiously inquire the value of stock in certain mining enterprises, or who seek advice on the advisability of making an investment in this or that mine. It does not fall within the realm of a newspaper to give information of the kind desired. In fact, such information can only be had by an actual, careful examination of a property. Those who contemplate an investment of any magnitude in a mining concern, whether corporate or not, would do well to employ a competent mining engineer to make an examination in their personal interest and be guided by his advice.

DIRECTORS of the Merced Gold Mining Co. of Boston, Mass., operating properties at and near Coulterville, Cal., contemplate increasing the capital stock of the company from $1,500,000 to $2,250,000, for the purpose, it is stated, of enabling the company to purchase additional properties and to more fully equip the proposition. The additional 50,000 shares are to be placed in the treasury subject to the order of the directors. A call has also been made for the last $3 per share of the original subscription. The president is credited with saying that if the stockholders authorize this increase of capital stock the company will be in position to pay all the net earnings as dividends when the mill starts again. It looks as though such an arrangement might be possible, if the directors are successful in placing a new issue of 50,000 shares at $15 per share.

OWNERS of prospects often seem to forget that the actual value of their properties may possibly be far below the price fixed by themselves. An instance of this was presented when, in response to an advertisement in the MINING AND SCIENTIFIC PRESS, the owners of antimony claims addressed a smelting company in San Francisco, Cal., that makes a specialty of handling antimony ores. The manager stated that he had received a large number of replies to his inquiry, but that in each case the owners held such exalted ideas of the value of their property or their ores that he was unable to do business. Claim owners sometimes read the quotations on the retail price of metals and expect to get this price or a figure near it for their raw product. This is of course an impossibility, as the smelters themselves do not as a rule receive retail prices.

REPORTS from the Cape Nome gold fields, almost on the edge of the Arctic circle, continue to be received by each returning vessel. The tales of fabulous wealth are intermingled with stories of claim jumping, death from exposure and improper food and now soldiers are to be sent to maintain the peace. From the south come other exciting telegrams of a scope of country in the desert region of Lower California, where nuggets as large as marbles can be had merely for the trouble of picking them up. These golden fields present two extremes of climatic conditions. One, those of cold, high winds and abundance of rain; the other of heat, destitution of water and every conceivable discomfort. That each locality will draw heavily from the restless men and women of the Pacific coast there is no doubt. The gold fever is as fatally contagious as the most virulent disease.

Concentrates.

MOUNTAIN LEATHER is a variety of asbestos.

TENSION in electricity is the same as pressure in steam.

THE melting point of gold is 2097° F.; that of platinum 3227°, and of tin 446°.

IN blasting work, always use a wooden tamping bar, never a metallic one of any kind.

THE present price of metallic copper is 18½ cents per pound, or $370 per ton of 2000 pounds.

ONE HUNDRED tons of waste broken in a mine will fill the space left by the extraction of 150 tons of ore.

ARAGONITE is calcium carbonate and is a chemical precipitate, occuring naturally from calcareous springs.

LIMESTONE is carbonate of calcium, often more or less impure, due to admixture with silica, clay, iron, etc.

A TRANSFORMER is an instrument used to transform a high pressure current to a low one, or the reverse.

DYNAMITE is a name given to all kinds of nitroglycerine powders, made by mixing the explosive with an absorbent material.

STANNITE is sulphide of tin. It is comparatively rare. Most of the tin of commerce is obtained from cassiterite, the oxide of tin.

A WATT is the unit by which electrical work is measured and is equal to the current of one ampere flowing at a pressure of one volt.

WHEN waste has to be hauled more than 1000 feet it is more economical to lay a light track and haul in trains of several cars drawn by horses.

MALLEABLE cast iron is a name given to castings which have been subjected to a process of decarbonization, making a crude wrought iron.

REFRACTORY clays are those varieties which resist the heat of ordinary furnaces, and consist of silica and alumina, the former predominating.

THE first cyanide plant installed in British Columbia is at the Doratha Morton mine, on Phillips Arm, 120 miles up the coast from Vancouver.

MANGANESE in cast iron tends to produce the white variety and it also increases its capacity for retaining carbon. It decreases the magnetism in iron.

WHEN blasting, high-grade powders will generally produce small rocks, and low grade larger rocks. The low-grade powders are employed in quarrying for this reason.

AN ampere is the unit by which the flow of an electric current is measured. A volt is the unit by which the electro-motive force or pressure of electric current is measured.

MINERAL TAR is made by distilling bituminous shales, and wood tar is made by the distillation of pine and other resinous woods. The residue left after distillation is called pitch.

CYANIDE solutions will not dissolve gold except in the presence of oxygen. When oxygen is withdrawn, dissolution of the gold ceases; when it is again admitted, the dissolving action recommences.

AN English industrial journal says there is more than likely to be considerable demand and development in chromic iron. California has numerous deposits of chrome ores associated with serpentine.

MANGANESE has more affinity for oxygen, carbon and sulphur than iron has. These properties are important and taken advantage of in the removal of oxygen from iron, and to obtain iron high in carbon.

THE affinity of steel for carbon varies with the temperature and the presence of other elements in the iron. Carbon in iron exists in three states: graphitic carbon, dissolved carbon and combined carbon.

A CAREFUL millman always makes an effort to amalgamate all of the gold possible in the battery. It is usually more easily saved there than subsequently on outside plates, canvas tables or concentrating machines.

LIME is the protoxide of calcium. It is caustic and almost infusible and possesses a marked affinity for water and will absorb 22% to 23% of its weight, generating much heat, and, passing into a hydrated condition, is termed slacked lime.

A "BLOW OUT" is a miner's term for an outcrop of quartz or other mineral at the surface. The name probably originated in the conception that a mineral vein was ejected from below in the same manner as a dyke of porphyry or other igneous rock is.

WATER may be appropriated for mining or other purposes on land in the public domain—that is, land open to settlement or location—where such water has not been previously claimed by others, and where its use will not in any manner injure the property of others.

EPIDOTE is a very common mineral in crystalline rocks, particularly associated with diorites. It is an aluminous silicate. It is usually yellowish green and may frequently be found in rocks containing hornblende and chlorite from the alteration of which latter it is formed.

THE tin plate of commerce is made from sheets of iron or steel covered with a coating of tin or tin and lead. Tern plate is of the latter variety. When a hole is made through the tin coating to the iron a galvanic action commences between the tin and iron and the tin is quickly eaten away.

A DRIFT BOLT is a rod of iron, round or square, which is driven in an auger hole of a dimension smaller than the rod, as an inch-round bolt in a ¾-hole, or an inch-square bolt in a ⅞ round hole. Smooth round rods hold better than square or jagged rods. Drift bolts are employed to hold large timbers firmly together.

A "SHORT CIRCUIT" in electricity is the term employed to indicate that a connection by means of metal or otherwise has been made accidentally between a positive and negative wire, by means of which the electric current is enabled to take a short cut, instead of completing its course through the lamp or motor.

ALWAYS give a "missed" hole plenty of time. It may go later. Do not try to pick out the powder. Remove most of the tamping and insert another stock of powder, and try to fire it again. A missed hole is often successfully fired in this manner without danger to the miner. No. 1 dynamite requires very little tamping.

ALL materials when excavated from the earth increase in bulk but some of them shrink later, occupying less space than formerly. Gravel will shrink 8% to 9%, while rock when broken from its place increases in bulk nearly 50%. Thirteen feet of quartz in place make about one ton, and 20 feet of broken quartz weigh a ton.

MINERAL WOOL, slag wool and silicate cotton are the names given to a glass-like fiber produced from the slag of blast furnaces, and is made by subjecting a stream of molten slag to a jet of steam or compressed air. A ton of it will cover 1800 square feet 1 inch thick. It is used for insulating heated surfaces, for protection against cold, and for deadening sound.

THE strength of pure iron is estimated to be about 38,000 pounds per square inch. An increase of .01% of carbon raises the tensile strength of acid steel about 1200 pounds per square inch, and of basic steel 950 pounds. An increase of .01% of phosphorus increases the tensile strength of acid steel about 890 pounds per square inch, and of basic steel about 1050 pounds.

ZINC, though ordinarily tough, when heated to a point near fusion becomes brittle. It is malleable and ductile at temperatures ranging from 210° to 300° F., and may then be rolled into sheets or drawn into wires. Zinc cannot be used in contact with copper, iron or lead, owing to the strong galvanic action set up by the contact of these metals, particularly in the presence of moisture.

THE Calumet mine paid its first dividend in August, 1870, and the Hecla its first dividend of $5 per share in December, 1869. The Red Jacket shaft on this property is vertical and about one mile in depth. It is 17x25 feet, with six compartments. It was started in the fall of 1889 and has passed far below the conglomerate bed. It is connected at several levels with other deep shafts on the mine.

UNDER the laws of California, a stockholder of a corporation becomes individually liable to each creditor of the company in an amount to be determined by taking such a part of each claim as each stockholder's stock is a part of the stock of the company, and an action may be brought against any stockholder, in the courts of any State where service may be had, to recover the amount due the creditor.

THE United States government does not now, and never has at any time offered a reward for the discovery of a tin vein or a deposit of mineral of any other kind. Tin occurs in a number of States, and had such a bonus ever been offered it would have been claimed long since. The person who finds a tin vein which will pay in the United States would not be long in gettting his reward, but not from the government.

WHERE rock is very hard, high-grade powder should be used in smaller quantity. The force of the powder is then well down toward the bottom of the hole, and should throw out the rock to the bottom or near it. Low-grade powders, when used in sufficient quantities, fill the drill-hole to a point so near the top that it affords insufficient resistance and the collar of the hole is blown off, leaving a considerable length of hole.

MINING corporations organized under the laws of California require that the superintendent or manager in charge of operations at the mine and works make a weekly report of the progress of work and the condition of the property. This weekly letter shall be accessible to all stockholders at the principal office of the company, and failure to furnish such statement or the issuance of an untruthful statement is a misdemeanor and punishable.

THE quantity of rock which may be broken by a given quantity of powder depends upon the hardness of the rock and the character of the ground, whether "blocky" or not; also upon the kind of powder used; but, more than anything else, upon the judgment used in pointing the hole or series of holes. A loud report does not always signify a successful blast. The reverse is usually the case; a muffled report generally indicates that the powder has done its work well.

PIG IRON is made by smelting iron ore in a furnace with coke or charcoal using either hot or cold blast. The latter is at ordinary atmospheric temperatures. Cold blast iron is usually of better grade for the reason that the hot blast, while more economical and producing a larger yield also causes the iron to combine with more impurities. From pig iron is produced three varieties of metal; cast iron, wrought iron and steel. The difference between these lies chiefly in the amount of carbon they contain.

PORTLAND cement is a name given to a composition of lime, clay and silica which, after being subjected to a high heat, causing it to vitrify, is ground and will in this condition, when mixed with water, crystallize and form a substance like stone, which resembles a natural stone found on the little island of Portland off the south coast of England. Nearly all of the Portland cement is made from artificial mixtures, though occasionally a deposit of calcareous clay is found which will produce a natural cement.

HEAVY flows of water at or near the surface which interfere with the sinking of a shaft may sometimes be overcome by constructing a structure of planks having a space between which is filled with clay, tamped down. This will shut out the water and sinking may be continued. As the excavation grows deeper the planks must be driven down to keep up with the progress. The system of forepoling and breast boards is described in a publication issued by the State Mining Bureau of California, Bulletin No. 2.

IN Colorado, the Court of Appeals has recently decided that in consideration of the sinking of a shaft in a mining claim, by certain persons, and obtaining a patent at their own expense, the owner of the claim contracted to convey to them a certain interest in same, provided the patent was obtained by a certain date. They sunk the shaft, paid him part of the expense of the patent, and notified him that they were ready at any time to proceed in the matter of the patent, but he advised delay, saying he should let them know when he wanted the balance of the money. It was held that he thereby waived the condition that the patent must be obtained by a certain date, and could not claim anything for non-fulfillment; and also that, as they could not take out the patent, all they had to do was to furnish the money for the patent.

THE process of tempering steel depends upon the characteristic, that after hardening, the steel on being reheated becomes softer as the heat increases. To produce steel of a certain toughness it is gradually reheated, and cooled at that degree of temperature which experiment and experience has shown will produce the desired degree of hardness. Heated steel becomes covered with a thin film of oxidation which, becoming thicker with higher heat, changes color. This fact is taken advantage of in tempering steel tools, as picks and drills.

TIN is less subject to oxidation than any other metal except gold and silver. It has a peculiar characteristic in giving out a crackling sound when a bar is bent. This is called the "cry of tin." The same phenomenon may be observed in large bars or masses by biting the edge with the teeth. When heated tin becomes very brittle, and when subjected to extreme cold for a long time it will be found covered with blisters; it becomes brittle and will fall to pieces, and eventually will be reduced to powder. The cause for this has not been definitely determined.

A NEW PROCESS for coating iron and steel consists in the use of a bath consisting of zinc, tin and aluminum. It is claimed that this produces a coating which is much superior to any now known, adhering so firmly that the sheet will stand working after it has been applied, and will resist corrosion and can even be heated red-hot without injuring it. The coating is applied in the same manner as in the well-known process of galvanizing; that is, by dipping sheets in the metal alloy. The most approved mixture is made by melting together 84 parts of zinc, 14 parts of tin and 1¼ parts of lead and 0.5 of a part of aluminum. The process is patented.

ELECTRICITY is now employed in seasoning timber. The stick to be treated is immersed in a solution containing 10% borax, 5% resin and ¾ of 1% carbonate of soda, the borax being used on account of its antiseptic properties and the sodium carbonate to assist to dissolve the resin. A porous tray, the bottom of which is lined with two sheets of canvas, with a sheet of felt between, is placed over the log, and a sheet of lead connected with the negative pole of the dynamo is placed above this. The positive pole of the dynamo is connected with a lead grating, upon which the log to be treated stands. The current is then turned on, and the treatment continued six to eight hours, by means of which the sap is driven out and its place taken by the solution. When the process is complete, the log is withdrawn and seasoned by drying, which requires, under favorable circumstances, several weeks.

ORES when received at custom smelters come from many mines in many districts, usually, and are made up of a great variety of ores. These are run through rock breakers and crushing rolls, sampled and then spread out in thin layers in a large bin. One consignment after another is thus laid down until the ore bed is several feet in thickness. Slices are cut or dug off vertically so as to get its proportion of each layer and the sample reduced to proper quantity is analyzed for silica, lime, iron, lead and other minerals as well as gold, silver, etc. The ore in this particular bin is then sent to the furnaces with the addition of such flux as may be required, if any at all, and the entire lot receives uniform treatment. The ores in an adjoining bin may have a somewhat different composition and will be treated accordingly. Smelters very rarely treat separately a "batch" of ore from a single mine. The minimum percentage of lead contained in a charge of ore is only limited practically by economic considerations.

THE gold first found which eventually led to the discovery of the Comstock lode at Virginia City, Nevada, was found by Wm. Prouse, May 15, 1850, who washed out a few specks of gold with a milk pan from gravel on a stream named by the discoverers Gold creek or Gold canyon. The placers yielded from $4 to $5 per day to each man. The canyon was worked towards its head, and in the winter of 1858–59 the vein afterward known as the Comstock was discovered by James Finney (who was known as "Old Virginny") and three others; but, although these men made locations, the value and character of the lode were not recognized. This was on Gold Hill. The discovery which created the rush to Washoe, however, was made by Patrick McLaughlin and Peter O'Riley on June 8, 1859, when they located on what afterward became the Ophir mine. They uncovered in a small hole, dug for a reservoir, to catch water for rocking the decomposed quartz, a vein of black sulphide of silver rich in gold. Comstock put in an appearance, and, recognizing the value of the discovery, claimed they were working on his ranch and forced the miners to locate him in. Through this the vein became known as Comstock's mine and later the Comstock lode.

THE law of Montana (Comp. St. 1887, div. 5, ss. 492–294), providing that the officers of a mining corporation shall have no power "to sell or otherwise dispose of" the whole or part of its mining grounds, mills, and plant, without such transfer being first approved by the holders of two-thirds of the stock, at a meeting at which at least three-fourths of the stock is represented, and that, if such sale be of the entire corporate property, the corporation shall be dissolved, is merely a limitation of the common law powers of directors and majority stockholders of a corporation, and does not authorize two-thirds of the stockholders of a prosperous company to sell all of its property against the protest of the other stockholders, or any of them. A transfer of all the property of a corporation to a foreign corporation organized by the directors of the former to acquire its property, in consideration of the latter assuming its liabilities, and agreeing to deliver to it its entire stock, stockholders of the former to exchange their stock for shares in the new company, or in lieu thereof to receive a fixed sum per share for surrendering them, is neither a sale nor an exchange within said provisions, conceding a sale or exchange to be authorized by such law. This is the gist of a recent decision of the Montana Supreme Court in the case of Forrester vs. B. & M. Consol. C. & S. Min. Co.

Cyaniding Slimy Ores and Tailings.

Written for the MINING AND SCIENTIC PRESS by MATT. W. ALDERSON.

Part 1.—Historical and Introductory.

When the cyanide process was first introduced into the United States there were mining men in Montana who were enterprising enough to give it a trial. Tested at Revenue it proved a success on ores which baffled all attempts at amalgamation and concentration and the mill has been operated as a cyanide mill ever since, having a capacity at the present writing of seventy tons a day. Tested at Iron Rod on a large accumulated pile of tailings, laboratory results were very encouraging. In the firm belief that an actual extraction of 85% to 90% could be depended on, a plant was put in at a cost of over $10,000, consisting in part of eight vats 10 feet in diameter, 4 feet in depth. Failure followed the venture, principally because of the slimy nature of the material. A similar result occurred at the Southern Cross mine, another prominent property. Not to be discouraged, the proprietors of Iron Rod made other attempts in years following to overcome the difficulties, the most successful being where the material was dried and the fine and coarse particles thoroughly mixed together. A test run was made in this way that was fairly successful, the extraction secured being 54%. In the winter of 1895-6 laboratory tests were made in Bozeman, where extractions as high as 96% were secured in a quarter of an hour with a cyanide solution containing five pounds to the ton. As the values in the tailings consisted of about $10.60 in gold and $1.40 in silver, it was easy to figure out immense fortunes in working the material. A company of Bozeman men arranged with the owners to handle the tailings on a percentage of their assay value. F. W. Traphagen, Ph.D., F. C. S., who has the reputation of being the best chemist in the State, went to work to elaborate a scheme whereby the material could be handled and he decided, after a large number of laboratory experiments, on a combined system of agitation and percolation, the slimes to be coagulated by the use of lime during agitation, when percolation could be carried on without difficulty. It worked beautifully on a small scale, and with the opening of spring arrangements were made to put the plan in operation. Being on very friendly terms with the experimenter, and being also very much interested in the success of the project, I was an invited guest at Iron Rod when operations commenced. The agitator was built, charge was put in, material was flocculated and everything worked as nicely and smoothly as anyone could wish, until attempt was made to draw the fluid. Every effort to secure percolation of the charge resulted in absolute failure.

In observing the working of the charge, I was much impressed with the fact that the moment agitation ceased the sand and slimes sought the bottom of the vat and the fluid rode the top. I remarked that every successful invention was the result of working with nature and not against it, and that successful handling of slimes would come about from drawing the fluid from the top, where it naturally came, and not from the bottom, where it refused to go. The attempt to secure the gold-bearing fluid by percolation was discontinued and decantation was attempted. It is not necessary to detail the syphoning arrangements that were used until the simple expedient was adopted of drawing the fluid through holes in the sides of the vat, but it is sufficient to say that the mechanical difficulties in the way of treating the slimes were soon overcome.

The conclusion naturally was that the troubles were over and that there was smooth sailing ahead. Instead, the troubles had but just commenced. The cleanups were disappointing and failed to anywhere near correspond with the recovery as shown by the assays. In the first place, such a proportion of the gold as had been expected from laboratory experiments could not be obtained in solution. This was surprising, for it was never dreamed that the very carefully conducted experiments in the laboratory would fall short in actual practice. It was one of those cases where something was done in the laboratory in a slightly different way from what was done in actual work, and that little something, overlooked and undetermined for many months, cut a very important figure. In the second place, the precipitation was imperfect. There were times when from $3 to $6 were in the solution after it had passed the extractor. Those were days of discouragement—face to face with the fact that the amount of gold expected could not be dissolved from the material, and that such gold as was dissolved could not be taken from the solutions. In the attempts to overcome the first difficulty, trial runs were made with different strengths of solution; vats were agitated for long and short periods, from three to seventy-two hours; tests were made with solutions ranging in temperature from 50° to 120°, etc. Whatever was done, there was no material difference in results; an extraction of 60% to 65% was all that could be secured. The assayer had served in that capacity for a successful cyanide plant, and had had charge of the zinc boxes; but he could not make those at Iron Rod do perfect work, and, looking back at them now, it could be said that they were truly sorry sights. Polarization must have prevented any action to amount to anything; the compartments were filled with a white, curdy material, and the zinc shavings themselves were incrusted with slimes and cyanide of zinc. Occasionally whole compartments would be a brilliant copper color, and the merest trace of copper was enough to cause all the blame to be laid on that metal. Various expedients were resorted to to overcome the copper, to prevent its precipitating on the zinc, to precipitate it first and then precipitate the gold; but copper in an alkaline solution is, like gold and silver, not easily precipitated. Then, in reality, the presence of copper was but partially to blame for this imperfect work. It was due principally to the bad condition of the zinc and lack of chemical action of sufficient strength. When these were remedied, the amount of gold in solution, after it had passed the extractor, ran about 40 cents in gold per ton. This was much better than leaving $6 a ton in solution, and, after failure upon failure through the summer, a run was made where the actual recovery was equal to what the assays showed it should be. An extraction of about 62% was secured and the gold recovered. In the meantime, the manager had resigned, though continuing to give the company the benefit of his chemical skill; the assayer had left, there had been some change in the personnel of the company, but the writer was in charge when the tide was turned from failure to success.

On page 581 is given an illustration of the mill at Iron Rod, the first plant in the United States successfully handling slimes on a large scale. It has four agitators and eleven other vats, has a daily capacity of thirty to forty tons and is in operation under the superintendence of Charles L. Dahler, one of the owners of the property.

Such, in brief, is the history of early attempts to treat slimes in Montana—attempts, however, which led to better work later on and to the formulation of a system yet to cut a very important figure in swelling the gold production of the country. Even such tailings as those at Iron Rod, which are tailings from a custom mill where a great variety of ores have been milled and concentrated, affording therefor more opportunities for complications than tailings from the ore of one mine, the skilled cyanider would not think of treating to-day for an extraction of less than 90%; and he would obtain this easier, in shorter time and at less expense than he could obtain 65% a few years ago. But the skill by which this may be accomplished has not been acquired in a few weeks or a few months; it has taken time as well as intelligent study and much costly experimental work.

(To be Continued.)

Graphite.

Not a single iron casting is taken from its sand mold without the sand being first faced by graphite. Not a gun projectile is cast but the steel is melted in a graphite crucible; not a tool, not a saw is made but from graphite crucible steel. Every pound of nickel, of copper, of composition metal, of brass, is cast in some way, the metal being reduced in a graphite crucible. Every printing house, for the perfection of its electrotypes, is absolutely dependent on graphite. Every electrician and every department of electrical work comes under the same tribute. Graphite lubricates friction ways; it is notably the most enduring paint pigment, and the bulk of the writing done on the globe to-day is done with a graphite pencil; it has ministered to the arts of peace and to the science of war. It saves labor and it proves a short cut to desired results. In brief, not a factor which to-day contributes to civilization but is helped by graphite. It is found in great abundance in the island of Ceylon, in the Indian ocean, and next in quality at the graphite mines at Ticonderoga, on Lake Champlain, New York State. The industry is fascinating from the moment the miner drives his drill, and all along the line of its being refined until both in usefulness and beauty it reaches perfection. The electric light would shine much less easily but for graphite, and the production of steel rails is equally dependent. The beautiful mineral has peculiar characteristics. Heat and cold and the highest and lowest extremes of both cannot touch it. It can bathe in acid as does a pebble in cold water.—Bradstreet's.

Klondike Output for 1899.

Under date of April 29, 1899, Consul Brush, of Clifton, says: An authority whose estimates have heretofore proved conservative, brings word from Dawson that the washup from the Yukon this year will aggregate $19,000,000, apportioned as follows: El Dorado, $2,500,000; Bonanza, $2,500,000; French Hill, $1,500,000; Gold Hill, $1,500,000; Big Skukum, $1,000,000; Little Skukum, $1,000,000; Dominion, $4,000,000; Hunker and Quartz, $5,000,000; total, $19,000,000. These figures leave out of consideration a number of important locations, including Sulphur creek, Stewart river, Upper Klondike and Scroggie creek.

Dry and Wet Crushing.*

By FRANK MERRICKS, M. Inst. M. M.

The subject of dry versus wet crushing has recently been so prominently before the minds of mining engineers that the author has been prompted to bring it before the members of this institution, with a hope that they will contribute their views on the matter, and thus perhaps be the means of saving many a manager much worry and expense in deciding whether he should adopt dry or wet crushing for the treatment of the particular class of ore he has to deal with.

The author is fully alive to the fact that a process or plant ought to be adapted to the ore for its proper treatment; but in this respect mistakes have occurred, and are often duplicated in the same district, by one company following the mistake of another.

The physical conditions obtaining in any particular district have also to be seriously considered in deciding on any ordinary or special treatment of ore; and perhaps, in certain cases, the process best adapted to the ore has to give way to one less suitable, as regards treatment, owing to existing conditions.

A great impetus to dry crushing was given by the introduction of rolls and ball mills, which, in many of the best designs, are ill adapted, or totally unsuited, to wet crushing. The merits claimed for this class of mills are: They cost less, are easier and more quickly erected, produce a pulp of a more even consistency, and require less power, than stamps. These merits are probably well deserved and applicable in some districts and with certain ores, but, in the long run, it is a very open question if they are more economical than stamps, even as dry crushers.

Dry stamp crushing and cyaniding has been carried on on an extensive scale at several of the mines in the Upper Thames district of the Hauraki Peninsula, New Zealand, and so far as the extraction of the bullion is concerned, with fairly satisfactory results. The percentage of extraction of the bullion by the ordinary amalgamation process was so small, that to use this method was hopeless ruination.

A short outline of the processes tried and results obtained, and the eventual adoption of dry crushing and cyaniding at the principal mine, the Waihi, may be of interest. The first two tons of ore from this mine were wet crushed (about '80) and amalgamated on copper plates, the bullion saved being 35% of the original value of the ore (£4 4s). During seven or eight years after this, 18,000 tons of ore were treated by wet crushing and amalgamation for an average return of 13s 6d per ton. The author does not know what percentage of the total bullion contents this represents.

During some four years later, '90-94, a series of experiments were made. The ore was treated by pan amalgamation, and both dry and wet crushing were resorted to, with the result that in the former case 70% of the gold and 45% of the silver, while in the latter 60% of the gold and 25% of the silver, were saved. It is reported that the duty of the stamps in each case was practically the same, but by wet crushing the calcined ore the output was increased 30%, while the extraction still remained 10% in favor of dry crushing. In '94 pan amalgamation gave way to cyanide treatment, the ore being dry crushed, with the result that an average extraction of 90% of the gold and 50% of the silver was effected.

The results, corroborating those obtained at the Crown mine in the adjoining Karangahake district, were considered so satisfactory that the companies in the surrounding districts, where the ores are of a somewhat similar nature, adopted this process, without for a moment considering the advisability of trying raw wet crushing and cyaniding, or even attempting any modification whatever.

About eighteen months ago, at the Crown mine, wet-crushing experiments were made with cyanide solution passing through the mortars. The method of handling the slimes and the results obtained have not yet been made public, but are presumed to have been satisfactory as the plant has been changed to wet crushing.

At the Waihi mine the low results obtained by ordinary amalgamation are accounted for by the fact that the gold is in a very fine state of division in the ore, and that the proportion of silver to the gold in the bullion is excessively large, the fineness being about 640. Very rarely can any gold be detected with the unaided eye, or even with a magnifying glass, or in panning.

The difference in the above results, both as regards dry and wet crushing and the extraction returns of such, by treating the ore by the cyanide method, call for more serious comment. It is generally admitted that drying the ore previous to crushing renders it more amenable to the cyanide treatment, probably owing to the fact that, although the pulp is reduced to such a fine state of division in crushing it is of a more porous nature, which is mainly brought about by the dehydration of the ore. This may partly account for the difference of 10% in

*Condensed from a paper read at the Institution of Mining and Metallurgy, London.

the extraction results, although the author is inclined to the belief that it may also be due to the floating away of some of the sulphide of silver and of the fine gold, and also to the want of a proper method of sampling.

The increase in capacity by wet crushing of only 30% over dry crushing is rather remarkable. Probably this increase was looked upon as the maximum duty of the stamp, which, combined with the fact that the increase of 10% in the extraction is in favor of dry crushing, was considered so satisfactory that wet crushing entirely gave way to dry crushing.

Since the matter of wet crushing has been so seriously taken up by the Crown Co., most of the other companies are following its example, and, although in some cases the results are said to have been indifferent, there is every indication that during the next year most of the ore will—and ought to—be wet crushed.

The author is of the opinion that the improvement effected at the Crown mine should be completed by adopting wet crushing, amalgamation, and cyaniding in its entirety. By this means the output would be greatly increased, say to three tons, for a less cost than at present dry crushing one and one-quarter tons, and, supposing the percentage of extraction is a little less by wet crushing, it would be more than counterbalanced by the increased output.

The bulk of the Upper Thames ores present no greater obstacles to wet crushing than did those of the Rand. Dry crushing has been repeatedly tried at different mines in the latter district, but has been abandoned in favor of wet crushing; in fact, were it not for the high stamp duty, it is very certain that the greater part of these ores could not be profitably worked.

In drying the ore in the crudely constructed kilns, excessive heat often becomes localized, and occasionally the gold gets melted, which, in the form of small pellets, is not dissolved by the weak cyanide solution.

At the present time a great divergence of opinion exists as to whether dry or wet crushing is the better and more economical method for treating the Kalgoorlie ores, West Australia, and in the author's opinion this problem is not yet solved.

In the early days of this field, when the surface or oxidized ores were treated, wet crushing and ordinary battery amalgamation were principally resorted to for extracting the gold, but owing to the fine state of division in which a great percentage of the gold existed in these ores, together with a short supply of water for battery purposes, only a poor extraction was effected, thus leaving the tailings very rich, may of which have been, and are being, treated by cyanide. As depth was attained, and tellurides, carrying a high percentage of gold, were met with, combined with the paramount water question, serious obstacles were presented in devising the best methods for the most efficient and proper means of treating these somewhat rare and complex ores. The most prevailing idea, at present, appears to be that they ought to be dry crushed, roasted, or vice versa, and then subjected to cyaniding.

Great difficulties, however, are met with in adopting this course, the first being the coarse gold, while in roasting, the gold in the rich telluride forms into pellets, in both of which cases the gold will be left in the tailings after cyaniding, and to extract it a further treatment will have to be employed.

In roasting there is the risk of loss of the precious metals by volatilization, and in cyaniding any tellurium left in the ore will be dissolved by the cyanide and precipitated by the zinc, thereby causing a further loss of gold by volatilization in roasting the precipitate.

Taking into consideration the general characteristics of these ores, notably their friable nature, their gold (often coarse) contents, which extend below water level, and their association with rich tellurides, it would appear that the above treatment is somewhat involved, necessitating much extra handling of the ore and very careful manipulation in connection with the roasting, and consequently rendering expenses somewhat high.

The method which suggests itself as being the best and most suitable for the handling and treating of these ores is, first to hand-pick the rich tellurides and to bag such for smelting. In regard to crushing, to break down the ore to a small size by means of crushers, and then to stamp wet, and to guard against sliming, crush as coarse as possible consistent with economical working and general conditions obtaining and to collect as much gold as possible by ordinary amalgamation; then to concentrate the tellurides and bag for smelting, the tailings, if carrying sufficient gold, being treated by cyanide, and the slimes collected by, and treated in, filter presses.

THE copper lodes of Butte, Mont., occur in great fissures from 10 to 100 feet in width, in granite formation, and cover an area laced with veins of silver and copper ore. Of the 4000 mineral locations in this district, 50% of them are located in the copper zone, yet less than 100 of them have been explored. No ledge yet explored in the copper zone has shown any sign of weakness with depth, and in no instance has the bottom of an ore chute been found.

Some Experiences of a Working Miner.

NUMBER XVIII.

Written for the MINING AND SCIENTIFIC PRESS.

No one, perhaps, had a better opportunity to see the outside and inside workings of the S—— J—— E—— Co. than myself. The fame of the mines and of the company had already became world-wide when I drifted into camp in search of a job, either hard or soft—the latter preferred. There seemed to be plenty to do and an army of men to do it. A scene of greater activity is seldom found any place than could be witnessed about the C—— mine, the principal one of the large property owned by the company.

No less than 150 men were employed in various occupations. Some were grading roads, some were making gardens, others building stone walls, and still others were aiding in the construction of numerous buildings. The bare, treeless hills which for years had been frequented only by bands of sheep and their herders, had as by magic been transformed in a night, as it were, to an active mining camp. It was a pretty sight, too. The numerous buildings were neatly painted, most of them were covered with corrugated iron roofs, and the bright colors with which they were adorned made the otherwise sombre landscape more than attractive. The office was the principal edifice, with its broad verandas and white-curtained windows; a tower surmounted the structure, and over all was reared a flagpole, glaring white and topped with a ball of gold. Beyond, in process of construction, stood two large "porcupine" boilers, whose dull-red color made a striking contrast with the prevailing gray of the hills and the yellowish shade of the buildings.

A little beyond the boilers great piles of red and white bricks were being consumed in the construction of reverberatory furnaces.

Timbers for the mine and lumber for more buildings were piled on the level pieces of ground about the camp, and men could be seen everywhere. About 10 o'clock each morning, with a rush and a rattle, the company's wagon—a grand affair, finished in the latest style of the wagon maker's art, enclosed and bearing a coat of arms—would dash up to the office, and the mail would be thrown out, fresh from the railroad.

Men were at work everywhere—except in the mine. I believe, on second thought, there were four men in the mine. I had almost forgotten them.

A mile or so away another small army of men, employed by the same company and under the same management, was building an elaborate and expensive dam across a gulch in which no living water ever ran.

Thousands of dollars—hundreds of thousands of dollars—were being energetically wasted on every side. The outfit would have done credit to a Homestake or an Alaska-Treadwell. Indeed, these mines in their early history did not begin to rival this new enterprise for extravagance and style. To look at the result of the money invested—the buildings, the machinery, the dam, the army of men and the gorgeous wagon with its richly harnessed team, one would naturally suppose that the S—— J—— E—— Co. had a great mine.

If they had no one has ever been able to find it out. I went into the mine and saw a vein 4 to 12 inches thick which was only developed to a limited extent, and on this—a mere prospect—half a million of dollars was spent in senseless surface equipment and display. Later the company did produce something like $20,000 in metal and the mine was exhausted, or at any rate abandoned. What metal was produced did not pay for the actual cost of production, giving no consideration to interest or capital.

Several miles away the same company had a group of gold mines. Among them were some fairly good prospects. A superintendent was in charge who was physically incapacitated from doing anything himself. This man had a crew at work cutting out a broad strip through the greasewood and chaparral, presumably on the course of the vein, though in fact it was not on the course of the vein at all. Although this latter enterprise was not so bad as that at the main camp, it was bad enough and like the other was a failure under that management. The whole outfit was closed down and since, the machinery, piece by piece, has been sold at the price of old iron and hauled away for use elsewhere.

* * *

The president of the E—— C—— mine was spending a fortnight at the mine, and being a close observer, could not fail to notice that the tally board in the hoisting works did not show the same quantity of ore being hoisted daily, consequently he went to the superintendent and said: "This hoisting engine is a good machine, isn't it?"

"Yes," replied the superintendent, "it is a very good engine." "Well," said the president, "I have been noticing that the amount of ore hoisted daily varies a great deal. For instance a few days ago you hoisted 100 tons, the following day 200, the next day 250, day before yesterday only 100 and yesterday 150 tons. How many tons could you hoist with your engine?"

"Oh," replied the superintendent, "perhaps 1000 tons."

"Well," said the president impatiently, "why in h—— don't you do it, then?"

* * *

A friend of mine told me the other day that he was once employed as assayer by a company which had as manager a man who had been engaged in lumber business all his life and had never seen a mine or mill before coming to take charge of the one referred to. One day the lumberman manager came into the assay office where my friend was pouring some assays, and noticing that the slag was dumped into a refuse box suggested that it would be a good plan to economize by saving the slag, crushing and grinding it and reusing it in making new charges. At another place, when making application for the position of assayer, he was asked by the superintendent if he could cook, it being the idea to employ a man who could do both. Usually competent assayers are satisfied to confine their culinary attainments to the cooking of ores, etc. He also related the story of a new manager who hastily went to the carpenter shop and ordered the carpenter to make half a dozen shovel handles at once, as he had sent to the store for the shovels, which would soon be down.

* * *

When B—— was superintendent of the C—— W—— mine it was told of him that he sent 250 miles to the nearest store and ordered 500 rasps. The storekeeper sent two dozen rasps—all he had on hand—and sent a letter to the superintendent expressing his pleasure at the receipt of so handsome an order, and incidentally asked to what use he intended to put them. The answer came back in a couple of weeks that they were "to sharpen picks. What do you suppose I want them for?" B—— has since emphatically denied this story.

* * *

M—— was washing out a pan of rich sand, etc., taken from the head box on his sluice line, and considerable gold was in sight when a shadow fell upon the pan. M—— looked up quickly and perceived an elderly gentleman with kindly face standing between himself and the sunlight, but did not like Diogenes order him out of his light while he bent over his tub; he bade him a cheerful good morning and remarked: "Did you ever see the likes of that? Do you see the gold?"

The old gentleman saw the gold and did not hesitate to acknowledge it. He expressed much interest in the contents of the pan and even a greater interest in the mine and its operation. M—— was a smooth talker and invited his visitor to dinner and did all he could to make his stay a pleasant one. So thoroughly did he impress the stranger that the latter was more than half inclined to make an offer for the mine. M——, however, did not urge the matter, but invited him to come up again the following morning and see the whole operation of stripping, shovelling in, cleaning up, etc. The stranger accepted his pressing invitation and agreed to come. M—— spent considerable time that night in judiciously salting his mine so as to impress the old gentleman with the possibilities of legitimate mining.

Agreeable to promise, the old gentleman was on hand early the following morning and stayed until noon, by which time six men had stripped, shovelled in and forked out an average of $10 apiece—a very good half day's work for four shovellers, one man on the box with fork and one man in the tailrace.

So much was the old gentleman impressed with the result of the work that he asked M—— to name a price, which M—— reluctantly (?) did, fixing it at $12,000. They went down to D—— and the money was paid over and M—— proceeded to celebrate the event in proper style. When he had recovered from the effects of his celebration, he thought he would go up the gulch and see how the old gentleman was getting along. He was greatly surprised to find that the old gentleman had made some radical changes. He had purchased the next claim below where there was a good fall and had cut a drain ditch some distance through a bed of local cement and was mining over the ground that M—— had called worked out. In explanation, the old gentleman said: "You see, Mr. M——, you were working on top of a local cement deposit—a conglomerated mass of gulch gravel cemented by iron from a spring just above here, and we are now working on the true bedrock; and when we reach the place where you were working, we will work both streaks. The lower streak on the true bedrock is much better than the one above. We get nearly $200 a day now on each shift."

M—— said to me afterward: "Just think of that, and I took him for a pilgrim!" MINER.

THE turbo-alternators of 1000 K. W. each are being constructed by Parsons for the lighting station at Eberfeld, Germany. These machines are said to be the largest ever made by any one.

AN additional 8000 square feet of space has been secured at the Paris Exposition for the United States, which will be devoted to a display of American bicycles.

The Occurrence and Origin of Diamonds in California.*

By H. W. TURNER, Washington, D. C.

It has long been known that diamonds are occasionally found in the gold placer deposits of California. Prof. J. D. Whitney and Prof. Hanks have recorded such localities where diamonds have been found as came under their notice. Prof. Whitney writes:

"The most interesting mineral found associated with the gold in the gravel of California is the diamond. This gem, as it would appear, is usually, although not universally, found in gravels which are washed or searched with care. Such gravels are chiefly those which are auriferous in character. Hence it follows that diamonds have been found in the surface detritus of most gold regions, as in Siberia, Australia, along the flanks of the Appalachain chain, and in California. * * * It appears that diamonds, like some other natural products, are widely disseminated over the surface of the earth, but are only present in considerable quantity at a very few points. Formerly, India was the productive region; then Brazil had its day, and now South Africa furnishes by far the larger portion of the new diamonds put upon the market. * * *

"The diamond has not been found in sufficient quantity anywhere in North America, whether in the Appalachian or the Californian gold fields, to be of much importance from an economical point of view. But from the methods pursued in mining in the latter region, it will be easily understood that but few of the diamonds actually contained in the detrital material washed would be likely ever to be seen. Still, the number of localities where this gem has been observed is considerable."

The following is a list of the occurrences as given by Whitney and Hanks:

DIAMOND LOCALITIES IN CALIFORNIA.

El Dorado County, near Placerville—	*Authority.*
South side of Webber Hill, several	Whitney.
White Rock Canyon, three or four	Whitney.
Dirty Flat, one	Whitney.
Smith's Flat, several	Whitney.
Amador County—	
Jackass Gulch, near Volcano	Whitney.
Rancheria, near Volcano	Hanks.
Loafer Hill, near Oleta	Hanks.
Nevada County—	
French Corral	Whitney.
Butte County—	
Cherokee Flat, 56 specimens	Whitney.
Yankee Hill	Hanks.
Trinity County—	
Trinity River sands (F. Woehler)	Hanks.
Del Norte County—	
Smith River sands	Hanks.

Recently has been received from G. W. Kimble of Placerville the following information concerning the occurrence of diamonds in his vicinity:

"Most of the diamonds were found between a point a little south of Smith's flat and White Rock canyon in river gravels. Ward & Co.'s mine is on the south side of White Rock canyon, where it had cut across the river beds. Cruson & Olmstead's claim adjoins theirs on the south and is known as the Unity mine."

Mr. Kimble also states that nine more diamonds have recently been found in the vicinity, mostly from the Unity mine, and that a great many diamonds have been crushed in the gravel mills, for he has frequently examined the concentrates of the mills and found in them fragments of diamonds often so small that they could be determined only by the aid of the microscope. Still more recently (1898) Kimble reports having examined a diamond found within the limits of the town of Placerville, in Cedar ravine, a tributary of Hangtown creek.

J. A. Edman reports two localities of diamonds in Plumas county. He found a few in the black sands at Gopher hill, the largest one being $\frac{1}{10}$ of an inch in diameter, and on upper Spanish creek in a sand rich in heavy minerals he found two. The Gopher hill locality is in Sec. 7, T. 24 N, range 9 E, and the Spanish creek locality is in Sec. 10, T. 24 N, range 8 E, Mt. Diablo meridian.

G. F. Kunz refers to the finding of two diamonds recently by W. P. Carpenter near Placerville, the larger one of a greenish shade and the smaller pale yellowish, and each nearly $\frac{1}{4}$ of an inch in diameter. Mr. Carpenter proposes to work his section of the channel by other means and avoid the possible loss of diamonds of more value than the gold. The same writer notes the finding of a small diamond on the banks of Alpine creek in Tulare Co., Cal., by L. W. Hawkins, and of five diamonds near Oroville in Butte county, and as many more at another locality, suggesting a peridotyte origin.

The California diamonds thus far found are mostly of small size. One found at Rancheria was of a pale straw color and weighed 225 milligrams. A diamond is in the collection of the State Mining Bureau at San Francisco. This was found at Cherokee. One of the diamonds found at this place is said to have been valued at $250. A diamond found at Yankee hill is said to be owned by Mrs. J. Bidwell of Chico.

The known occurrence of diamonds in South Africa in serpentine suggests a similar origin for the California finds. If we take the geological maps of the gold belt published by the U. S. Geological Survey we will find that there are serpentine masses near all of the localities above reported in the Sierra Nevada. There is no serpentine in place in the gulches in which diamonds were found near Placerville, but Kimble reports that serpentine pebbles were frequent in the diamond-bearing gravels. These serpentine pebbles may easily have come from a point about 6.5 klms. east of Placerville.

It would be interesting, in view of the above facts, if the local gravels of gulches lying entirely in serpentine could be carefully washed and all of the heavy minerals saved and examined. The finding of diamonds in such gulches would strongly suggest that serpentine is the mother rock of the California diamonds, and this might lead to economic results of local importance.

The year 1897 was remarkable in the history of diamond literature for the appearance of three important publications, by De Launay, Lewis, and Crookes. De Launay describes the serpentine of the Kimberley mines of South Africa as being derived from a peridotyte determined by Stelzner as a picrite-porphyry. Mixed with the serpentine are abundant fragments of various rocks, so that many specimens are of the nature of a contact breccia. These serpentine bodies occur as pipes or plugs extending down nearly vertically to an unknown depth. The general shape of the section of each pipe at the surface is round or oval. In following the volcanic plugs down it has been proven that each one passes through several formations. At the surface the enclosing rocks are carbonaceous shales, and at one time it was believed that the carbon composing the diamonds was primarily derived from these shales, and when the excavations passed through the carbonaceous shale it was feared that diamonds would no longer be found. Underlying the shales is a bed of diabase. The serpentine at this horizon still contained diamonds as before. At the present time the excavations or shafts at Kimberley and De Beers have gone through the diabase horizon and the miners are now engaged in working the volcanic pipes in the underlying quartzites. De Launay states that the enclosing terranes have had no influence whatever either on the quantity or the quality of the diamonds. These have incontestably come from below with the peridotyte breccia. The idea that the carbon of the diamonds came from the upper carbonaceous shales is thus disproven. Moreover, there are very numerous volcanic chimneys of the peridotyte (kimberlyte) in South Africa, and not all of these contain diamonds, while some contain them only rarely or of microscopic sizes.

(To be Continued.)

* From the American Geologist. Published by permission of the Director of the U. S. Geol. Survey.

IT is a question how soon or to what extent the copper ore of Butte, Montana, turns into iron. The percentage of copper in the Butte mines is reported to have been steadily decreasing and the percentage of iron increasing until at the present time a large part of the copper of Butte is simply a minority of mineral extracted from iron ores, but the iron ore furnishes a cheap flux. In recent litigation between the Montana Ore Purchasing Co. and the Boston & Montana, experts testified that there was a large body of iron ore between the 1600-foot level and the 2000-foot level, but that below the 2000-foot level a higher grade copper ore would come in than was the grade of copper ore above the iron belt. In the Green Mountain of the Anaconda group a diamond drill has been sent down below the 2000 level, encountering rich copper ore.

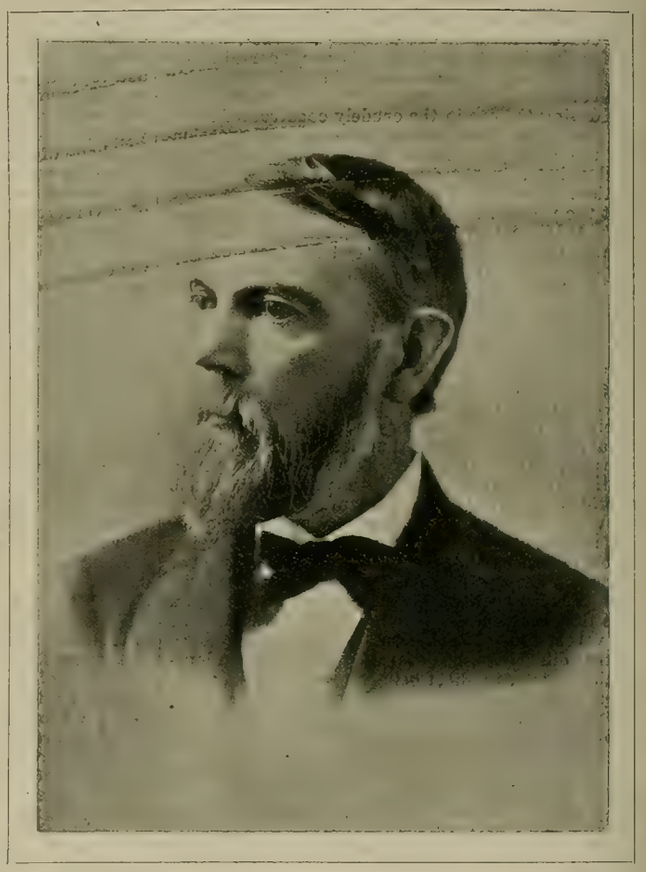
THE California Water and Forest Society proposes to hold a great convention in this city soon, to advance the effort to conserve the waters of the State. The executive committee recently met and a general discussion was had as to the surest means of getting the sentiment of the people at large in regard to the best plan to utilize the waters of the State, when and where needed, in order to bring about the conservation of the watersheds and forests. Finally President Gleaves appointed a committee of five to meet with representatives of the commercial, mining, farming and other interested bodies in the State, and arrange for a State convention. The purpose of this convention will be to induce the State to appropriate sufficient funds for the construction of impounding reservoirs. Should the State fail to pass needed legislation then the convention will devise ways and means to bear the expense.

Death of A. T. Dewey.

The older readers of the MINING AND SCIENTIFIC PRESS will hear with sincere regret of the death of Alfred T. Dewey, which occurred at his residence in Oakland on May 24th.

Mr. Dewey was born May 4, 1834, at Westfield, Mass. He learned the trade of printer in his native town and in 1852 was associated with his surviving brother, E. M. Dewey of Tulare, in the publication of both weekly and daily journals in Westfield and Springfield. In 1856 Mr. Dewey came to California and purchased a half interest in the *Mountain Messenger* at La Porte, at the time a rich mining center, and later became sole proprietor of the paper. In the fall of 1863 he purchased a half interest in the MINING AND SCIENTIFIC PRESS, and published the same in partnership with W. B. Ewer, under the firm name of Dewey & Co. Mr. Dewey was also a partner in the Patent Agency, which bore the same firm name. From 1863 until the incorporation of the Dewey Publishing Co. in 1891 Mr. Dewey gave his personal and unremitting attention to the conduct of this journal, calling to his assistance the best help he could secure by intelligent selection and generous remuneration.

In 1892 Mr. Dewey's interest in the journal ceased by sale of his share of ownership to other parties and during the remaining years of his life his attention was given to the affairs of the Dewey Engraving Co., which he had previously organized and of which he was sole owner. Mr. Dewey was the pioneer on this coast in the direction of photo-engraving, as he introduced the process in 1877 as the result of his faith in the method instilled by his study of its beginning at the East during his attendance at the Centennial Exposition at Philadelphia.



THE LATE ALFRED T. DEWEY.

Mr. Dewey was a resolute believer and promoter of fraternal organizations and maintained membership in several leading societies of this class until his death. His funeral in Oakland on May 28th was under the auspices of these bodies and was a fitting token of respect to his memory.

Such in briefest outline is the record of the public life of Alfred T. Dewey. The most striking characteristics of his life were the sincerity of his motives, the clear integrity and honor of his intentions, the loftiness of his ideals and aspirations and the exceptional generosity of his purpose.

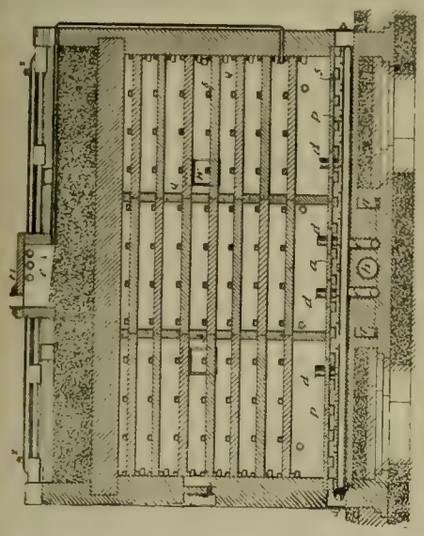
To the bereaved family the sympathy of friends everywhere will come as new testimony to the worth of him whom they have lost. To Mrs. Sarah H. Dewey, who since 1861 has upheld his hands in all earnest work and shared his fortunes with wifely tenderness and self-sacrifice, the most earnest condolence will come. For her and for her son and daughter there remains the welcome duty to cherish the memory of a man who deserved well of the State.

Latest Mining and Metallurgical Patents.

Patents Issued May 23, 1899.

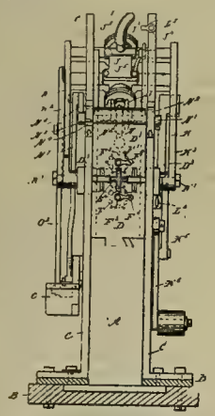
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

WHITE LEAD CHAMBER.—No. 625,196; H. G. Percival, London, England.



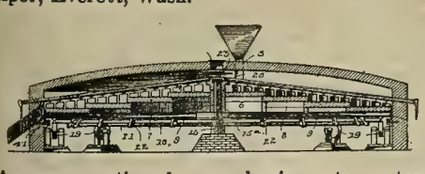
A chamber for the manufacture of white lead, having an air space beneath floor and air spaces, communicating therewith, in walls, heating means for air in spaces, a mixing chamber for air and carbonic anhydrid beneath floor, communicating with interior of device, air conduits leading through walls of chamber, communicating from outside with interior, and with spaces in walls, means for controlling passage of air through conduits, and valved discharge pipes leading from interior of chamber.

MACHINE DRILL SHARPENER.—No. 625,140; J. J. Brossoit, Butte, Mont.



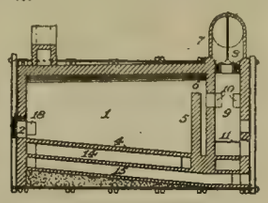
A drill sharpener, comprising a pair of swages for engaging the shank at opposite ends, one of the swages having a reciprocating movement, a reciprocating end swage at an angle to the pair of swages, and a cylinder mounted to swing and having a reciprocating piston arranged for connection with either of reciprocating swages; a drill holder, a reciprocating swage for sharpening the end of the drill, a cylinder mounted to swing and having a reciprocating piston adapted to be connected with or disconnected from the end swage, and mechanism operated by the movement of the cylinder for locking and unlocking the drill holder; a reciprocating hammer and a swage formed with sharpening recesses for engagement with the end of the drill to sharpen the same, the said swage being adjustably held on the end by the hammer and provided at its top with a flange extending over the top of hammer and a screw rod turning in flange and screwing into hammer.

ORE ROASTING FURNACE.—No. 625,336; J. F. Keiper, Everett, Wash.



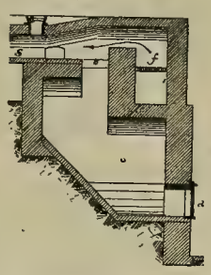
An ore roasting furnace having rotary stepped hearth, means for depositing material upon and receiving same after roasting operation from hearth, a feeding device for advancing material upon hearth from the point of deposit to the point of discharge, means consisting of a series of blades, disposed diagonally with relation to a radial line of hearth, and in operative relation with the several steps of hearth surface, and a radial spindle, supporting a plurality of blades, mounted for revoluble movement to provide for swinging blades toward and from the surface of the hearth; furnace having a rotary hearth stepped downwardly from its center toward its periphery, and having central spindle extending above and below plane of hearth with its lower end mounted in a suitable bearing, ore depositing and receiving devices located respectively contiguous to the center and periphery of the hearth, a cap having an anti-friction bearing upon the upper exposed extremity of the hearth spindle, a refractory sheath inclosing portion of hearth spindle below cap.

METALLURGICAL FURNACE.—No. 625,367; W. Swindell, Pittsburg, Pa.



A metallurgical furnace, the combination of a heating chamber, means for applying heat from gaseous fuel thereto, a system of tortuous waste flues extending alternately forwardly and rearwardly in a horizontal plane beneath floor of heating chamber and communicating at opposite ends so as to admit of traverse in opposite directions of outgoing waste products of combustion beneath floor of heating chamber, and a corresponding system of horizontal air admission flues underlying water flues, and communicating at opposite ends so as to admit of traverse, in opposite directions, of incoming air beneath the walls of waste flues; combination of a heating chamber having a charging opening and door at one of its ends, a bridge wall at opposite end of chamber, an air inlet, a gas supply chamber provided with outlet ports adjactent to bridge wall, a valve-controlled gas conduit leading into chamber, a grate in lower portion of gas supply chamber, a fuel opening and door and an ash pit opening and door in wall of the gas supply chamber above and below grate respectively, vertical flues for the reception of waste products of combustion at end of furnace adjacent to charging opening and door.

PROCESS OF CHLORINATING ORES.—No. 625,397; W. B. Jackson, Pueblo, Colo.

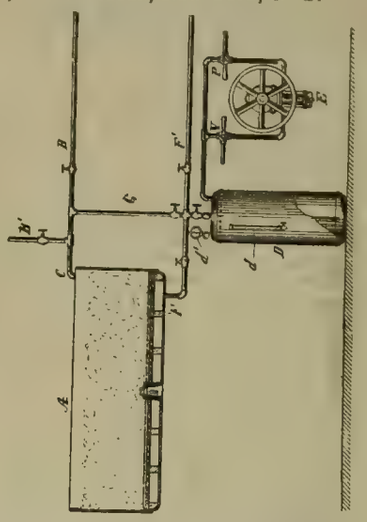


Process of chlorinating ores, which consists in roasting the ore under low heat, adding to heated ore a chlorinating material consisting of a sulphide ore and salt, continuing heat at a bright red, allowing chlorinating fumes to attack ore, and thereafter allowing mixture to cool while in chloridizing fumes.

HAMMER HAND SLING.—No. 625,469; H. H. Schepers, Sandon, B. C.

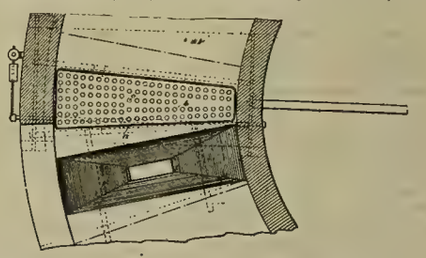
A hammer hand sling for retaining a hammer and relieving the hand at intervals from grasping the handle while striking an upward blow, comprising a U-shaped clutch to fit the hammer handle, a strap having the ends fastened to said clutch and forming a loop to receive the head of the hammer, a buckle connected to said clutch and a strap passing through said buckle and forming a loop to fit on the wrist of the user.

PROCESS OF TREATING GOLD OR SILVER ORES AND COMPOSITION OF MATTER FOR SAME PURPOSE.—No. 625,564; E. D. Kendall, New York, N. Y.



Process of treating ores or other bodies for the extraction of precious metals, which consists in treating them with an aqueous solution containing a thiocyanate and a ferricyanide; composition of matter, to be used for extracting precious metals from ores, tailings, or other bodies, consisting of a suitable thiocyanate and a suitable ferricyanide in watery solution.

COOLING ATTACHMENT FOR ORE-ROASTING FURNACES.—No. 625,608; J. E. Rothwell, Boulder, Colo.



The combination with an ore-roasting furnace, the flat hearth thereof and means to discharge the ore from such hearth, of the herein-described ore-cooling attachment, arranged at the discharge of such hearth and with entrance level with the floor of hearth, and comprising shell or casing a containing a series of tubes which open at both ends outside of said shell and through which tubes the ore passes by gravity as it is fed thereto, and means to circulate the cooling agent, such as water, through such shell or casing and around the said tubes.

PROCESS OF TREATING SULPHURETED ORES.—No. 625,432; M. Body, Brussels, Belgium.

The extraction of metals from refractory sulphidic ores or minerals, the process which consists in converting the metallic sulphides in the ore or mineral into polysulphides by means of heat in presence of carbon and of an alkali metal salt, washing out the polysulphides and treating alkaline polysulphides solution without destroying its alkalinity, with a suitable precipitant to precipitate therefrom all of metallic sulphides except those of arsenic antimony and tellurium. In process of treating sulphureted ores of a complex nature, comminuting and melting ore in presence of an alkaline salt and carbon, whereby alkaline polysulphides soluble in water are formed, plunging melted mass into water, whereby a magnetic precipitate is formed and the polysulphides dissolved in the water, separating the solution from the precipitate, subjecting same to action of air and sulphurous acid gas forced thereinto, whereby monosulphides of iron, together with the precious metals, are precipitated, maintaining the alkalinity of the solution during the operation of precipitation by addition of an alkaline substance, as lime, separating the solution from the monosulphide of iron precipitate, extracting from latter copper, and then precious metal, and separating arsenic and antimony from solution by precipitation.

PROCESS OF TREATING GOLD OR SILVER ORES AND COMPOSITION OF MATTER FOR SAME PURPOSE.—No. 625,565; E. D. Kendall, New York, N. Y.

Process of treating ores or other bodies for extraction of precious metals, which consists in treating them with an aqueous solution containing a thiocyanate and hydrogen dioxide; composition of matter to be used for extraction of precious metals from ores, tailings or other bodies, consisting of a suitable thiocyanate and hydrogen dioxide in watery solution.

Water Development.

By THEODORE S. VAN DYKE.

The coming summer will see more water development south of Tehachapi than any two seasons of the past. Much of it will be solid and permanent addition to the resources of the section. Much more will be of merely temporary benefit, but still well worth what it cost. Considerable more will represent disappointment either sooner or later. How to avoid loss of time and money is the principal question that is of much practical value, and is also the hardest question to answer.

Old River Beds.—From the time when our mountains were several feet higher, and the streams leading from their bases were several hundred feet below the present level of the wash and drift that has formed the soil of the valleys and slopes, the streams have shifted their channels so many times that it is quite impossible to tell where they now are, or what their number. Many are miles from the present bed of the stream, while the chances are against any of them being exactly under the present bed, because the range of most of the streams from side to side has been so wide.

Equally impossible is it to say how large they are, or what the amount of water they carry, or how long it will take to run it out if heavily drawn on. Some one has had the audacity to frame a formula for computing the flow of water underground. But there is nothing in hydraulic engineering that justifies anything of the sort. In the dozens, and even hundreds, of old channels that the shifting of the streams and covering of the old beds with drift have made, the gravel or sand through which the water is now flowing, between two layers of clay or concrete, varies so much in the size of the grains, in the amount of fine material lying between the grains, as well as the character of the inlet and outlet to the sea, that nothing approaching a rule should be given, even if we knew the size of the channel and its exact slope. In short, the only way to develop water is to develop it.

Natural Reservoirs.—There are, however, certain principles to be borne in mind, or you may find trouble ahead, although it may not be immediate. First, all development is drawing on a reservoir. If you have an artesian well, or one in which the water rises much above the level on which it is first struck, you have a reservoir in which the dam is generally friction instead of masonry. But it is none the less a reservoir. Too many taps cannot be made in it, nor can too many be left open. Much of the development made this year will represent pockets or channels of water connected with the source of supply by some small tread of gravel through which water moves very slowly. If exhausted it may take a long time after the next wet winter to fill them again. In many cases the very fact they are now full shows that they have no outlet to the sea. From this it is quite easy to understand how the inlet to them may be very small. For if it were very large the channel would probably go clear through to the ocean. The expression "inexhaustible well" has become quite common. But all wells are inexhaustible as long as you do not exhaust them. The test will come after many weeks, months or even years of pumping, when you have planted your orchard or alfalfa and expanded out on the strength of the new supply. Many developments will stand it, but it is quite as certain that many more will not.

Supply for Wells.—In case of wells, which will be the principal means of development, keep a careful record of the material passed through, so that you will know whether you are on gravel channel which is probably a stream, or only in a sponge which will feed the well by seepage. Seepage is unreliable for heavy and continuous work. It may do for the windmill, but generally the engine that is throwing much of a stream must be on an underground stream or a few weeks, or even days, may find the bottom of the well dry soon after the engine starts up. At first the well fills readily when pumped out, but a cone or depression forms around it as soon as the pump begins. At first the sides of this are steep and when the pump stops the water soon fills it to the general level of the stratum of water in the sand or gravel. Day after day the edges of this cone spread further away from the well, the slopes forming the sides become longer and more nearly a level. The water having further to travel through a resisting material, comes in more slowly, while the general level of the stratum of water is constantly falling to the level of the bottom of the pump. Once down there it may take several weeks, months or even years to fill again. The time cannot even be guessed at, for you know nothing of the mode of supply, and perhaps not even its source. Such is quite certain to be the case with wells sunk in decayed granite if a heavy draft is made on them. Even though the water comes in from crevices they cannot long be depended on.

Passage of Water Through Fine Material Very Slow. Springs in the hills that flow without weakening for at least seven months after the last rain and yet where it is much less than a quarter of a mile in any direction to the rim of the watershed from which you can readily see they must come. It is much the same, and often worse, with water passing through soil, and even through pure sand it is provokingly slow. No one can calculate its rate of progress, but you can generally rely upon its being provokingly slow when you need much water. If it were otherwise few of our supplies would hold out after one dry year. People love to flatter themselves that the water comes from some distant source, independent of the watershed about the well. If in a well-defined gravel channel this is generally the case, and most wells in such formation are reliable under very heavy draft. But if in soil, or decayed rock, the presumption is heavily the other way, and even sand is often a mere sponge for a local watershed. Even where it is certain that it is not, I have found the passage of water through it so slow that a well 20 feet across pumped down from 8 to 2 feet took one hour to regain 1 foot with the water standing at the 8-foot level all around it. This was a foot an hour under an average pressure of 5½ feet. No one can say what it would have been under no pressure, but with the grade of the stream 25 feet to the mile.

A mile and two-thirds a year is quite slow under a pressure of 5½ feet, even for fine quicksand which this was. Yet I measured and timed this well myself as soon as the pump stopped, and could not have made more than 5% error at the most. Through most sand water will pass more rapidly under that head, yet you are liable at any time to be greatly disappointed in its velocity. Wells in soil, soft rock, and fine sand will do for a light supply, and also to help out in bad seasons, but should not be made a basis of further expansion in planting until time has proved what they will do. The only danger in the present great developing movement is the cry "Eureka." Too many may think they have solved the great problem only to find what may be valuable as a reserve will not stand the brunt of steady battle.

Gravel Channels.—Strange as it may seem a gravel channel in which the water does not rise in the pipe may be a more reliable source of supply than one where it does. Where pressure is indicated by the rising of the water above the top of the stratum in which it is struck, it means resistance all the way back to the last thread of water that feeds it below ground. If this resistance be removed by opening the channel by wells, and drawing out the resisting water, the supply is quite apt to come in much faster than when the resistance of the water below aided friction in holding it back. Consequently too many taps on an artesian belt may seriously reduce it by accelerating the feed of water from above. But where there is no pressure the flow from above cannot be accelerated by taps below. There may be wells enough in it to take in all, but they cannot hasten the end as in the other case. As this is contrary to common belief, even of many good engineers at first glance, you will find it of much interest to consider this carefully, especially in view of its possible importance.

Underground Riparian Rights.—In the case of Yarwood vs. The West Los Angeles Water Company it was proved beyond question that the water in wells some 1200 feet above the development cut fell some 4 feet about the time the main cut was made, and some 16 inches while an extension was being made. This was not denied, and could not be, for it was found on examination of the wells that it was true; it was from failure in the supply and not from the draft made by the cut. The other engineers in the case took the same view and the case was won by the company on that ground. Had the water been a still sheet it could have been lowered, but in that case it would have been percolating water, and the owner of the land (the company) would have a right to it, even to the damage of another. To maintain this case plaintiffs had to claim as upper riparian owners on an underground stream, and the court found that it was such a stream, although in the form of a moving sheet. But being in motion on a grade, instead of standing on a level plane, it became instantly subject to the laws of water flowing against resistance without regard to its form, depth, velocity to fall.

How Resistance Holds Water. — One of the most simple of these laws is that water flowing against resistance will, by that very resistance, be held up to a certain plane. If so, it cannot be lowered below that plane as long as the resistance is there. The illustration given in court was that of a flume carrying 100 inches of water. It will flow full to a short distance from the end, where it will drop off in a curve. This curve cannot be extended back of a certain point by any mode of facilitating the discharge. You may break off section after section, or widen the outlet as you please, but the curve quickly stops. No matter how short the flume you cannot carry it back the whole length, for if you could the flume would carry more than the 100 inches. It would not be long enough to be a real flume.

Suppose, now, we fill the flume with gravel until it carries only 1 inch of water. We still have the results. The curve at the end is changed some by the character of the resistance of the gravel, but it is still there. The flume runs full as before to near the end, and then curves suddenly off. By no way of assisting the discharge can you increase it so as to carry the curve back of the point where the resistance has located it. If such assistance could lower it for the whole distance, it would then carry more than 1 inch. But its capacity is now reduced to 1 inch by the resistance, and that resistance necessarily holds the water up to the top of the flume.

As Applied to Artesian Wells.—You cannot avoid this conclusion except by jumping the terms of your own proposition. The consequence is that you cannot, in this way, reach the source, and therefore cannot lower all the water plane as long as the supply lasts. The hydraulic curve formed by the lessening of the resistance at the end will vary with the character of the material, but in no case can it run back very far. In the Yarwood case we bored some fifty wells to test the theory, connected them all by the level, and plotted the results. The curve ran out entirely in 300 feet or over 900 feet below the land of the plaintiffs, showing that the lowering of the wells must have been due to failure of the supply far above. This was further shown by the fact that the area over which the lowering occurred would have doubled the flow in the cut for several weeks had it all gone out that way. But there was no increase in the flow over that which continued for many months thereafter, and the plaintiffs, though living where they could readily see and measure any such increase, did not attempt to show any. The sheet of water in this case rose again 300 feet below the cut and moved on as if nothing had happened, the supply evidently coming up from below at that point.

The consequence is that several wells may be bored into such a stream not under pressure, and if not too close, so that one comes within the cone of depression formed by the other, each may get its share of the water without damage to the supply, which would pass away to the sea if not thus taken. But if under pressure, the same number of taps would probably increase the flow between the upper well and the mountains, so as to let out the supply much faster. Thus a stream not under pressure may be a safer supply than one under pressure, though it may cost more to raise the water.

Zinciferous Ores at Leadville, Colo.

Written for the MINING AND SCIENTIFIC PRESS.

A great tonnage of zinciferous ore exists on numerous Leadville dumps and large bodies of it are available in many of the well-developed mines of the district. The increasing demand for spelter at higher prices is creating an active interest in the subject of mining and shipping this class of ore from Leadville. The proposition to establish zinc smelters here is met with the assertion that these ores should be shipped to the source of fuel supply rather than to ship fuel required in their smelting to Leadville; that each ton of zinc ore requires from 2¾ to 3½ tons of coal to smelt it.

R. R. Moore of the St. Louis Smelting & Refining Co. has given the subject here some attention and is reported as being favorable to the belief that zinc smelting may become a successful industry in Colorado, notwithstanding the fact that the presence of iron in Colorado zinc ores is detrimental on account of its corrosive action on the retorts. The Leadville *Herald-Democrat* gives the following condensation of Mr. Moore's description of the standard zinc smelting process:

"The crude ore is crushed to about 12-mesh size and then thoroughly roasted until desulphurization is complete. The desulphurized product is then mixed with about 30% coal and retorted in small retorts. These latter are about 4 feet long by 8 inches in diameter, and a large furnace has as high as 800 of them. The carbon of the coal in the charge reduces the zinc to metal and the metallic zinc, at the high temperature required, being volatile is condensed in another pot outside of the furnace."

Recent shipments of zinc ores from Leadville to Antwerp and Swansea have been made, the result, it is claimed, being to demonstrate that ores running as high as 45% zinc, with only a small per cent of iron, can be shipped from Leadville to points abroad at a profit.

The New Jersey Zinc Works, whose plant is at Mineral Point, Wis., have purchased the Colonel Sellers mine at Leadville, which is a large zinc producer, and it is reported here that the purchasers intend working the mine and shipping its zinciferous ores to their plant at Mineral Point.

WORK has been commenced by the Telluride Power Transmission Co. of Provo, Utah, to double the capacity of the Provo Canyon plant, adding 2000 more H. P. for use in the Tintic district. L. L. Nunn, the president of the company, thinks that power can be turned on the new route in about sixty days, and as soon as it reaches the Tintic district there is assurance of good patronage. Mines in which Provo parties are interested will likely put in electric power.

The Old Telegraph Mine, Utah.*

By G. LAVAGNINO, Salt Lake City.

The recent reopening of the extensive group of mines of which the Old Telegraph is the central figure gives more than a passing interest to a geological description of the property at this time.

The Old Telegraph mine lies on both sides of Bear gulch, a short branch of Upper Bingham canyon, and nearly in the center of the group of mines called the Bingham mines, about twenty-seven miles southwest of Salt Lake City. It is considered by local miners as the most important mine of the district.

The geological formation consists of Weber quartzites, with subordinate conformable limestones and shales, alternating with porphyritic rocks. These widen toward and connect with the massive backbone of the Oquirrh mountains, while the quartzite develops itself on the slope broken through by Bingham canyon.

The porphyry not only runs between the strata, but also cuts across them, isolating large portions near the mountain mass, and again on a smaller scale it penetrates some joints in the quartzite. It is a crystalline felspathic rock, containing variable portions of quartz, mica, hornblende, chlorite, and iron pyrites as accessories. In places, it takes a less distinct or almost uniform fine-grained structure. It has a gray or greenish, and, when much altered, also a reddish or even white color.

The quartzite is a fine-grained or almost compact grayish-white or bluish or reddish quartz rock, containing in places fine scales of mica and grains of iron pyrites as accessories. The raised, folded or broken masses show well defined bedding joints, and their general dip is 35° to 50° towards north or northwest.

In the porphyry occur metalliferous veins with a prevailing N.E.-S.W. strike. These are in general narrow veins; their principal contents are not dissimilar from those of the other deposits; but there is considerably less oxidation near the surface and the ore is mostly richer in silver.

In the quartzite the ore deposits generally occur on the joints of bedding. The more important deposits occur either in clearly defined contact veins, or, more often, in somewhat vaguely defined mineralized zones, that could be called contact zones. These comprise several masses of more or less altered or decomposed rocks and the newly distributed products of their mechanical and chemical decomposition, such as breccia and clay in seams or in more irregular bodies.

These zones are more definitely limited beneath by a bed of hard quartzite upon which they rest, than on the opposite side by limestone or porphyry. White, fine-grained limestone remains near the surface in isolated benches only, and in the upper part of the Old Telegraph mine it is almost absent. Porphyry makes a more continuous limit, not only as a roof, but also often terminally.

The ore bodies in these zones are very irregular. Although they are generally lenticular masses lying flat with the strata, they occur also in different forms and positions, and often they are connected by narrow channels, veins or threads. When an ore body, as in the more frequent case, occurs in soft ground, there is often in immediate contact with it a local slickenside, commonly called a hanging wall; but similar polished joints occur also through the ore body. The country rock is not always clearly distinct from the ore proper; more frequently it is more or less impregnated next to the ore, or even transformed so far as to be worth mining as ore. This is especially the case in the upper parts of the mines, in the regions of the oxidized ores, which have been hitherto the more important in this district.

In a very wide sense, the more important group of mines, extending from the Wasatch and Lead mines on the east to the Jordan and Stewart mines on the west, can be considered as belonging to a single mineralized zone or belt, although portions of it may appear isolated by porphyry as above described, or by the later phenomena of erosion, which play an important part in this district, as attested by the existence of placers and of conglomerates in the canyon and in the gulches. Very likely, all these deposits have a common genesis with those of the Old Telegraph mine.

At this mine there are large, irregular bodies of more or less silicious pyrites, transformed within in the limits of oxidation into more or less ochreous, spongy and brittle quartz, and into more or less silicious yellow, red or black ochres. In or near these pyrite bodies, and also wholly apart from them, occur smaller bodies of galena, with fine-grained zinc blende and iron pyrites, corresponding to the bodies of carbonated lead ore within the zone of oxidation, which have furnished the main production of this mine since its discovery.

The distribution of silver and gold is very irregular; the main part of the ore is of low grade, while in smaller pockets the yield is considerably higher. The pyrite is of very low grade, that most free from quartz containing only five or six ounces silver and less than $1 gold per ton, although better samples both in silver and in gold can be obtained. In places it carries a little copper. The pyrite occurs both crystallized and massive. The "base ore," generally coarse-grained crystalline galena, with fine-grained zinc blende, contains about twice as much silver as the pyrite.

The more or less spongy quartz above mentioned (the old matrix of pyrite) contains always a little silver and gold, mostly little more than the pyrite. In some places it carries ten to twenty ounces of silver per ton, and in exceptional spots much more. Most of the silver and gold is contained in the small amount of ochre adhering to and coloring the quartz. Perfectly white, spongy quartz is poorer; some of the best quartz is gray. The more or less silicious and argillaceous ochre, usually extending into the country rock, is of no practical value, unless it passes over into lead ore proper.

The lead carbonate ore is a more or less silicious, ferruginous and argillaceous lead ore, colored yellow, red, light or dark gray, containing as accessories pieces of "free" galena—that is, galena free from other sulphurets. It carries mostly ten to twelve ounces of silver and about $1 gold per ton. This yield is often raised by the presence in the ore body of small veins of soft quartz, richer in silver and gold.

The above-mentioned types of ore are not always clearly distinct. There are transitions; and the country rock next to the ore may be more or less impregnated with iron oxide and lead carbonate. The practical distinctions are between first-class lead ore or smelting ore, second-class lead ore or concentrating ore, and silver and gold ore. Pockets of true silver and gold ore (a brittle, sandy quartz with white or yellow clay) occur indeed in position even independent from the lead ore, and appear to be a more recent production in the upper levels of the mine.

The Old Telegraph mine was first discovered by prospecting near the top of the ridge, east of the gulch, on the outcrop of some bodies of lead ore, and it has been opened and worked by adits or tunnels on both sides of the gulch, most of them originally driven to prospect separate mining claims. The gulch represents a large natural gap in the ore-bearing ground; it abuts on the quartzite south limit of this ground and crosses a belt of porphyry north of it.

The connection between some of the ore bodies has been proved in several cases, and in one particular instance this connection has been traced for several hundred feet, between the ore bodies discovered near the top of the hill on the east and other ore bodies discovered by lower tunnels. A similar relation exists on the west side of the gulch.

The ground is generally soft and needs timbering. The largest stopes were timbered by "square sets." Most of the openings cave, unless their timbering is expensively kept in repair.

The first-class ore was either smelted at the Old Telegraph furnaces in West Jordan, near the Jordan river, about ten miles south of Salt Lake City, or sold on the market, The second-class lead ore was concentrated at the Old Telegraph mill in West Jordan, or at a similar mill in the canyon. Some of this ore was first lixiviated by filtration with hyposulphite of soda, to extract a small portion of the silver, and then concentrated. Some good and some poor silver ore was lixiviated with hyposulphite of soda in a small mill at the mines.

The mechanical concentration presents two difficulties, which are especially notable when the ore is higher in silver and gold—namely, the silicious tailings carry off several ounces of silver per ton, and the slimes much more. These slimes usually contain more silver and gold than the concentrated ore, and they cannot be successfully concentrated. They hold most of the ochre contained in the ore, and with a little care they can be kept free from the very fine sand which tends to follow them. But for their fineness, they would be a desirable smelting material. The plan adopted when all the works were running—that is over twenty years ago—was to collect the slimes and to combine with them the flue dust and make bricks ready for smelting.

The problem of the future lies in the utilization of the low-grade pyrites and base ore, and low freight rates and economical concentration are the first steps towards its solution.

*Condensed from Transactions of American Institute of Mining Engineers, '87.

Chloride of Zinc.

A curious by-product of zinc is chloride or salts of zinc, which formerly went to waste, but now is used as a wood preservative by railroads, bridge builders and dock builders, and for the protection of shingles, clapboards, and any other wood that is exposed to moisture or influences that cause decay, says the Chicago *Record*. The salts of zinc, in solution, by hydraulic pressure are forced into the pores of the wood, which is then soaked in a solution of tannin and glue. The ties and piling now used on the Santa Fe and Southern Pacific and other Western roads are treated in this manner. The railway companies named use from 3,000,000 to 4,000,000 pounds a year each. With this treatment a pine tie, which is the only kind that can be found out in the mountain country, will last three times as long as one of oak.

Characteristic Mines of the California Gold Belt.

Written for the MINING AND SCIENTIFIC PRESS.

The peculiar characteristics of the great dolmitic vein, which is such a prominent feature of the southern portion of the so-called mother lode, in the central part of the gold belt, are no better shown anywhere along its length, perhaps, than at Coulterville and vicinity. Just below the village, on Maxwel. creek, the great vein crosses that stream, which has cut a gap through it about 100 feet wide. On the south side of the creek is located the Louisa mine, and immediately north of it is the Margaret, on the opposite side of the creek. Where the lode crosses the creek it has a width of 300 feet, and consists of an immense mass of ankerite, through which is disseminated the green, scaly mineral mariposite. Large, lens-shaped masses of quartz outcrop boldly from the ankerite, being somewhat harder than the latter. The lenses are irregularly distributed, but occur mostly along the hanging wall and near the center of the vein. The large veins or lenses of quartz are separated by equally large or larger zones of the dolmitic mineral, which is interlaced in every direction by quartz veinlets and veins of varying size, making the entire mass a mineral zone or lode proper. One of the quartz lenses is nearly 20 feet in width, outcrops to a height of 25 feet and is 300 feet long. A shaft sunk on the foot wall side of it to a depth of 60 feet showed it to be thinning out; but there is no doubt that it would be found replaced in depth by another lens of similar character. South of this large cropping a small vein branches out into the hanging wall, which is diabase, striking northward and increasing in width until it disappears underneath Maxwell creek. On the opposite side of the stream a large vein appears, which apparently is the northward continuation of the one referred to.

Through the center of the lode is a quartz vein 10 to 20 feet in width, and still west of it another, but smaller, vein. The entire western portion of the ankerite mass, constituting about one-third of the whole width of the zone, is a perfect network of small quartz veins, stringers and bunches of quartz.

A prominent feature of interest is the union of two of the largest quartz lenses near the center of the lode by a third large vein, which crosses the intervening ankerite diagonally. The two large veins are about 120 feet apart. Beginning near Maxwell creek, on one of the large outcrops referred to, a careful examination discovers a seam in the quartz, along which gold may be seen almost every foot of the way. This gold seam can be followed some distance in a southerly direction to where the diagonal branch above referred to leaves it. This latter also shows gold along a similar seam, leading to the other large quartz lens parallel with the first, and here, again, is a gold seam which may be followed if care be taken. Outside of the gold thus occurring, none was observed elsewhere by the writer, though it was said that prospects could be obtained by crushing certain portions of the rock and carefully panning it. Southward from the section above described, the several large veins converge toward a central point on the ridge, which rises higher and higher, terminating in an immense mass of quartz at its apex. Southward from this point the quartz is less prominent and the ankerite constitutes the major portion of the lode until another occurrence of quartz lenses is reached, which in each case, whether following the lode north or south, is much the same.

Gold sometimes occurs in the ankerite and mariposite, when seamed with quartz. A brecciated, crushed condition of this rock seems to favor the gold, or, at least, rock of this character contains more gold than that which is massive and solid. The entire mass is low-grade, and ankerite wholly free from quartz is practically free from gold in this mine.

The hanging wall country at these mines is massive diabase, and the foot wall a diabase dyke, separating the ankerite lode from the black clay slates of the mariposa beds. These latter are a mile wide and are intruded in numerous places by dykes of diabase and diorite.

The next prominent outcrop on the lode northwesterly from Coulterville is at Pinon Blanco, about three miles distant. This hill rises prominently, its larger axis lying with the lode and being defined by conspicuous outcrops of quartz similar to those at the Louisa. The country rock at Pinon Blanco is somewhat different from that at the Louisa. At the former a coarse gabbro is prominent, some crystals of pyroxene in semi-decomposed rock masses being 2x3 inches in width and length. Serpentine is also in contact with the lode on the foot wall side. The ankerite mass is more than 300 feet wide. Portions seem to be almost pure dolomite, the iron constituent being absent. Some of this rock contains mariposite in abundance and in other parts it is missing. The quartz at a certain point on the eminence known as South Pinon Blanco contains small crystals of tetrahedrite, and this rock is rich in gold. The oxydation of the gray copper has produced a large number of small blue specks of azurite. This characteristic has been noticed at several mines on the central gold belt, notably at the Alameda mine, the Rawhide mine and Rawhide No. 2 in Tuolumne county.

W. H. S.

Mining Summary.

ALABAMA.

State Geologist Eugene A. Smith has issued a statistical bulletin showing production of ores and metals in that State for the first quarter of 1899 as follows: Coal, 1,761,271 tons; coke, 358,320 tons; iron ore, 546,310 tons; pig iron, 242,590 tons. Partial returns are also given on the following substances: Stone for flux, 111,029 tons; bauxite, 2918 tons; lime, 31,500 barrels.

ALASKA.

Great activity in the Atlin Lake district is reported. Numerous new strikes are being made, some of them promising. Wilson creek has been located for five miles. It is situated over the summit which divides Dixie from Pine, Spruce and Boulder creeks and the claims on the north side. Prospectors think that Dixie and the creeks in that locality will yield abundance of gold. A new strike was recorded on Hitchcock creek. Pans have yielded coarse gold as large as BB shot. Another new creek not yet named is being staked. On Pine, Spruce, McGee, Birch, Boulder and El Dorado development work is being done with good results. On McGee creek and its tributary—El Dorado—pans running as high as $1.50 to $2 are being made.

ARIZONA.

A report is current that the Azurite copper mine had been sold to Eastern parties for $500,000. It is known that an option was secured some time ago on this property, and three parties are waiting their turns to secure consideration from the owners.

Globe *Silver Belt*: The Commonwealth M. Co. of Pearce is to add thirty stamps to its mill, having opened a large body of ore in the lower levels.

Prescott *Courier*: On the 12th of April, S. M. Waterman discovered and located the Humming Bird mine, Walnut Grove mining district. He has done 15 feet of work on the claim all in ore. The pay streak is 8 inches wide. He brought to Prescott 800 pounds of the ore which gives an assay of 5.38 ounces gold per ton. Adjoining the Humming Bird is the Olive, also owned by Mr. Waterman, which has 30 feet of development and a vein 4 feet wide, ore from which carries 14% to 19% copper and seven to eight ounces gold per ton.

CALIFORNIA.

Alpine.

Gardnerville *Record*: E. Lewis and F. Musser of Markleeville, while prospecting Boulder Hill, have discovered a ledge. They have three men at work driving a tunnel. The ledge is not large and it will take some time before the full value of the mine can be determined.——Boulder Hill is a mountain of boulders and in the early 60s, when the Alpine mines were first discovered, boulders rich in gold were discovered on this mountain, an arrastra built and worked, the gold-bearing boulders paying fair wages, but no ledge could be found.

Amador.

Amador *Dispatch*: At the Butte Mountain mine, east of Jackson, Supt. R. L. Marsh, a tunnel is being driven to a point where two lodes intersect, 200 feet below the surface. The tunnel is now in 300 feet, and an upraise is being made to the surface. The cost of mining and milling the ore will not exceed $1.50 a ton.——At the Zeila mine at Jackson drifts are being driven at the 1080 and 1300 levels. The mill is dropping fifteen stamps, as little ore is being hoisted while the drifts are being run.

Jackson *Republican*: At the Amador Queen, Supt. Dye reports the shaft down nearly 1200 feet and the crosscut showing a ledge of gold-bearing matter 310 thick.——At the Queen No. 2 ore has been struck and a quantity sorted. A tunnel 1200 feet long reaches the ledge. A shaft is being sunk from the tunnel, and in this shaft the rich ore was found. An unusual flow of water was struck on the 5th inst., since which time little has been done except to pump water.——At the Valparaiso five men are at work, searching pockets irregularly distributed through the slate and greenstone which separates the two ledges. The gangue is quartz, containing gold and auriferous arsenical pyrites. The lessees are handling ore that will go from $25 up, all low-grade ore being rejected.——The Peerless mine shows a ledge of decomposed quartz 4 to 7 feet, mixed with slate near the outcrop. The shaft is down 35 feet.——Prospect work is being done at the Moore mine, a mile south of Jackson. A crosscut is being made from the bottom of the old shaft 60 feet deep to find the east ledge.——A tunnel has been started on the Belluomini ranch, one-half mile from Jackson, to cut the ridge which runs from Jackson creek west of town, south toward the river.——The Doyle mine, near the Amador Queen mines, is being pumped out, and the shaft will be extended 500 feet to reach the ledge at the hanging wall.

Butte.

Oroville *Register*: Two dredges will be built by the Risdon Iron Works of San Francisco, to operate below Oroville.

Marysville *Democrat*: Workmen in the employ of the gas company struck gravel at the corner of C and Fourth streets, which was washed and found to contain gold in a quantity that would pay. This dirt was hauled from the gravel pit near the racetrack, and there is plenty of it remaining in the bottom of the pit.

Calaveras.

J. V. Coleman is making preparations for the starting up of the Angels mine.

The grading for additional twenty stamps at the Lightner mill is progressing. Much blasting has to be done.

The Utica mine and mill are idle waiting for the castings needed to repair the damage to the hoist.

The Bruner mine, near Angels, is reported sold to southern California men for $35,000. The shaft is to be sunk to 600 feet. W. Wall is Supt. It has been named the St. Lawrence.

Mokelumne Hill *Chronicle*: The Independence mine, owned by D. Conradi, is one-half mile east of Railroad and comprises 160 acres of ground, the main channel running its entire length. Mr. Conradi and partner are working on the north end of the claim, having a tunnel in over 100 feet. They have 5 feet of gravel that can be breasted out 125 feet. Their last cleanup of 230 wheelbarrow loads netted $70 over expenses.——S. Smith, M. De Vries and G. G. Gates have purchased the Garnier mine, near Big Bar bridge, on the Mokelumne river. The property has a 10-stamp mill, compressed air and electric plant. The new owners propose to add ten stamps. The ore body averages 8 to 10 feet. The mine will hereafter be known as the Baltimore.

Angels *Echo*: The Melones M. Co. at Robinson's Ferry is advertising for bids for hauling 690,000 feet of lumber from Jamestown, which will be used in the construction of a mill. Bids for hauling general freight, including 1,000,000 feet of lumber, from Milton to the Reserve shaft at Carson Hill, are also called for.——The Big Horn mine, three miles from Murphys, has been sold to Fresno men. The mine was owned and worked by Taylor Bros., but three months ago they gave a bond to the new owners, who have been working it. The quartz of this mine is dark, of bluish color and much of it rich in free gold. The formation is mica schist.

El Dorado.

Amador *Dispatch*: W. R. Pearson of Cleveland, Ohio, will resume work on his Flagstaff and Mt. Hope mines, north of Grizzly Flats. Twelve years ago a company, of which Mr. Pearson was a member, erected a ten-stamp mill on the Flagstaff, but operations were suspended. Mr. Pearson now has a controlling interest, and will put men to work.——Mr. Jackson of Placerville is unwatering the Darling mine, near Georgetown, for an English company. The shaft will be sunk 300 feet farther.——The Placerville Slate Co., with a capital of $100,000, has been organized. The directors are T. R. Jones, H. E. Moody and J. F. Moody of Sacramento, and K. L. S. Cummings and G. W. Cummings of Placerville. The principal quarry of this company is north of Placerville.——Hayward & Lane have completed the dam on their hydraulic claim at Indian Diggings, and as soon as it has been approved by the Debris Commissioners work will commence.

Placerville *Nugget*: The Blue Gouge mine at Sly Park has been sold to a Boston company, who will open it and put in improvements. E. Bind will be Supt. of the mine. A new tunnel and drifts will be run, and in the 300-foot tunnel will be run two upraises. A mill will be built and work will be commenced on a boarding house and offices.

Inyo.

(Special Correspondence).—The Harrison & Godsmark Co. now have their 10-stamp mill running, the only drawback being the tram, which up to date has not been able to keep the mill supplied with ore; but they expect to make improvements in the trolley wheels that will insure better work. They have from 12 to 18 feet of ore which is milling $10 to $12 per ton in free gold, while the tailings show assay values of $12 to $14. The ore chimney has been developed to a depth of 250 feet, and drifts have been extended over 200 feet, with no indication of giving out. The company owns 6000 feet on this ledge, which shows several other chimneys of ore beside the one now being worked. It is a large lead and gives indication of becoming a large gold producer.

The P. D. Q. Cyanide Co. have finished the tailings at Montgomery's mill in Pleasant canyon, from which they succeeded in extracting $8 per ton. This lot of tailings is the product of the World Beater and other mines of the Montgomery Bros., situated near the head of Pleasant canyon, and near the Harrison & Goldmark mine.

The Cyanide Co. will begin on the tailings at Anthony's mill with a ten-ton equipment, and will send a like plant to the Reward mill to handle tailings there. They have also ordered a small plant in sections, to be packed into Beveridge district.

Grading has been finished and preparations made for moving the Bryan mill, formerly at the mouth of Pleasant canyon, to the World Beater mine; when this is done another bullion producer will be added to the county.

Charles Anthony has 50 tons of ore at the mill ready for crushing.

Weaver and Porter Bros. are running their mill at Ballarat on custom ore.

Last week, at Stone Corral, one man pounded out $80 and another $130, in a hand mortar, in a few hours.

Ballarat has an air of permanence, as evinced by the number of women and children now seen there. A good lodging-house is the latest addition to the town.

The shipment of 16 tons of ore recently made by Barnes & Anderson, from their mine east of Independence, worked over $100 per ton. This ore was taken out of a hole 10 feet deep, by two men, in a few weeks. The mine was discovered two months since, and promises to be another Keynot in the production of high-grade gold ore.

Independence, May 24th, '99.

Kern.

Randsburg *Miner*: C. Koehn is having 100 tons of the dump at the Winnie mine milled at Barstow.——Preparations are being made to sink 1500 feet in the main shaft of the Trilby. An engine has been ordered from the Union Gas Engine Co. of San Francisco of 130 H. P., with auxiliary engine of 15 H. P. to be placed at the top of the double-compartment shaft. This engine will have power to raise 6000 pounds 300 feet per minute. The dividend declared for the month of April was $15,000.

Los Angeles.

A 400-barrel oil spouter is reported from Fullerton. The well reached oil on the 28th ult., at the depth of 1460 feet. It belongs to the Graham-Loftus Oil Co. The well is deeper than any other in the field. The Santa Fe people have a well 1200 feet deep, 100 feet from the gusher. The discovery of the new Graham-Loftus increases the daily production of the field to 700 barrels, and it is now as large a producer as any other section in the State. The oil ranges in gravity between 20° and 22°, although oil of 32° gravity has been found in three of the most easterly of the wells worked. The oil is now worth 80 cents to $1 a barrel.

Nevada.

Nevada City *Herald*: J. R. Ritchie has begun work on his new quartz claim, the Examiner, in Omega district.

Placer.

Colfax *Sentinel*: The J. D. Peters M. Co. of Green Valley have raised a shaft at the end of their bedrock tunnel, now in about 900 feet. The shaft is 70 feet to gravel. They expect to run 250 feet to the channel. The gravel found in shaft prospects good.——The Polar Star mine has been closed down for several days on account of repairs on the South Yuba ditch.——Development work is progressing at the Van Avery mine, in Blue Canyon mining district. The mine is the property of the Alder Creek M. Co. Twenty more men will be put on. A compressor plant has been ordered. Ten stamps will be added to the mill in July.——The Dutch Flat Blue Lead M. Co. has opened promising gravel in their tunnel, one-half mile below Dutch Flat. The tunnel is now in 854 feet from Dutch Flat ravine. Several upraises have been made, a channel of 200 feet has been prospected. In former years gravel was found on this lead from 350 to 400 feet in width. The body of gravel prospects for 3 feet above bedrock. It is cemented and a mill will be necessary. The principal owners are G. K. Rider, E. Breuner, J. Breuner and A. Breuner, D. W. Carmichael, G. S. Brand, M. J. Curtis and W. Lampert of Sacramento. S. C. Jordan of Dutch Flat is superintendent.——The Alameda quartz mine is located on the south side of Bunce canyon, on the Forest Hill road, 4½ miles southeast of Colfax, and is owned by F. Wise and M. Partridge. The gold-bearing vein is a porphyry dyke or ledge 100 feet in width, which runs north and south, and is cut by seams running diagonally across it. For a depth of from 25 to 40 feet the dyke formation is soft, and they have worked the claim by sluicing. Wm. Shaub and E. Jones are making wages sluicing tailings from this mine.——The extension north of the Alameda, the Annie Laurie, is owned by G. Nissen. The decomposed ledge is 100 feet in width and is sluiced to a depth of 35 feet. Mr. Nissen cleaned up $170 from a 16½ days' run. Three tunnels have been run 90, 78 and 68 feet.——A. Weske is running a tunnel from the American river to tap a ledge parallel with the Alameda. The tunnel is in 85 feet.

Auburn *Republican-Argus*: The Jupiter Con. M. Co., an Auburn organization, owning the Jupiter and Winchester mines, near Iowa Hill, has ordered machinery and is preparing to work the property. An incline has been run down the rim rock 225 feet, and a slope will be run from the foot of the shaft. F. H. Harvey, E. M., of Galt recently visited the mine in the interest of Sacramento stockholders and will act as consulting engineer. Following are the officers of the company: R. F. Rooney, Pres.; T. J. Nichols, Vice-Pres.; B. B. Deming, Sec'y; C. Wickman, Supt. The above are the directors, together with W. S. Graham. The mine is south of the Morning Star.——It is reported that the Mineral Hill mine, near Spenceville, has been sold to a New York company for $50,000. The mine carries gold and copper.

Nevada *Transcript*: O. Woehler of Spenceville, who has been to North Bloomfield to inspect a copper mine owned by the McKillican estate, will probably open it up. The mine is about a mile from North Bloomfield.

Auburn *Herald*: C. Hollen has six men at work on the Boulder mine and will sink the shaft deeper. He has leased the Malmberg quartz mill in Auburn ravine.——Washing at the Big Gun claim at Michigan Bluff uncovered fair gravel, but the water season was so short the owners were unable to realize much.——An electrician is making an estimate of the expense of putting in an electric plant at the Red Point mine.——There will be more prospecting this season than ever before at the eastern end of the Forest Hill divide.——W. Nicholls is hydraulicking at the Polar Star. The gravel pays.——The Gold Run M. & M. Co. is handling rich gravel, but has lost the grade.

Plumas.

Quincy *Bulletin*: Richards & Eva have resumed work on the Golden Gate west of Quincy.

San Bernardino.

The Gold Chief mine, six miles west of Manvel, owned by R. Young, has recently been investigated by Los Angeles people, and it is reported that they will undertake active development of the mine. It is a large, low-dipping ledge of gold-bearing quartzite.

It is reported that the Resting Springs lead-silver mines, which thirty years ago were operated under the direction of J. B. Osborne, are to be reopened. A smelter built at that time is said to be in good condition. There are some good gold prospects in the Resting Springs camp.

Stilson & Hall, at Vanderbilt, are working the Gold Bronze mine at the lower end of the village, shipping high-grade ore to Kingman.

Yuma *Sentinel*: Placers along the Colorado river are attracting attention and gold-bearing gravel beds have recently been located for 200 miles above Needles. Several companies have been organized and are preparing to operate. A large number of individual enterprises are taking out gold in paying quantities.

Shasta.

(Special Correspondence).—Lewisohn Bros. of New Jersey continue development work on the Galinsky group of copper properties near Kennet, and fifteen men are employed under the supervision of Wm. Kemp. Previous to the work begun by the present bonders of the property a crosscut tunnel had been run 128 feet at 100 feet depth, all in copper ore.

The Mammoth mine, formerly known as the Backbone, four miles from Kennet, under bond to J. F. Coleman of New York City, is doing development work under the supervision of H. Woolcock. The property comprises 1000 acres. There are 1000 feet of tunnels, the lowest being 100 feet below the apex. The greatest depth attainable is 1000 feet. The lowest assay of the ores was 4% copper and from that to 37%, and $1.96 gold and one ounce in silver. Eleven men are at work. There are many hundred tons of ore on the dumps. The main workings are in solid ore for 150x90x80 feet. The distance from railway is two miles. Wood and water is plentiful. A smelter will be built at Kennet.

The Uncle Sam mine has seventeen men at work while adding fifteen stamps, which will give a total of thirty stamps. When completed the force will be increased.

Near Shasta, the old Spanish mine, Supt. Shephard, is employing ten men at development work. The mill is temporarily idle.

Swasey & Howell, two miles from Shasta, are reopening the old Thompson mine and hauling ores to the smelter.

Garvin & Taylor are reopening an abandoned property near Shasta and forwarding ores to Keswick.

Development on the Colorado mine, which also produces smelting ore, shows 3½ feet of ore in a 50-foot shaft.

Ingram & Davis, near Shasta, made a shipment of ore to Keswick that yielded $50 a ton.

Almost every known available ledge in this part of the county has been located and prospecting work progresses as it never has before in the history of Shasta county.

Shasta, May 29th, '99.

Redding *Searchlight*: In the northwest corner of Shasta county, near the Trinity and Siskiyou line, and twelve miles northwest of Castella, has been opened a ledge of free gold ore. There are eight claims in the group, lying on a ridge of porphyritic diorite. The claims are the property of H. Nofsinger, A. Johnson and the estate of J. M. Bryan. The ledge runs northeasterly and is developed by two open cuts and a shaft 50 feet.

Shasta *Courier*: Work has been resumed on the Nigger Hill mine, midway between Shasta and Keswick and owned by Dunn Bros. The work is under the direction of W. Cheynoweth of Shasta. R. G. Dunn, Wells-Fargo's agent at Redding, is one of the owners and is investigating his mining interests. He is also one of the owners in ground at Copper City, in a claim adjoining the original Williams & Kellinger. The Nigger Hill claim is on an eminence in the Rock Creek district, adjoining Shasta.

Sierra.

Downieville *Messenger*: Preparations are being made to transport a wire rope to the Lewis ledge on the Middle Fork. It is 6000 feet in length and will be carried five miles on mules over a narrow trail. It will be cut into six pieces of 1000 feet each. Each of these pieces will require five mules to carry it. The rope will be used for the tramway that will connect the mine with the mill.

Siskiyou.

The miners of Sugar Creek district are busy. The ores in this district are chiefly copper containing values in gold and silver. Some of the ores contain native copper.

Yreka *News*: J. M. Quigley has discovered a vein of mica on Marble mountain.——It is reported that C. A. Mitchell has discovered a ledge cropping, 2000 feet in length with an average width of 50 feet, of tin ore on Klamath river.——A nugget of gold and quartz, weighing ten and a half ounces, was found recently by a Portuguese miner named Fernandez. The gold was found 800 fine. Fernandez refused $150 for the nugget.

Yreka *Journal*: Hadley & Tucker have been finding pockets of gold quartz on Scott river.——Several quartz claims have been located on Patterson creek in Scott valley, in the neighborhood of the Sheba mine and around the Goodale place at lower end of Scott valley, also on Shackelford creek.——H. Harris the Humbug miner, has rich quartz from the Mocking Bird mine at Humbug. The ledge is 3 feet wide.——The miners at the Golden Star at Humbug are working on the upraise to the old works from the tunnel and will drain the upper levels besides stoping.——The Yreka M. Co., working the Greenhorn blue gravel mine, is reported to be taking out pay ore and has a good supply of water.——Austin & Co., working the deep bedrock diggings on the flats, north of the Yreka High School, continue to find good prospects.

Grant's Pass *Courier*: Three hundred tons of copper ore is being packed on mules from the Siskiyou copper mines on lower Illinois river to Selma, fifteen miles, from which it will be hauled in wagons twenty miles to Grant's Pass and shipped by rail to San Francisco.

Yreka *Journal*: The Golden Eagle ledge has been found at Indian Creek in the tunnel lately extended near the old works and averages $80 a ton. The ledge is 18 to 30 inches in width. A new mill is to be put up.——F. D. Fraser will commence operations on the Rostel and Nehrbass ground, adjoining the blue gravel mine at Greenhorn.——The Yreka M. Co., working the Greenhorn blue gravel claim, continues to take out pay, keeping a large force employed day and night. The pay channel extends towards Yreka creek.

Tulare.

Porterville *Enterprise*: The third payment on the Minnie Ellen mine at Deer Creek has been made. Reports are that the prospects are good. The investors have sunk a shaft 51 feet, drifted 27 feet west, 20 feet north and

south. The rock will average $15 per ton. The ledge is 7 feet wide. The shaft will be sunk 50 feet farther and drifts and crosscuts run. Water will be piped from Deer creek and a stamp mill erected. There are 250 tons of ore on the dump.——H. Etter and W. Hastings are reported to have discovered a gold vein on the Hamilton ranch, north of White river. It seems to be a continuation of the Minnie Ellen mine at Deer creek, about six miles south.

Tuolumne.

The ore in the central ore chute at the fifth level of the Santa Ysabel mine, near Quartz mountain, is showing as well as that in the fourth level. The shaft is down 650 feet, and sinking will be pushed to the sixth and seventh levels. A partial mill run showed satisfactory results.

Sonora *Union-Democrat*: In the Dreisam, at Arrastraville, connection will be made by a raise from the 230 level and sinking from above. When the connection is made it will change the shaft to one of two compartments. The crosscut tunnel is in 415 feet, and 35 feet more will reach the east vein.——At the Buchanan everything is reported in good shape. The main shaft is down 600 feet, with sinking in progress. Since Mr. Moorehead became Supt. this shaft has been sunk 260 feet.——The report of H. M. Pease, Supt. Mazeppa mine, for the year ending April 30th, is as follows: Work on the Mazeppa was commenced on May 20th, '98; sinking was commenced on the east vein, but was abandoned at a depth of 40 feet, surface prospecting showing that the west vein was richer; a shaft was started at an incline of 70° on the latter ledge and sunk 70 feet by hand; at this depth a 40 H. P. hoist was put in and sinking resumed; on April 30th the main shaft had reached a depth of 268 feet, with sinking going on; at 100 feet the first crosscutting was done, the vein measuring 18 feet and exposing a body of ore; the south drift was driven 70 feet on the vein; the north drift is in 12 feet, the vein 11 feet wide, showing free gold; but as the ore body is richer south, operation is being confined in that direction; the east crosscut from the 100 is in 45 feet, and the middle vein will be reached in 25 feet; the ore in the Mazeppa ranges in grade from fair to very rich, and it is estimated that there are 800 tons on the dump; a 20-stamp mill will be put up and dropping by Nov. 1st.

Jamestown *Magnet*: Supt. A. Dron of the Longfellow mine, Big Oak Flat, states that the Longfellow G. M. Co. has purchased the Nonpareil mine on Deer Flat. He has stopped sinking the incline at the Longfellow mine, down 350 feet, and is drifting at the 300 level. The Longfellow mill is running steadily on ore from the old dump. Twenty-four men are employed.——The Jumper mill is dropping sixty stamps—fifty on Jumper ore, ten on ore from the Golden Rule mine, which is now connected with the Jumper mill by tramway. Two new rock breakers have been set up. These and the air compressors are operated by electric power. A new blacksmith shop, 30x40, is being built.——The mill on the Hilton & McPherson mine, at Sawmill Flat, has commenced crushing ore.——At the Hope mine the tunnel has been extended 180 feet. Stoping will soon begin.——Late developments at the Vine Springs mine are encouraging. In the lower level there is a shoot of sulphuret ore.

COLORADO.

BOULDER COUNTY.

The Magnolia mill will start up this week. It adopts the bromo-chlorine process.

Denver *Republican*: Shipments continue from the Gillard mine, one of the properties of the Gold Extraction, Mining & Supply Co. Carload lots have yielded $20 to over $30 per ton, and a higher grade $90 to $180. This property and several claims adjoining have been examined by English capitalists, and as a result a company called the Nancy Gold Mining & Milling Co. has been incorporated with a capital stock of $200,000, to which company the Gold Extraction, Mining & Supply Co. has sold the Gillard, Wedge, Grand View, Freya and Doss No. 2 lodes, and the Hastings tunnel and tunnel site, the latter company holding a controlling interest in the new. The capital invested will be used in opening the properties and increasing the output. The Hastings tunnel will crosscut the lodes at a depth of 500 feet, and a power plant will be put up at the mouth of the tunnel. A hoisting plant will be installed at the Gillard shaft, which will be sunk to the Hastings tunnel. Prospecting will be done on the Freya, Wedge and Grand View. The Freya has a shaft 120 feet deep and the Grand View one of 80 feet.——At Summerville, in this district, a mile and a half from Wall Street, work is being done on the Victoria, which has recently been acquired by the same interests which own the Lucky Star and Trident. Improvements are under way. As soon as they are completed twenty-five men will be employed in sinking shaft No. 2 from its present depth of 450 feet and drifting east 125 feet to intersect shaft No. 3, and west to shaft No. 1, 475 feet distant. This property has a record of production of $500,000.——Considerable other work is being done near Summerville, notably on the Goldsmith Maid, Scotia, Cash and Sterling.

CLEAR CREEK COUNTY.

The Mendota mine at Georgetown will be worked for its zinc ores, which are to be shipped to the smelter at Upland, Ind.——E. W. Humphrey, representing the Upland smelter, has secured a lease of Mr. Maxwell on the Mendota, and has also leased the Bush tunnel and lodes cut by the Burleigh tunnel, all of which carry bodies of zinc ore. A number of men are at work and more will be added until the output of the Mendota amounts to one car per day.

Georgetown *Courier*: Rodda & Bradley have made a discovery on Republican mountain, from which they are taking ore that carries 365 ounces silver, 2 ounces gold and 15% lead.——McLaughlin & Co. are drifting on a body of ore in the Polar Star Extension east. Their last run returned 369 ounces per ton.——Bellotti & Co. have a body of high grade ore in their lease on the Aliunde.——Rogers Bros., working the Paymaster, have a body of lead ore and will commence shipping.——C. Carleson on the Mendham, East Argentine, has 200-ounce ore.——Six assays of ore from the Ona Bell averaged 3 ounces gold and 200 ounces silver.——The shop at the Josephine mine, carried away by a snowslide, has been rebuilt. C. Butterfield has charge.——Nyquist & Co. have a crosscut to the north wall of the Independence, in East Argentine, and found a 2-foot vein of mineral, some of which is rich.——Johnson & Segstrom have scattered mineral that mills 150 ounces silver and ⅓ ounce gold.——Roberts & Sherman have a discovery on Leavenworth mountain from which they have taken rich gold ore.

Silver Plume *Standard*: The Comet and Gambetta mines near Georgetown have been leased and will be operated, an option having been secured on the latter. While zinc is the metal sought for, operations will not be confined to that alone, but where ore is found which shows greater value in other metals than zinc, it will be sold in the markets, and it is likely a mill for concentration will be erected.

GUNNISON COUNTY.

The strike reported in the Venable mine at Spencer, near Vulcan, is causing excitement. The ore is said to make smelter returns of $4000 per ton in gold. There was an excitement in that region five years ago, but it died out. Some good strikes were made in the Goose Creek and Domingo districts.

At Pitkin, on the opening of the South Park road, a shipment of five carloads of ore from the Maid of Athens mine will be made, and that will be followed by daily shipments. The Maid of Athens is the lost mine of Mineral Farm basin, discovered eighteen months ago. The vein is 24 feet wide. The ore is chiefly quartz, impregnated with native silver. It averages $25 per ton. The quartz is fissured, and the seams are filled with galena, which carries 600 to 1300 ounces of silver and some gold. The Maid of Athens is owned by W. Friend, T. Huxtable and others, the two first named being the discoverers.

LAKE COUNTY.

(Special Correspondence).—The properties of the Morning Star Con. and Evening Star M. Co., on Carbonate hill, are keeping up their record of 100 tons of ore per day, from which they have not varied materially for several years. The entire property is worked by lessees, whose general operations are under the directions of the owners. By this arrangement there was no cessation of work during the labor strike of two years ago. Originally these workings were in two contacts of lead carbonate ore that were worked from the outcrop; but the present deeper workings are in bodies of manganiferous ores, the latter occurring under the carbonate deposits. Present ore shipments average in value about $3 per ton. The Evening Star group has four working shafts, and there are twelve on the Morning, all ranging in depth from 100 to 700 feet.

A local company known as the Maid of Erin and Henrietta Silver Mines Lease, are operating as lessees on that part of the Maid of Erin above the 700-level. They are hoisting from the 450, 500 and 615 levels, and shipping therefrom 50 tons per day ores running in lead carbonates, sulphides of iron and copper. The old workings of the Maid of Erin extend to the 900-level, but all below the 700 is under water and leased to S. Nicholson, who has also a lease on the Wolfe Tone and adjoining property, which is likewise in water from the 650 to the 1000-foot level. The lower workings of the Maid of Erin and those of the Wolfe Tone are connected, and it is said to be Mr. Nicholson's plan to unwater the two properties and work their lower levels. The Wolfe Tone upper levels are and have been producing. Mr. Nicholson has also a lease on the Adams, below the 600-level.

The Mahala, on the same zone as the Maid of Erin and Wolfe Tone, is producing rather lightly now, but expects soon to be shipping 150 tons per day. The ores of this property contain little carbonate, but are chiefly iron and copper sulphide, with values in silver, gold, lead and iron. The Mahala main shaft is 1130 feet deep and requires constant pumping. Originally this mine worked in lead carbonate ores. WASCOTT.

Leadville, Colo., May 21st, '99.

Leadville *News-Reporter*: O. C. Bartholomew, owner and manager of the Sadalia mine, has been making investigations of the progress of the several mines in Big Evans gulch, and says of all the shafts in that section there is not one failure.

MINERAL COUNTY.

The unwatering of seven of the largest silver mines of Creede commenced when a diamond drill operated in the Nelson tunnel tapped the bottom of the Last Chance shaft. The mines drained include the Last Chance, Commodore and New York. The lower workings of these mines were abandoned on account of water, which was hundreds of feet deep in all of them.

This is the first of the important unwatering propositions contemplated by the Nelson tunnel. When completed the tunnel will be three miles in length.

Among the mines on the line of the Nelson tunnel are the Bachelor, Commodore, Last Chance, Amethyst, Happy Thought and Park Regent. The New York adjoins, and will be drained through the Last Chance, as they are connected by drifts in three places.

The Nelson tunnel is now in more than a mile and a half.

The next mine that will be tapped is the Amethyst, which has more water, more drifts and stopes than the Last Chance; 1000 feet more will have to be tunneled before this property is reached.

The Amethyst, Last Chance and nearly all the mines on the line of this tunnel have been working under leases for three years, but only the upper levels have been worked, owing to the inability of the pumps to clear the water from the lower workings.

OURAY COUNTY.

Telluride *Examiner*: The Skyrocket mill, below Ouray, has been started up by Price & Philbrin. They buy ore and take chances on the returns.——It is reported the Yankee Boy mine and mill are to be started up. They are in the Sneffles district. In former days the mine produced rich silver ore, but now runs more in gold and lead.——Improvements go on at the Camp Bird mines and mill. Extensive development is being done and shipments are regular. Capacity of the mill is being doubled by the addition of twenty stamps and other machinery. A cyanide plant is proposed for the tailings that are impounded below the mill, and an electric system is in contemplation for power and light.——A strike is reported adjoining the Slide mine, owned by T. W. Emerson of Ouray.

RIO GRANDE COUNTY.

At the Con. M. Co., at Summitville, steady production will be commenced, the new roasting furnaces having been completed. When the consolidation of interests in the properties was effected by G. Crawford a year and a half ago, the mines had not been worked for ten years, the tunnels and many of the drifts were filled with ice, which had to be blasted out, the timbers were broken and rotted, and in the drifts caves had occurred. The clearing out of ice and debris, and repairs, made work for months. When the ore bodies were reached it was found that there were quantities of low-grade ore carrying values to guarantee operation, but a test in the company's mill showed them to be refractory. After a series of experiments it was decided to install roasting furnaces. The work in the mine has opened up bodies of ore and proved the property to be of value. The announcement is made that the furnaces will be fired this week. The alterations necessary in the mill have been completed.

SAN MIGUEL COUNTY.

Telluride *Examiner*: The new forty stamps of the Liberty Bell mill are nearly completed. The stamps now operating are turning out a good product on the plates and in concentrates.——The Butterfield mill of ten stamps in Bridal Veil basin will soon be in operation on Waterloo ore. At the Waterloo a large quantity of ore is awaiting treatment. Tests by the processes at a number of mills will be made before the building of a mill is begun.——The Smuggler-Union mill at Pandora is undergoing repairs. Work on the new mill, which is to have a 200-ton daily capacity, is well under way.——The force at the Silver Pick is being increased. The concentrates from this mill constitute 20% of the ore, and the season's shipments promise to exceed those for years past.——The Tomboy mill is beginning the season with smaller forces at the mine than in the past, from the fact that the veins in new ground are yielding a larger and richer product than formerly.——The Gold King, with three shifts, is turning out a good product. The values are largely saved on the plates, the ore being free-milling. Thirty-five men are employed by Mgr. McCoy at mine and mill.——The Jim Corbett and Lizzie G. keep up regular shipment from Saw Pit. The former property is looking well. The Lizzie G. has already paid its owners good returns.——There will be a resumption of work at the Bessie mine and mill, with some new appliances added to the mill.——The Butterfly mill is treating ore from the mine; seventy-five men being employed.——It is said work will be done on the Merry group discovered last season, near Ophir. The find was made by Crawford & Hyatt, and ore taken from the surface returned seven or eight ounces in gold.——F. P. Morgenson has started work on the Butler.——Operations are active in the Marie Antoinette group. The Suffolk mill is treating the ore. Returns vary between $8 and $40.——At the Gertrude mine, Mr. Brink, one of the owners, will commence on a mill of thirty stamps, the building to be erected for the accommodation of a larger number. Experimental tests have been made on ore from the Gertrude and it will yield $6 to the ton. The body of ore is 100 feet wide. A large tonnage was milled at the Illium plant a year ago.——San Bernardo mines are active and will soon be turning out their usual spring output of high-grade ore.——The Suffolk Co. is working its ground with small forces, which will be increased. The mill is dropping twenty stamps.——The weekly shipments from Ophir amount to several cars, and the tonnage increases as the season advances. The Carribeau and Silver Bell are the heaviest shippers.——D. Martin, owner of the Silver Tip group of five claims—Silver Tip, Bob Lee, Free Coinage, Independence and Lone Star—has made a strike on the Silver Tip. There are three veins, two intersecting each other and one crossing the other two below the intersection. This is the vein in which rich ore has been discovered. The pay streak is 10 to 12 inches.

IDAHO.

A strike is reported in the Monte Cristo claim, in the Buffalo Hump camp, a mile and a half south of the Big Buffalo. The claim is operated under $60,000 bond by S. I. Silverman, J. F. Cameron, W. S. Norman, G. Potter and L. C. Gilliam of Spokane. At a depth of 15 feet an assay of the bottom goes $74 in gold. The claim is owned by J. Turner.

Men are arriving daily at Buffalo. Assessment work is being done and work begun upon various properties. Trails and other improvements are being made. The snow is 10 feet deep.——The Monte Cristo has commenced work with six men. They have been hauling supplies to the mine on toboggans. W. H. Hill, Supt. of the Big Buffalo Co., commenced work last Monday with four men on a pack trail into the camp from Badger. The trail will make an improvement over the old road, saving five miles.——F. Brown is building a trail from Camas prairie. It is expected to reduce the distance to the prairie to forty-five miles.——Residents of Buffalo who get their mail by way of Elk City pay $1 per month apiece for the service—no large packages allowed.

The Last Chance mine near Wardner has started up with a small force of non-union men.

Spokane *Spokesman-Review*: W. Carter, formerly Mgr. of the Blue Jacket mine in the Seven Devils district, says the entire ledge contains pay ore. There is a 4-foot streak that is rich. Two carloads of ore from that streak were shipped to the Nickel Smelting Works in New York, returns showing 54% copper, $18 a ton in gold and $12 silver.——There is excitement in Boise basin over the discovery of a gold ledge three miles west of Idaho City, in a section famous for placer gold. E. Burson made the discovery while placer mining. The ledge is 6 feet wide, all ore, while on the hanging wall is a streak 8 inches thick that is rich.

Wardner *News*: Copper strikes are being made on the lower Illinois river and in the vicinity of Preston Peak. Several copper miners have been in that locality for some time making examinations.

MICHIGAN.

American Manufacturer: The Stevens property, on the Mesaba range, upon which 40,000,000 tons of ore are said to be in sight, was bought by the Oliver M. Co. recently. It gets a lease for ninety-nine years at 15 cents royalty. The ore is said to be largely non-Bessemer. The Oliver Co. will mine 400,000 tons of ore at the Queen group this season. It is announced that this company contemplate buying the Champion mine at Champion.

MONTANA.

Montana intends to increase its copper output from 60,000,000 to 100,000,000 pounds annually. Improvements at the smelters will increase the capacity of each department 50% and that of the district 25%, and more men will be employed in the mines.

The Diamond R. Co., at Neihart, has commenced work on a large mill and concentrator to be owned and operated by the company, but equipped to do custom work. The building will be 250 feet by about 400, lying on the lode claims, the Frisco, Equator and '98. The floor space in the building will be 200x135 feet and the actual elevation 100 feet. It will stand on a steep hillside. The machinery will require 600 H. P., which will be generated from water by means of Pelton wheels. The lowest floor in the building will be traversed by a railroad spur. The gravity system will work throughout, and ore will be sent from mine to mill without hoisting or shoveling.

Wardner *News*: A strike is reported on the 50-foot level of the Bamboo Chief, one mile west of Virginia City. Assays from a vein 15 to 20 inches returned $1500 per ton. The lessees will lease the Largey mill, a short distance from the mine.——T. Cooney of Helena has discovered what may become a new quartz mining district within view of Helena, in the foothills near the Missouri river, on the road to Canyon Ferry. A lead, carrying free milling gold ore, has been opened by Mr. Cooney and partner during the winter.

NEVADA.

The official telegram of the pumping work at the C. & C. shaft, received in San Francisco, June 1st, reads as follows:

To Aug. Waterman, Sec. Comstock Pumping Association, San Francisco: The second elevator is working on half time, keeping the water down. The break in the discharge pipe of the first elevator was in the tapered steel section. It will be replaced with a bronze taper piece and regular discharge column that we have here. Will start lowering the first elevator again to-day, and expect to have that elevator running again in a few days.

G. McM. Ross.

The owners of the Grand Prize mine at Tuscarora are considering the building of a chlorination plant.

The Zadig drift, it is reported, will be run to connect the mines of the Occidental Co. with those of the Chollar & Potosi Co. at Virginia City.

Prospecting is going on in the mountains back of Genoa. Several of the claims are old ones, on which assessment work has been done for years. The German mine is the oldest of these, and was prospected by parties who have since abandoned it, after shipping a ton of ore to Dayton for a milling test, which, after paying $30 freight, returned ample to pay expenses.

Winnemucca *Silver State*: An important strike in copper was made in the copper mine at Brunswick owned by J. Yerington, B. Logan and D. Hickey last Tuesday. An east drift had been run from the main incline 120 feet below the surface, and the ledge tapped where it is 6 feet wide, and carries 30% copper.

Kingman *Miner*: The cyanide plant at El Dorado canyon is proving a success. Values are being saved up to a high percentage. The loss of cyanide is reported to be small. Thirty-eight tons of ore are worked daily, and the average value is $30. When all the refuse ore and tailings are worked up a plant will be put in and water pumped to the mine.

Reno *Journal*: The Comstock Pump Co. has secured the water right for three miles of the Truckee river above Floriston. It is designed to be used to generate electric power to be used on the Comstock and in Washoe and Ormsby counties——F. J. Button has returned to Virginia City from a ten-days' prospecting trip east of Golconda, where he found ore the same as that of the Adalaide and located ten claims in that section.

NEW MEXICO.

The pump for the reservoir well at the Texas mill has been put in place. The underground reservoir of drifts and crosscuts will

soon be completed. From this reservoir the water will be pumped to a reservoir on the surface from which the mill will be supplied. Good ore is being produced from the 300 level of the Grand Central and the 400 and 500 levels of the Texas. The mill is running day shift and making a high-grade concentrate. H. Niles, the Supt., has systemized mining and milling facilities.

It is reported that reliable parties have taken the St. Helena mine, owned by H. H. Whitehill and H. Woods. The mine has good bodies of gold ore which run an ounce of gold to the ton.

There is a probability that the big mines of Paschal will resume operations. P. R. Smith is at the mines in company with G. A. Schroeder. There are bodies of ore which run from 5% to 15% in copper.

There is excitement at Cooks over the discovery of bodies of zinc ore at Indian Springs. J. Mitchell, Supt. of the Kansas City Smelting and Refining Co.'s mines, is one of the owners of the new strike. He sent out a prospector who discovered the ore.

Forty men are employed in the mines of Chloride Flat, located almost within the limits of Silver City. All employed are working upon the tribute or lease system, paying the owners a royalty on ore sold. The leasers are making above wages, some of them clearing $25 to $50 per day.

Byrne & Co. are working a vein of lead ore half way between Silver City and Pinos Altos. The vein is a large one with streaks of lead ore which carry value in silver and gold.

B. C. Gillett has a lease and bond on the Copper Rose and Native Copper claims owned by J. A. Lucas and J. Clark. A cash payment has been made on the purchase.

OREGON.

The gold districts around Baker City are attracting attention. The Bonanza mine was recently sold for $1,000,000, and the report now is that the Red Boy mine is about to change hands for $1,000,000. The Red Boy is a paying mine. No one knows how much, as it is in private hands. The Red Boy has a 20-stamp mill and employs fifty men.

On the Burnt river, in Weatherby district, are good mines, among which is the Bonanza, or Shelton. This mine has passed into the hands of a Spokane company, which will operate it. The mine has produced $45,000 with a 5 stamp mill, and cleanups of from $1000 to $2500 monthly are made. In the vicinity are the Rattler, Gold Cliff, Gold Hill, Gallaher and others, making favorable showings. The Gold Cliff shows free gold in the ore, and samples have been shown running as high as $5000 per ton. A 2-stamp mill is on the claim, pounding out a few hundred dollars every month. Formerly Burnt river camp was quite prominent, but it has been neglected of late until recently. The report is that the new owners of the Bonanza mine will increase the mill from twenty to forty stamps. The mine is said to be in condition to supply 100 stamps.

The Golconda mill, employing Greenawalt & Robinson's electro-chemical process, is in operation.

SOUTH DAKOTA.

The Carr mine on Lightning creek, nine miles southwest of Custer, is reported sold to a New York syndicate for $105,000 by J. Sidney. Seven thousand dollars cash was paid.

The copper prospects on upper Box Elder, eight miles northeast of Rochford, are being investigated. The copper belt is broad and contains large zones of slate carrying carbonates and oxides of copper. Rich specimens and streaks occur, but the general tenor of the ore is low grade. These mines were discovered and prospected nearly twenty years ago. Copper also occurs in conglomerate on Box Elder creek.

Deadwood *Mining Review*: The last shipment of bullion by the Homestake Co. contained nine bricks, each weighing 130 pounds. The total clean-up was $350,000.——The Uncle Sam mine, on Elk creek, which has been idle for years, is nearly cleared of water and work will commence on the main shaft, down 100 feet. At that depth an incline has been sunk. The shaft will be sunk deeper and a drift run to the incline.——Work has been resumed at the Spokane mine, northeast of Custer, owned by the Crown Hill M. Co., S. E. Young Supt. The shaft is down 165 feet and it will be sunk to the 200-foot level.——The Creede group of five claims, owned by J. Demereau, C. W. Robbins and E. N. Davis, is nine miles southwest of Custer. Assays of the ore give 16% lead and $34 in gold. The veins in the district are in a flat formation.——The Cleopatra M. Co. owns a group of claims in Squaw creek comprising 100 acres. Tunnels have been run and a shaft sunk 75 feet below the creek, which opened ore bodies of importance. Water has been encountered which will require a pump. The company will purchase a hoisting plant. The Gen. Mgr. is R. B. Hughes, formerly of Rapid City.

UTAH.

C. E. Watkins, C. Sherwin and A. J. Strouse, who have been devoting time to the placer bars along the Colorado river, are preparing to ship to their camp special machinery, now being built for them. Dr. Watkins and his associates are the owners of 600 acres of placer ground between Dandy Crossing and Lee's ferry. The locations cover what is known as the "high ground" and adjoin those of the Hoskinini Gold Placer Co. of Salt Lake. The gravel, according to samples, shows from 50 cents to $3 per cubic yard. Mr. Strouse has been working the sands of the Colorado river for five years.

In the North country mining operations are active and everything from the Keystone is under development. Among these are the Raymond, Black Warrior, Ridge & Valley, Illinois, the Trixy group and the Jefferson. The Watts property is in the preparatory stage. The Jefferson M. Co.'s shaft has been retimbered and all is in shape for opening their property. P. T. Cook is Mgr.

Eureka *Republican*: Twenty men are employed on the Copper Mountain mine. This property is eighty miles south of St. George and thirty miles east of the Grand Gulch. Shipments will be made.——The Eclipse, adjoining the Sunbeam at Silver City, is being opened under contract, subject to the directions of D. C. Dunda, J. E. Jennings and J. E. Caine. The ore is carbonate and all the conditions are the same as in the Sunbeam.——J. C. E. King, C. W. Watson of Salt Lake City and J. F. Graham of Denver visited St. George to look over the Dixie property.

St. George *News*: T. Jennings of Salt Lake City has gone to the Grand Gulch copper mines. A. McDonald and party left recently to clean out the mine. This property was located by S. L. Adams and others thirty years ago and was worked till fifteen years ago, when work was suspended. The hauling in those days was to Milford, 200 miles.

Salt Lake *Tribune*: O. Nay tells of an important copper belt he has visited. This belt is in the southeast corner of the State and on the head of the west branch of Beaver Dam creek. Wooley, Lund, Judd, Dodge and others have mined there for years, but the copper belt has only lately attracted attention. He with several others prospected this copper belt and found a large quantity of high-grade ore that carries gold and silver.

Salt Lake *Tribune*: The Silver Shield M. Co., purchaser of the Silver Shield and Toledo mining claims at Bingham, has made its initial payment, $6000 being placed to the credit of the Tiernan estate, from which it has been purchased at a cost of $60,000. The mine is sending out enough ore to meet the requirements of its payroll.——The report is that Eastern parties have an option on the stock of the Ben Butler M. Co. of Bingham. Supt. M. McGrath reports it in most favorable condition. Work is progressing and a good quality of ore has been exposed. The properties are on the divide between Markham Gulch and Carr Fork.——Snake creek is receiving the attention of representatives of the Standard Oil Co.—— Supt. C. Rooklidge of the Queen of Sheba mine in the Deep Creek country, will make arrangements for the rebuilding of the mill that was burned in February.——Work on the Steamboat group of claims in Snake Creek district has commenced under the direction of C. Buchler. Four men were put on. A power plant is contemplated for this property, and can be cheaply put in, as the creek runs by the mouth of the tunnel; 300 feet of flume will give ample fall for power sufficient to run half a dozen drills. Work will be directed on the lower tunnel, which will cut the vein at a depth of many hundred feet.——It is reported an increase of the force will be made at the Daly-West.

Bingham *Bulletin*: J. H. Miller of Arizona is in charge of operations on Capt. DeLamar's Bingham property. For the present all work will be for development. Six tunnel contracts have been let and a large force is at work to prove the width of mineral-bearing rock. No sinking will be done at this time.——At Bingham placer several hours are devoted each day to washing gravel. Three shifts are employed in drifting, and a large area of ground will soon be ready for stopers.

WASHINGTON.

Palmer Mountain *Prospector*: J. E. Longacre will begin work on the Annie May, a Mt. Ellmeham property. A shaft will be sunk through the iron cap.——A road two miles long is being constructed on Gold hill. As soon as completed, work will be begun on a half-dozen claims which have been practically inaccessible.—— The Grand View, on Mt. Chapacca, has over 300 feet of open cuts, 150 feet in tunnels and 100 feet of shafts on ledges 10 to 40 feet, and assay values in gold. Mr. Redpath is continuing the tunnel, which will cut several veins.——J. Woodward is getting in shape for summer work on the Oro Fino, on Douglas mountain. This property is near the Little falls and rich ore has been taken from it.

Spokesman-Review: It is reported that the Liberty claim is to be prospected, either by shaft and crosscut or by the North Star tunnel into the Liberty.——Porphyry in the face of the Reindeer tunnel has changed, stringers of spar coming in.——There is 4 feet of quartz in the face of the Princess Maud drift. Assays vary from day to day.——Supt. Rice of El Caliph states there are 3 feet of quartz in the face of the drift. It is not as rich as some previously taken from the shaft.

Spokesman-Review: G. T. Eaves has gone to the south half, where he has claims on Bridger creek. The Papoose ledge is 20 feet wide. There is said to be 7 feet of ore that will assay $100 per ton. There is a shaft on the property 20 feet deep. The ledge lies between slate and porphyry. It was one of the first locations in the camp.——The Roaring Eagle is another prospect in that section. It is on the same ledge as the Papoose. It is 5 feet wide.——It is understood that the Big Six will resume work. —— The Insurgent ledge is 10 feet wide.——Supt. Lane of the Princess Maud says the ledge is 5 feet wide.——The shaft on the Bodie is 120 feet deep.——Supt. Ryan of the Republic Giant is sinking a winze from the tunnel.——There are no new developements on the Surprise. The ledge is 7 feet wide.

FOREIGN.

AUSTRALIA.

Melbourne *Standard*: Mr. Petherick, Mgr. Homeward Bound, at Yalwal, claims that at that mine the total cost of raising, crushing and cyaniding is not more than 7s 10d per ton, the cyaniding averaging 3s 6d per ton. Mr. Copeland recommends that the Homeward Bound Co. and the Pioneer Co. combine and put down a shaft on the creek below the mines, 50 feet, and ask the Government for assistance.——An attempt is to be made to test the deep lead under the basalt, near Tumberumba, and the prospecting board is sending an official to inspect operations.——Three parties of miners have left Sydney for the goldfields of the Braidwood district. Letters from individual miners state that payable wash is being found.——A large number of men have left Cobar for the White Cliffs opal field.——The M'Queen Bucket Dredging Co. at a trial run found the buckets brought up dirt without the amount of water necessary to treat the material. This necessitated stoppage to fix a pump to supply water. Mr. M'Queen has expended £1000 on his plant, and will be satisfied if the returns average 4d per ton.

BRITISH COLUMBIA.

The ore shipments from Rossland for the week ending May 27th were: Le Roi 1824, War Eagle 463, Iron Mask 37, Center Star 130. The shipments for the year up to date were: Le Roi 31,859, War Eagle 14,757, Iron Mask 941, Evening Star 36, Deer Park 18, Center Star 148. The ore shipments, owing to the accident in the War Eagle, have fallen off, but there is indication that during the coming week there will be an increase.

The Madison group near Nelson has been bought by the Montreal-London Gold & Silver Development Co. of Montreal for $20,000 cash. The group is owned by J. C. Eaton and San Francisco associates. Development was under the supervision of W. W. Warner. Up to the time of sale Mr. Warner had a lease on the mine.

The first shipment of concentrates from the Ymir mine was made the 27th ult., when forty-three tons were sent to the Nelson smelter. There is a large quantity of sacked concentrates remaining and twelve tons are coming down daily. An ore bin has been constructed by the Ymir Co. at the railway for ore which is to be shipped.

Ore shipments for the past week from Sandon were: Payne 250, Last Chance 60, Slocan Star 20, Whitewater 64, Madison 15; total 409 tons.

LOWER CALIFORNIA.

San Diego *Union*: A mill has arrived at Ensenada for the Real del Castillo gold mines, thirty miles east of Ensenada. The mill is for D. Goldbaum, and is for custom work. It will be operated by water power, and will crush ore from the Pueblo, Castillo and Guija mines, owned by Mr. Goldbaum.——A mill has arrived at Ensenada for A. Miller, and will be put up at the Alamo to crush rock from Mr. Miller's mine. —— The Viznaga mine near Alamo is reported to be in good ore and averaging $8000 to $10,000 a month in its output.——H. M. Russell has been at Alamo. The mill recently bought by him will start up.——A new mill will be put up at La Huerta, not far from Agua Dulce. San Diego parties are interested here.——The Escondido mines, on the road to Alamo, between San Antonio and Santa Clara ranch, are being developed and a new camp started. —— The Socorro placers, owned by H. Johnson, are running with more water than formerly.——There are fifty men employed at Buena Vista on the ditch, and by October the placers will be turning out gold.

SOUTH AFRICA.

The March yield of the Rand was 464,000 ounces gold.——During March the Crœsus mill at Johannesburg treated 6000 tons of mill tailings, producing 841.6 ounces of melted gold, at a cost of 1s 11.2d per ton.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

LINOTYPE MOLD ADJUSTERS.—John D. Harvey, Salinas, Cal. No. 625,445. Dated May 23, 1899. This invention relates to linotype or line-casting machines, in which lines of matrices are assembled and the metal afterwards cast against them to form a complete line of type. As usually constructed the molds in this class of machines have a channel of fixed width, and any change in the width and size of the line to be cast necessitates the removal of the mold and the insertion of another and expensive mold having a a different width of channel and liner, all of which is troublesome and expensive. The mold has a liner with portions of unequal thickness, one adapted to fill the channel in the mold and the other to partially fill and form a wall of said channel, and a tongue-and-groove connection is made between the two portions of the liner and the adjacent faces of the channel. Means are contrived by which the two parts of the mold are locked together, a means for introducing and removing the liner transversely.

CARTRIDGES. — John P. Elliott, Martinez, Cal. No. 625,440. Dated May 21, 1899. This invention relates to a device for the discharge of projectiles containing high explosives in such a manner that the initial impulse of the projectile will not be accompanied by such a shock as will tend to explode the charge within it before it leaves the gun. To avoid this objection, the cartridge may be formed containing the projectile and the impelling charge of powder in a single structure, or the gun may be formed with the projectile and charge chambers connected, so as to produce the same results. In either case the diameter of the powder chamber is much less than that of the projectile. The firing pin is so arranged that the ignition of the impelling charge takes place at the front of the smaller powder chamber, and the charge is turned from this point toward the rear, so that the projectile is started at a comparatively slow rate of speed, and the increasing expansion of the burning charge of powder increasing the velocity from the starting point to the muzzle of the gun, where it attains its highest speed, but the movement is so gradually communicated that there is not enough shot to explode the charge of high explosive in the projectile. A cushion of suitable material is interposed between the powder chamber and base of the chamber to further relieve the shot of the preliminary ignition of the charge.

Personal.

E. M. SPARHAWK represents the Carnegie Steel Works at Denver, Colo.

C. D. COLFAX, of the Calumet & Hecla mines, is in Idaho examining mining properties.

R. C. CHAMBERS has returned to Park City, Utah, after a visit in San Francisco, Cal.

CAPT. THOMAS MEIN, who recently went to Alaska, returned to Tacoma, seriously ill.

C. F. VON PETERSDORF, formerly of California, is employed at the Ibex, Leadville, Colo.

P. BAUMGARD of Angels leaves for Alaska this week. He spent last summer in the north.

W. S. GRAHAM is employed in mapping the Ralston Divide mine in El Dorado county, Cal.

J. G. ENGLISH, owner of the Golconda mine and mill, Bourne, Oregon, was in Denver, Colo., on the 25th ult.

A. J. KING, formerly with the Jackson Drill and Manufacturing Co., Denver, Colo., has gone to Mexico by way of El Paso, Texas.

J. H. HENLEY, formerly Supt. of the Drum Lummon mine, Marysville, Mont., is now Supt. of the Ibex mines at Leadville, Colo.

LUTHER WAGONER has gone to Mariposa county to superintend the reopening of the Francis mine, eight miles below the town of Mariposa.

G. ALBERS, until recently foreman of the App mine at Quartz Mountain, Cal., has gone to Sierra county, Cal., to superintend the Mountain Gold mine.

PATRICK REDDY of San Francisco, Cal., is in Wallace, Idaho, as counsel for the Union miners recently arrested by the military authorities, accused of destroying the mill and other property of the Bunker Hill & Sullivan Co.

THE Harriman scientific expedition recently organized for a tour of Alaskan waters left Portland, Or., on the afternoon of May 30th for the north. The personnel of the expedition is made up of the following: E. H. Harriman, patron of the expedition; W. H. Brewer, Yale University; J. Burroughs, ornithologist, West Park, N. Y.; W. R. Coe, Ph.D., Ass't Prof. of comparative anatomy, Yale University; L. J. Cole, taxidermist, Ann Arbor, Mich.; F. V. Colville, botanist of the Department of Agriculture, Washington, D. C.; Dr. W. H. Dall, honorary curator of mollusks in the National Museum, Washington, D. C.; F. S. Dellenbaugh, artist, Cragsmore, N. Y.; W. D. Devereux, mining engineer, Glenwood Springs, Colo.; Miss D. Draper, New York City; D. G. Elliott, curator of zoology in the Field Columbian Museum, Chicago; B. K. Emerson, Prof. of geology in Amherst College, Amherst, Mass.; B. E. Fernow, Prof. of forestry of Cornell University; Dr. A. K. Fisher, ornithologist of the U. S. Biological Survey, Washington, D. C.; L. A. Fuertes, bird artist, Ithaca, N. Y.; H. Gannett, chief geographer of the U. S. Geographical Survey, Washington, D. C.; R. S. Gifford, artist, New York City; G. K. Gilbert, geologist of the U. S. Geological Survey, Washington, D. C.; Dr. G. B. Grennell, editor of *Forest and Stream*, New York; J. H. Jones, stenographer, Washington, D. C.; T. H. Kearney, Jr., assistant botanist of the Department of Agriculture, Washington, D. C.; C. A. Keeler, ornithologist, director of the Museum of California Academy of Sciences, San Francisco, Cal.; Capt. L. S. Kelly, scout, Yellowstone National Park; T. Kincaid, entomologist, Seattle, Wash.; Dr. C. H. Merriam, chief of the U. S. Biological Survey, Washington, D. C.; Dr. L. Morris, physician, New York City; W. E. Ritter, Prof. of biology in the University of California, Berkeley, Cal.; J. Muir, specialist on glaciers, Martinez, Cal.; Rev. Dr. G. F. Nelson, chaplain, New York City; Dr. C. Palanche, geologist of Harvard University, Cambridge; R. Ridgeway, curator of birds in the National Museum, Washington, D. C.; De Allon Saunders, botanist of the South Dakota Experiment Station; E. C. Starks of the U. S. Biological Survey, Washington, D. C.; L. F. Timmerman, New York City; Dr. W. Treleaz, director of Shaw's Botanic Gardens, St. Louis; Dr. E. L. Trudeau, Jr., assistant physician at Saranac Lake, N. Y.; Mrs. Harriman, Mrs. M., Cornelia, Carol and W. Averill and R. Harriman of Arden, N. Y.; W. H. Averill, Mrs. Averill and Miss E. Averill of Rochester, N. Y.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MAY 23, 1899.

625,638.—TANNING—J. R. & J. S. Brown, Alameda, Cal.
625,379.—CAMERA—E. T. Carns, Portland, Ogn.
625,440.—CARTRIDGE—J. P. Elliott, Martinez, Cal.
625,391.—SEALING BOTTLES—H. S. Garr, Los Angeles, Cal.
625,669.—LAWN MOWER—C. H. Gorr, San Jose, Cal.
625,499.—GUNPOWDER—F. A. Halsey, San Rafael, Cal.
625,445.—LINOTYPE MOLD—J. D. Harvey, Salinas, Cal.
625,336.—ORE FURNACE—J. F. Keiper, Everett, Wash.
625,887.—VEHICLE WHEEL—T. E. Kellogg, Walla Walla, Wash.
625,337.—WATER WHEEL—S. N. Knight, Sutter Creek, Cal.
625,571.—ELECTRIC LIGHT CONTROLLER—O. M. Lacy, Hanford, Cal.
625,694.—PLOW—McCune & Davis, Camp Verde, A. T.
625,586.—COOKING UTENSIL—Jennie R. Morgan, Placerville, Cal.
625,461.—PLOW—G. J. Overshiner, San Diego, Cal.
625,601.—CARTRIDGE EJECTOR—G. D. Potter, Spokane, Wash.
625,475.—POWER MACHINE—J. H. Smith, Glide, Ogn.
30,830.—DESIGN, PENCIL HOLDER—M. Williams, Pasadena, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

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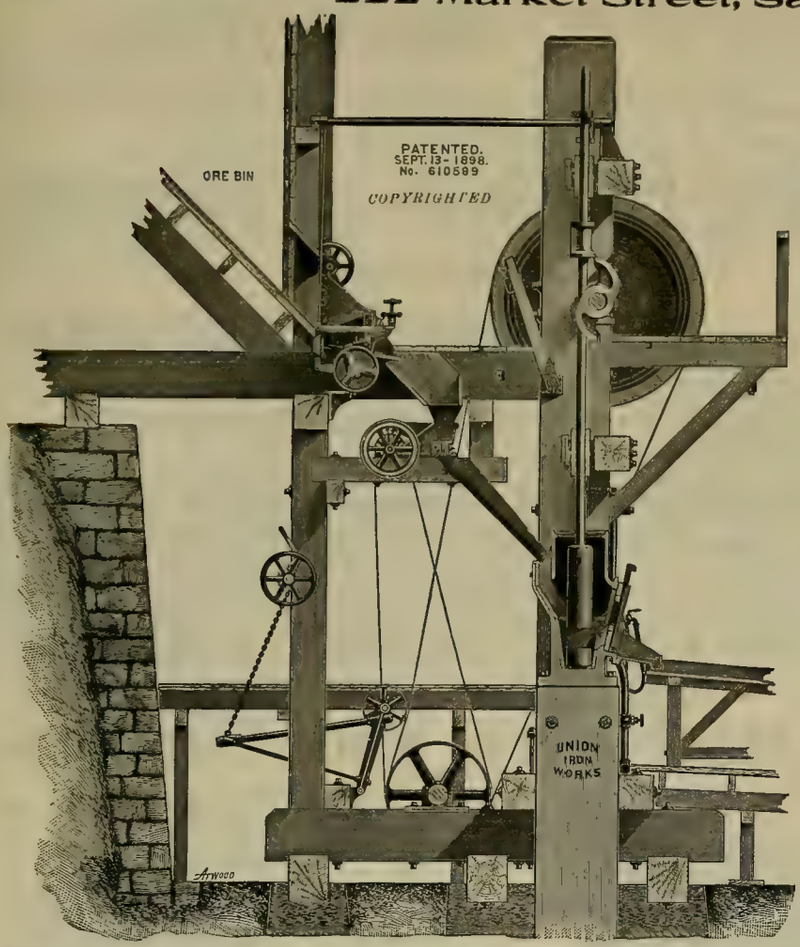

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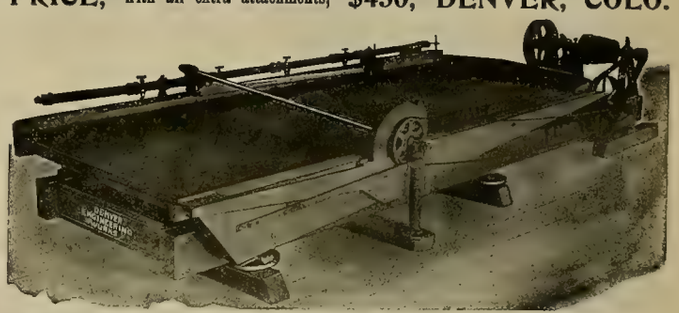

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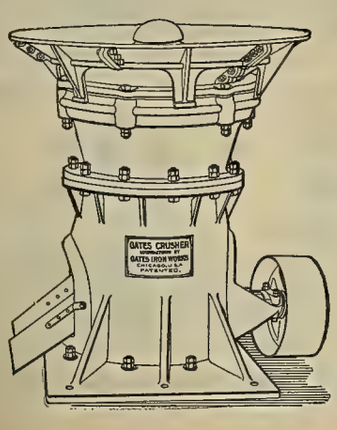

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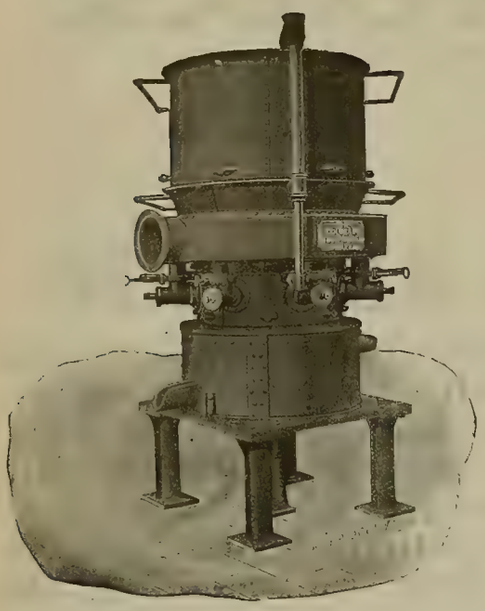

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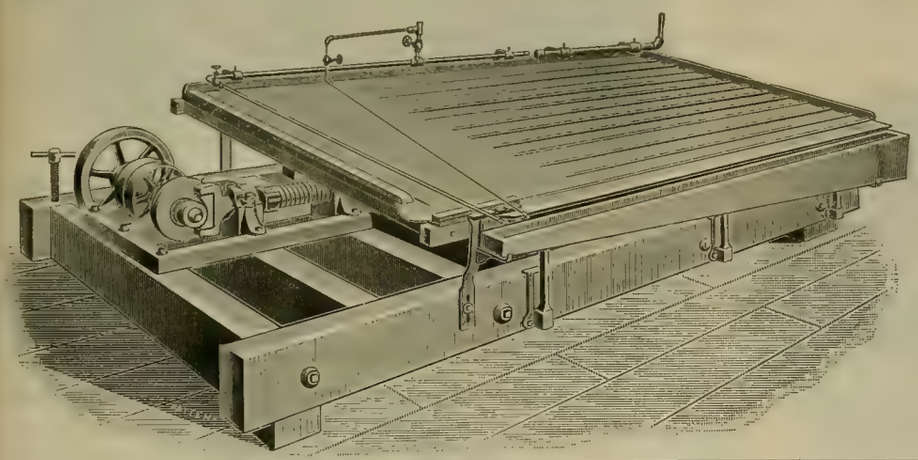

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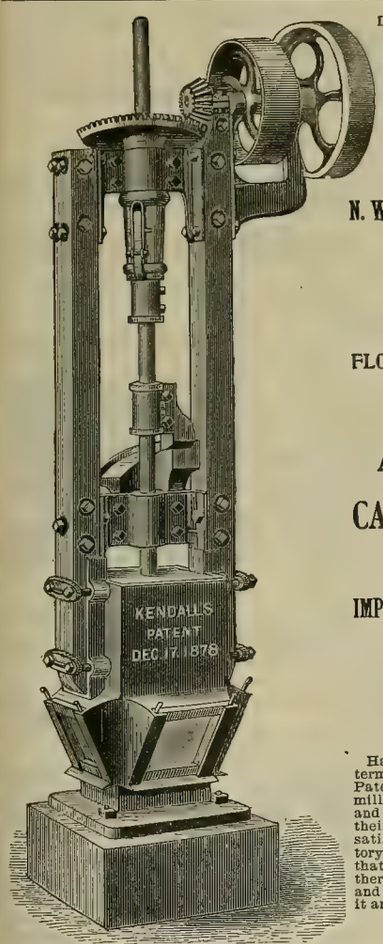

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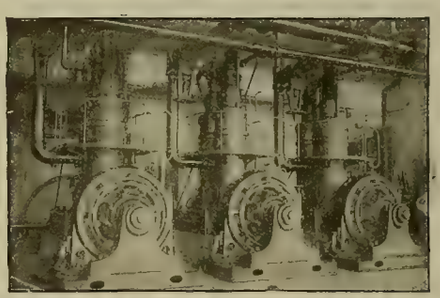

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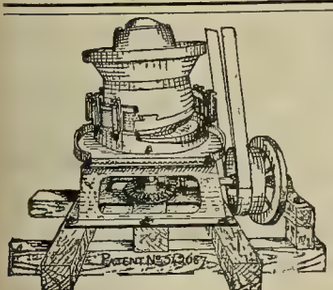

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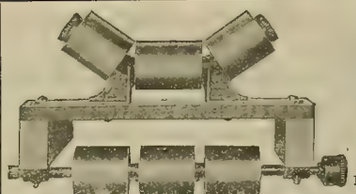

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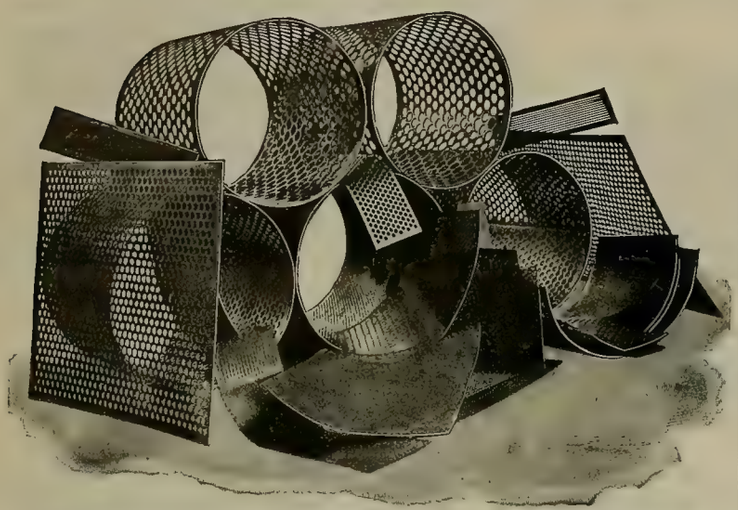

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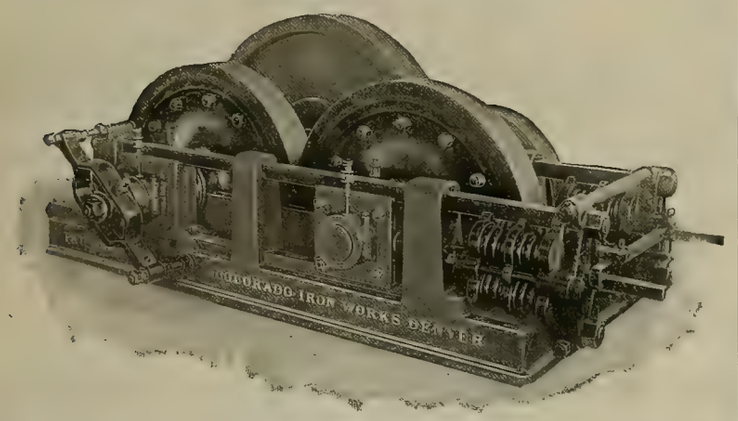

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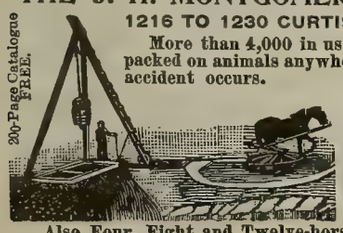

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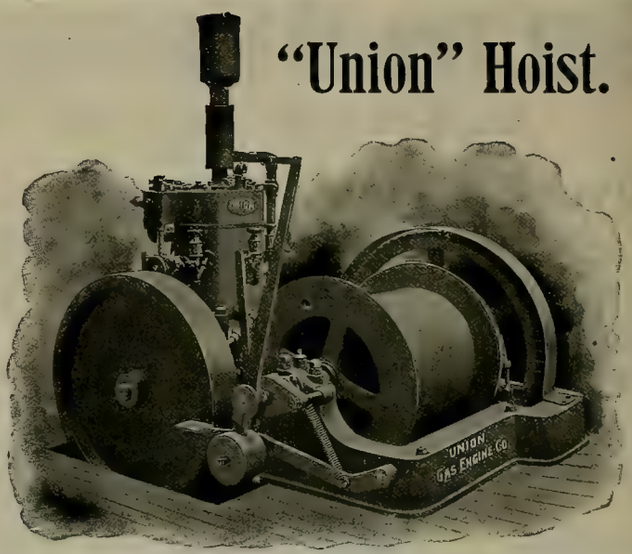

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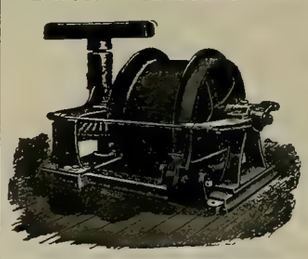

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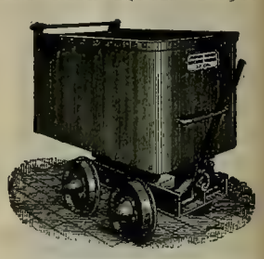

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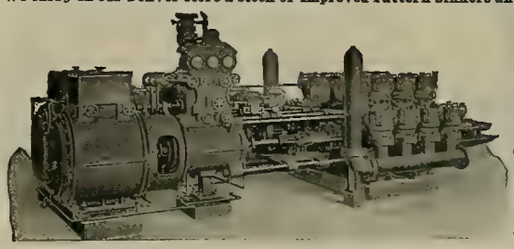

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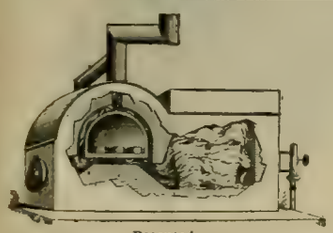
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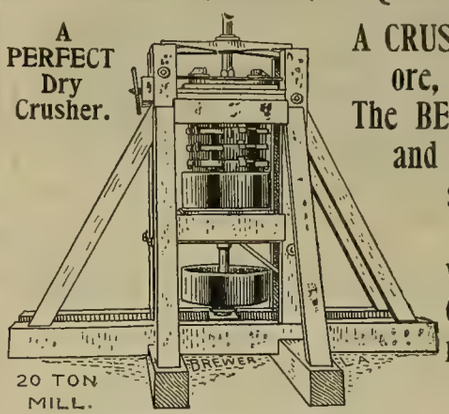

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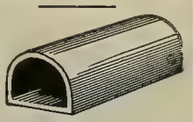

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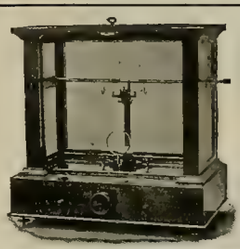

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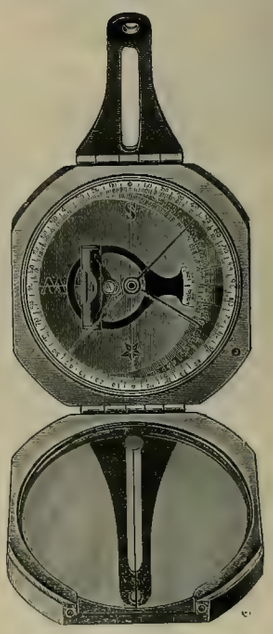

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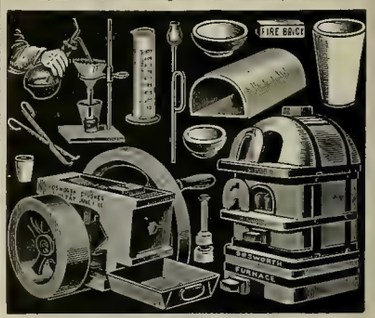

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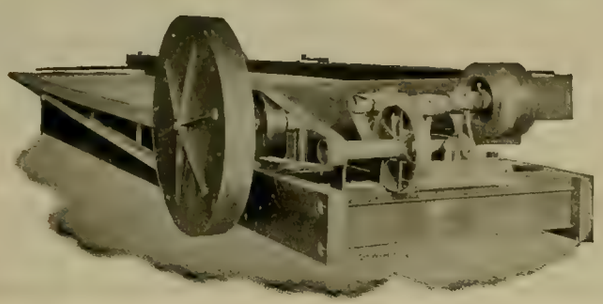

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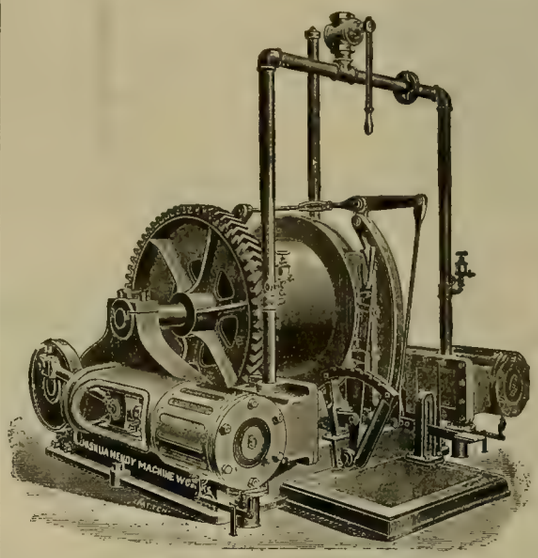

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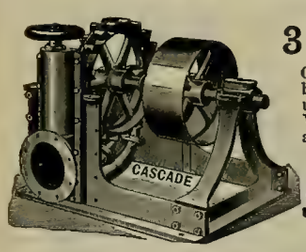

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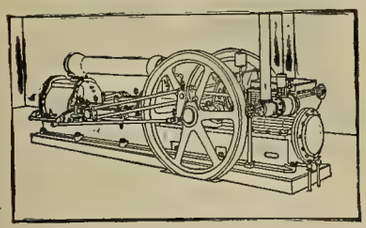

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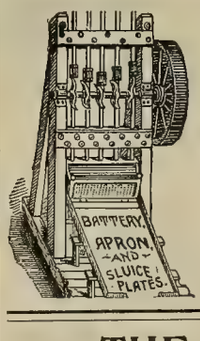

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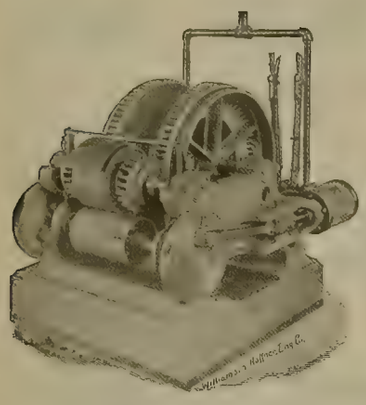

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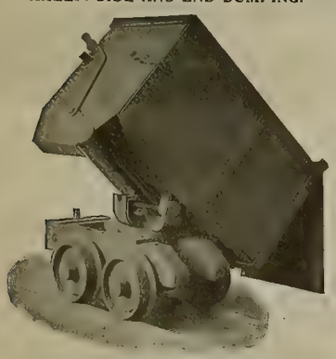

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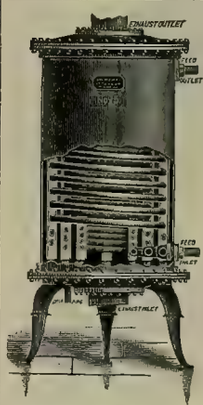

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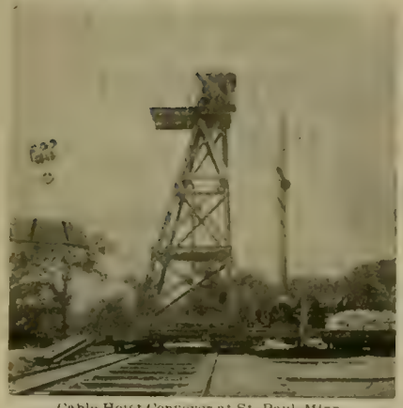

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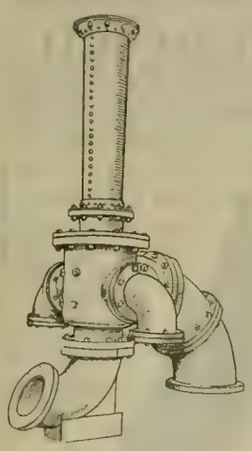

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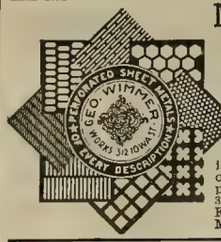

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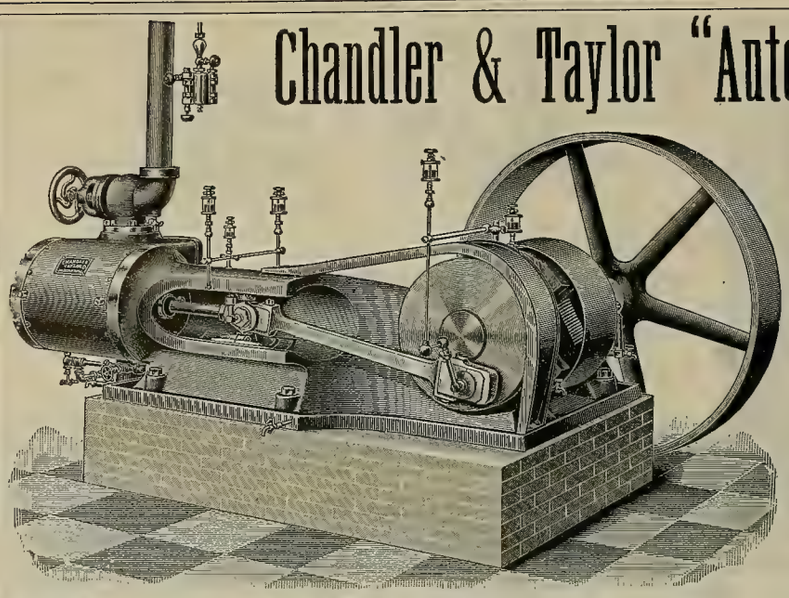

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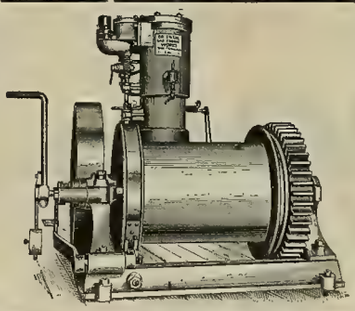

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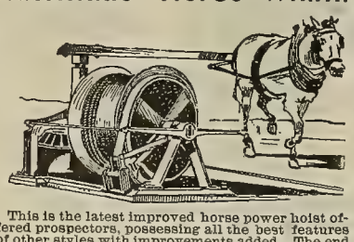

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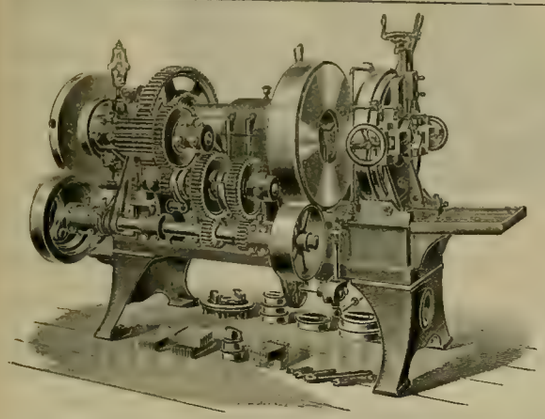

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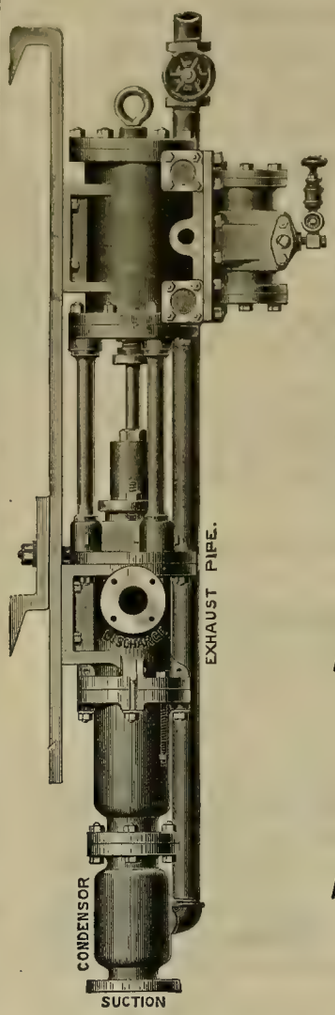

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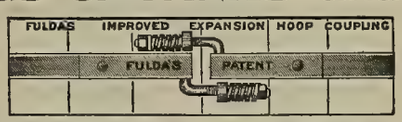

Our Patent Self-Tightening Hoop Coupling is the Only Practical Method of Keeping a Tank Tight at All Times Without Any Care or Trouble.

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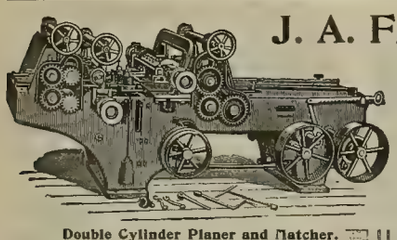

Double Cylinder Planer and Matcher.

J. A. FAY and EGAN CO.,
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Wood Working Machinery
— FOR —
Box Factories, Planing Mills,
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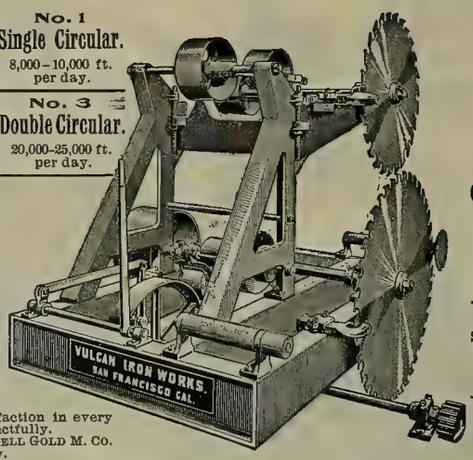
MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**
MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

Portable Saw Mills.

No. 0 Single Circular.	No. 1 Single Circular.
4000 - 6000 feet per day.	8,000 - 10,000 ft. per day.
No. 2 Double Circular.	**No. 3 Double Circular.**
15,000-20,000 ft. per day.	20,000-25,000 ft. per day.



Alaska Treadwell Gold Mining Co.
SAN FRANCISCO.
Feb. 20, 1896.

Vulcan Iron Works,

GENTLEMEN: Our Double Circular Saw Mill of about 20,000 feet daily capacity, for which you made plans and built the machinery complete, including a set of three 6-inch beam Vulcan Head Blocks, 60-inch opening, has given us complete satisfaction in every respect. Respectfully,
ALASKA TREADWELL GOLD M. CO.
A. T. CORBUS, Sec'y.

For
Mining Companies
—OR—
Other Consumers of Lumber at Remote Points.

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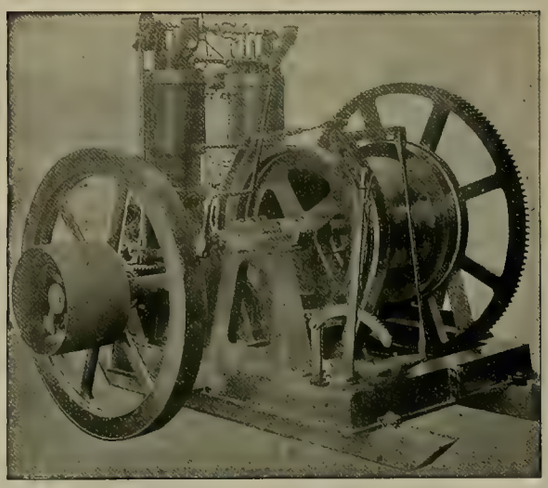
Manufactured by

VULCAN IRON WORKS, Office, 505 Mission Street, SAN FRANCISCO, CAL.

Improved Mining Hoist.



THE
Golden Gate Gas Engine
THE MOTIVE POWER.

Will Raise More Ore at Less Cost Than Any Other.

MANY IN USE
Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power Etc.

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SPADONE'S CONCENTRATOR BELTS.

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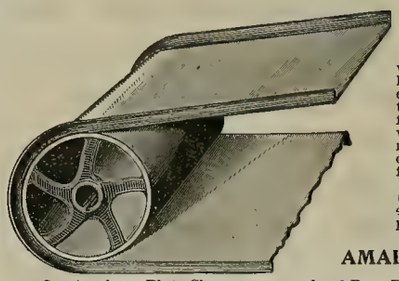


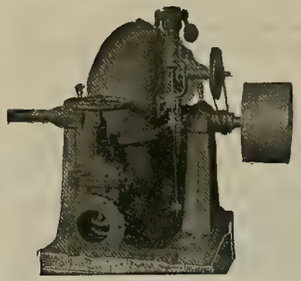
This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

AMALGAM PLATE CLEANERS.

Our Amalgam Plate Cleaners are made of Pure Rubber in moulds, thus insuring a plate cleaner which will not scratch the plates and a perfect edge which will clean the Amalgam plates evenly. They are made 6 inches long, 3 inches wide and ½ inch thick, making a convenient size to handle. Price by mail to any address, each 75 cents. Correspondence solicited.

Send us your order for Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING, RUBBER PACKING and LEATHER BELTING.

THE GUTTA PERCHA RUBBER AND M'F'G CO.,
30 and 32 FREMONT STREET, Telephone Main 1813. SAN FRANCISCO, CAL.



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Patent Water Wheels.

Don't buy any other until you have seen them and investigated their merits. We not only guarantee high efficiency and regulation, but obtain it in actual practice. Estimates and surveys made for the installation of Water Power Plants of all sizes and capacities.

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108 First Street,
Telephone 1007 Main. SAN FRANCISCO, CAL.

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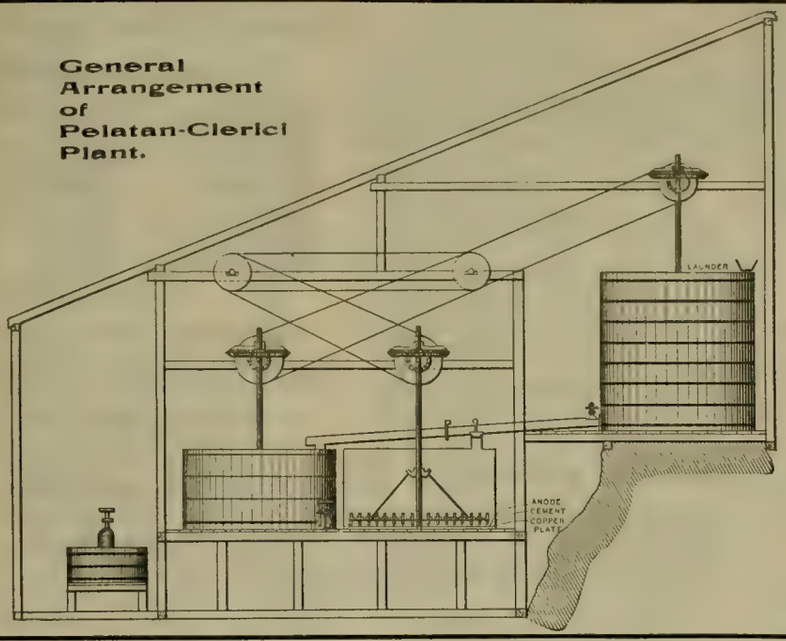
General Arrangement of Pelatan-Clerici Plant.



The "Pelatan-Clerici" Process

OF TREATING REFRACTORY ORES

Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

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AGENTS.

ADAMANTINE SHOES AND DIES.

CHROME CAST STEEL.

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

H. D. Morris Co.,
141 and 143 First Street, San Francisco, Cal.,
Pacific Coast Sales Agents.

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RAND ROCK DRILLS and Drill Mountings.

HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.

AIR —AND— Gas COMPRESSORS.

Standard Types! Special Patterns! All Sizes!

RAND DRILL CO., 100 BROADWAY, New York, U. S. A.

San Francisco Office: 141 & 143 FIRST STREET.

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

Suitable for all kinds of Excavating Work, making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co.
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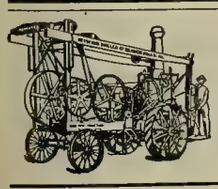
GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.



For Testing Placer Ground.

Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes.

Write for Catalogue and full information.

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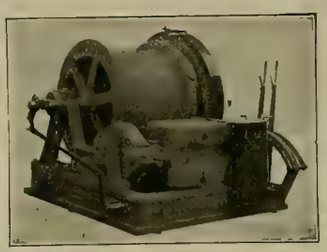
Standard of the World.



Hoist Driven by Electric Motor.

THE Economical Solution —OF THE— MINING PROBLEM.

PUMPS, HOISTS and LOCOMOTIVES.

REFRACTORY MINES RENDERED PROFITABLE.

GENERAL ELECTRIC COMPANY,

SAN FRANCISCO, CAL., Claus Spreckels Building.
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Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.

Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS, ELEVATOR BUCKETS & BOOTS, TAKEUPS, FRICTION CLUTCH PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

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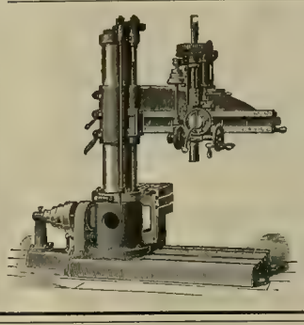
17 & 19 MAIN STREET - SAN FRANCISCO, CAL.



RADIAL DRILLING and TAPPING MACHINES.

To tap on a Radial Drill is not a success unless done with our PATENT TAPPING ATTACHMENT which is placed directly on the Drill spindle, and which is entirely automatic, no friction clutches or reverse belts. A guaranteed saving of from 50 to 75 per cent.

BICKFORD DRILL & TOOL CO.
CINCINNATI, OHIO, U. S. A.
HENSHAW, BULKLEY & CO., Agents, San Francisco, Cal.

DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

Market Reports.

SAN FRANCISCO, June 1, 1899.

SILVER.—London, 28 1-16d; New York, 61; San Francisco, 61; Mexican Dollars, 50@51½. New York exchange, sight, 15; telegraphic, 17¼ cents premium.

LEAD.—New York reports quiet, $4.45 bid, $4.50 asked; brokers' price, $4.25.

Local, pipe, 7¼@7½c; sheet, 7¼@8¾c; pig, 7c; bar, 7½c.

COPPER.—New York reports Lake dull at $18.50; brokers' price, $18.25@18.50; mill copper plates, 23¾c.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Pig, 31c per lb.; Bar, 35c. New York dull, $25.65 bid, $25.75 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $42; export, $38.50 @39; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

RED LEAD AND LITHARGE.—One ton and over, at one purchase, 6¼c; 500 lbs. and less than one ton, 6½c; less than 500 lbs., 7c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1⅓@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c @ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¾c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 17½c; Astral, 17½c; Star, 17½c; Eocene, 19¼c; Extra Star, 21¼c; Elaine, 23½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 13c; do., cs., 18c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 11½c; do., in cs., 16½c; Lard Oil, Extra Winter Strained, bbl., 56c; cs., 61c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 55c; cs., 60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia)	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 1, 1899.

9:30 A. M. SESSION.

500 Best & Belcher	50c	400 Mexican	44c
200 Con. Cal. & Va.	$1 70	100 Ophir	$1 10
300 Gould & Curry	29c	300 Overman	16c
50 Hale & Norcross	35c	300 Sierra Nevada	73c
100 Justice	17c		

2:30 P. M. SESSION.

100 Best & Belcher	49c	200 Utah	15c
100 Con. Cal. & Va.	$1 70	1000 Silver Hill	02c
200 H. & N.	36c	100 Andes	08c

Recent Mining Incorporations.

Petroleum Development Co., Los Angeles; capital stock, $125,000, subscribed $50,000: G. W. Nevin, G. Holterhoff Jr., H. J. Stevens, E. L. Doheny, Los Angeles, and A. B. Butler, Fresno.

Continental Oil and Development Co. of California, San Francisco; capital stock, $60,000, subscribed $24,500; Wm. Corbin, A. E. Rudell, E. E. Heill, San Francisco; L. Chambers, Visalia, and F. M. Chittenden, Fresno.

Goleta Mining Co., Montecito M. Co., Sterling M. Co., united under the name of Goleta M. Co., San Francisco; capital stock $300,000; J. F. Tichenor, J. A. Alexander, F. L. Underwood, New York City; M. McM. Weighl, L. Shorns, San Francisco, and G. H. Folsom and D. M. Kent, Oakland.

Laurel Gold M. and Development Co. of San Francisco; capital stock $100,000, subscribed $33,000; J. B. West, J. W. Richards, Souisbyville; H. Bohls, S. McMullen, W. Fass, San Francisco.

Elkhorn Oil Co., Selma, Fresno Co.; capital stock $670,000, subscribed $390,000; W. E. Walker, H. E. Corbett, H. J. Wells, C. L. Mercole, J. C. Dodson.

Martinez Oil Co., Fresno; capital stock $50,000, subscribed $30,000; M. Brody, G. A. Lion, C. Nelson, D. L. Ewing, T. C. Stillwean

Industrial Notes.

—The iron works at Hantgan, China, employ 2000 men. The plant cost $4,000,000. Only nineteen Europeans are employed.

—The Phœnix Bridge Co. of New York has received a contract from Japan to build a large steel bridge for the Imperial Railway. The bridge will weigh upwards of 1,000,000 pounds and will be the largest steel bridge ever contracted for by American builders.

—The Grand Central Railroad of England has ordered twenty American locomotives to be delivered during the current year. They are to be freight engines of the same character and design as those now under construction for the Midland Railway of England.—Boston Financial News.

Recently Declared Mining Dividends.

Sacramento M. Co., Utah, $5000; June 1.

Calumet & Hecla Copper M. Co., 111th dividend, $20; May 31. Total, $61,850,000.

Mead G. M. and M. Co, regular quarterly dividend No. 3, at rate of 40 cents per share per annum on issued stock of the company; June 1.

Boston and California G. M. and M. Co., regular quarterly dividend No. 2, at rate of 6 cents per share per annum on issued stock of the company; June 1.

Commercial Paragraphs.

THE Weigele Pipe Works of Denver reports an active season in supplying material for hydraulic works in Colorado and Wyoming.

THE Jeanesville Ironworks Co., Denver branch, A. Middlebrook Mgr., have shipped one of their high-lift, solid-end-pattern station pumps to Leadville.

THE Edward P. Allis Co. of Milwaukee have closed a contract for a 200-ton cyanide mill, to be shipped to Kalgoorlie, Western Australia. This includes a Reynolds-Corliss engine and three 12x121 feet Holthoff-Wethey furnaces, electric lighting plant, etc. Total weight about 800 tons.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated. EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

Cable address Edbee Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.

GRAHAM, GARRETT & CO.,

211-212 Peyton Block, SPOKANE, WASH.

MINE PROMOTERS AND BROKERS.

Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

Our specialities are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough s.

THE CALIFORNIA DEBRIS COMMISSION. HAVing received applications to mine by the hydraulic process from J. H. Southwick, in the North Hill Placer Mine, near Milton, Calaveras Co., to deposit tailings in Rich Gulch; from T. B. Bennett, in the Ohio Mine, near Wash. Plumas Co., to deposit tailings on a flat below the mine; from W. E. Duncan, Sr., in the York Ranch Placer Mine, near Spanish Ranch, Plumas Co., to deposit tailings on a flat below the mine; and from Alfred Schofield, in the Klondike Mine, at Whiskey Diggings, Sierra Co., to deposit tailings behind the dam of the Washington Mine in Slate Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on June 12, 1899, at 1:30 P. M.

Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

WANTED.

Position as Assayer and Bookkeeper.

References: A. H. Hanks, Baldwin & Howell, S. F. Address W. B. HOAG, Berkeley, Cal.

Mine Foreman Desires Position.

Competent and reliable. Understands development work, drafting, assaying. Speaks Spanish. References. Address Box 834, Los Angeles, Cal.

OPEN FOR ENGAGEMENT.

A Mining Engineer, Geologist and Metallurgist; associate of the Royal School of Mines, London; first-class Government certificated mine manager, England, (39) is open to an engagement with responsible gold or copper-producing company as General Manager or Superintendent. Has had 21 years' practical experience in all branches of mining work and held the position of Manager at some of the largest and most important mines both in Europe and this country. Highest testimonials and references. Address "QUARTZ," care of Mining and Scientific Press, San Francisco.

WANTED---Stamp Mill Tailings.

Will buy or work on shares. State quantity, value, character and terms. Address C. R. P., care Mining and Scientific Press.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.

For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

MINING PROPERTIES.

Capital wanted to continue development on partially developed, promising mine. Will give an interest or bond, with option for purchase. Near good ore market. Also a group of six claims, developed, ready for mill. Likewise a partially developed prospect containing eight ledges, smelting character, near ore market.

J. N. ROSA, BOX 5,.....SHASTA, CAL.

Slocan, Rossland and Republic Mining Stocks

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For reliable information, write to

JOHN HAWLEY, - Vancouver, B. C.

Codes used: Clough's and Moring & Neal.

REPUBLIC and ROSSLAND Mining Stocks

Bought and sold for non-residents. SOLID DIVIDEND PAYERS as an investment. Prospective producers as a speculation. Write for information.

H. P. PALMER & CO.,

Ecxhange Nat. Bank Bldg., SPOKANE, WASH.

..CRIPPLE : CREEK..

FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MacBETH, Equitable Building, Denver, Colorado.

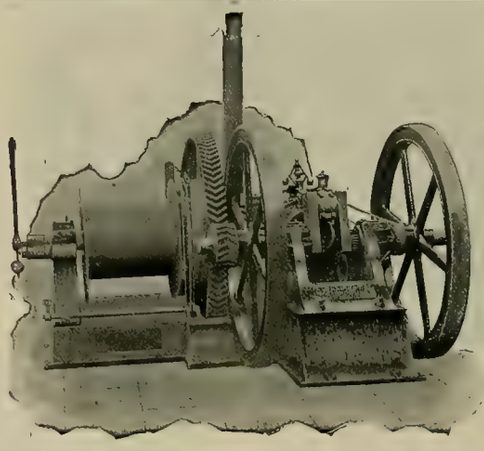
Quicksilver

—FOR SALE BY—

The Eureka Company,

OF SAN FRANCISCO.

ROOM 1, · 426 CALIFORNIA STREET, SAN FRANCISCO.



FRESNO, June 25, 1898.

Hercules Gas Engine Works.
San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,

305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,

MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,

ALSO REPAIR AND JOB WORK OF ANY KIND.

Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.

509-511 Howard St., - San Francisco.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

POWELL'S GREASE CUPS.

Large Variety. For Every Requirement.

FEED adjustable the **entire length** of Cup.

CUT-OFF in base regulates the flow.

Any Supply House on the Pacific coast can furnish them.

The Wm. Powell Co., Cincinnati, O.
Manufacturers.

Assessment Notices.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of May, 1899, an assessment (No. 2) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 23th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of May, 1899, an assessment (No. 13) of Ten Cents (10c.) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of June, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California.

The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of May, 1899, an assessment (No. 19) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of June, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3rd day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, Cal.

BOULDER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1899, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 27th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building. San Francisco, California.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

BADGER HILL AND CHEROKEE GRAVEL MINING Company.—Location of principal place of business, San Francisco, California; location of works, Cherokee, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of May, 1899, an assessment of Three Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 27th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1899, an assessment (No. 3) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 11th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson street, San Francisco, Cal.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of May, 1899, an assessment (No. 12) of two cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3d day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary.

Office—Room 9, 320 Sansome street, San Francisco, California.

Stockholders' Meeting.

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines.—In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated mines, a meeting of the stockholders of this company will be held at 11 o'clock in the forenoon on WEDNESDAY, the 12th day of July, 1899, at its principal office, 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Hundred Thousand ($200,000.00) Dollars in 200,000 shares at the par value of One Dollar each.

Dated: San Francisco, May 25th, 1899.

JOSEPH H. MOOSER, Secretary.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the NATIONAL CON. MINING CO. will be held at the office of the Company, 773 Mission St., San Francisco, California, on MONDAY, the 5th day of June, 1899, at the hour of 8 P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

SPECIAL MEETING.—A special meeting of the stockholders of the Electric Placer Mining Co. will be held at the office of the company, 204 McAllister street, room 12, San Francisco, Cal., on SATURDAY, June 17th, 1899, at 2 o'clock P. M.

A. R. VINING, Secretary.

DIVIDEND NOTICE.

Mead Gold Mining and Milling Co.—A regular quarterly dividend (No. 3) at the rate of forty (40) per cent per annum on the par value of the issued capital stock of the company has been declared, payable after June 1, 1899, at the office of the company, 411 Claus Spreckels building, San Francisco. Transfer books close May 28, 1899.

J. C. JENS, President.

G. GALL, Secretary.

DIVIDEND NOTICE.

Boston & California Gold Mining and Milling Co.—A regular quarterly dividend (No. 2) at the rate of six (6) per cent per annum on the par value of the issued capital stock of the company has been declared, payable after June 1, 1899, at the office of the company, 411 Claus Spreckels building, San Francisco. Transfer books close May 28, 1899.

J. C. JENS, President.

G. GALL, Secretary.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork All communications *strictly confidential.*

DELINQUENT SALE NOTICE.

HEAD CENTRE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. S. Parsons, Trustee	108	100	$20 00
H. B. Parsons, Trustee	112	100	20 00
H. B. Parsons, Trustee	116	100	20 00
H. B. Parsons, Trustee	145	100	20 00
H. B. Parsons, Trustee	152	100	20 00
J. W. Pew, Trustee	348	500	100 00
S. B. Wakefield	361	3	60
J. W. Pew, Trustee	384	100	20 00
J. W. Pew, Trustee	389	100	20 00
J. W. Pew, Trustee	390	50	10 00
J. W. Pew, Trustee	403	100	20 00
J. W. Pew, Trustee	504	5	1 00
J. W. Pew, Trustee	536	50	10 00
G. B. Root, Trustee	564	20	4 00
G. B. Bayley, Trustee	674	50	10 00
J. W. Pew, Trustee	710	100	20 00
J. W. Pew, Trustee	711	100	20 00
J. W. Pew, Trustee	712	100	20 00
E. B. Deane, Trustee	717	100	20 00
S. Iglauer, Trustee	820	100	20 00
H. H. Shinn, Trustee	873	700	140 00
F. A. Benjamin	875	5	1 00
W. Steele, Trustee	890	500	100 00
J. W. Pew, Trustee	893	50	10 00
J. W. Pew, Trustee	905	100	20 00
H. W. Hasselgren	908	100	20 00
H. W. Hasselgren	909	100	20 00
Peter Lane	910	630	126 00
M. Rehfisch, Trustee	917	1,250	250 00
M. Rehfisch, Trustee	918	1,250	250 00
M. Rehfisch, Trustee	922	300	60 00
M. Rehfisch, Trustee	923	200	40 00
M. Rehfisch, Trustee	924	400	80 00
J. W. Pew	946	1,333	266 60
John Sinclair	951	500	100 00
A. W. Foster	957	8,000	160 00
A. W. Foster	958	4,000	80 00
Rehfisch & Co., Trustees	960	100	20 00
Jas. Rolph, Trustee	968	500	100 00
S. B. Wakefield & Co., Trust's	969	1,500	300 00
S. B. Wakefield & Co., Trust's	971	3,833	766 60
J. W. Pew, Trustee	975	400	80 00
J. W. Pew, Trustee	989	40	8 00
A. W. Foster	1010	3,000	600 00

And in accordance with law, and an order of the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

POSTPONEMENT.

The day of sale of the delinquent stock of the above named company is hereby postponed to MONDAY, June 12th, 1899, at the same time and place. By order of the Board of Directors.

J. W. PEW, Secretary.

Trade Mark. Trade Mark.

SCHOTT & GEN. JENA SCHOTT & GEN. JENA

Jena Normal Glass,

THE BEST LABORATORY WARE MADE.

Everything necessary for the

Assayer and Chemist

will be furnished of best quality at *reasonable prices.*

UNEXCELLED BALANCES, WEIGHTS AND PLATINUM.

EIMER & AMEND,

205-211 Third Ave., NEW YORK.

THE ROESSLER & HASSLACHER CHEMICAL CO.

100 William Street, New York.

THE ROESSLER & HASSLACHER CHEMICAL COMPANY CHEMISTS NEW YORK TRADE MARK

CYANIDE

Peroxide of Sodium

Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And other Chemicals for Mining Purposes.

MICHIGAN COLLEGE OF MINES.

A State Technical School. Practical work. Elective System. Summer term. Every graduate employed. For catalogues, showing occupation of graduates, address *Michigan College of Mines,* Houghton, Mich.

Weber Hoists.

6 to 100 H. P.

Cost to Run, 1c per hour per H. P.

All Latest Improvements.
Get Catalogue.

WEBER GAS ENGINE CO.,
430 S. W. Boulevard, Kansas City, Mo.

THE "Pneumatic" Cyanide Process.

(Patented in United States, South African Republic, New Zealand, Victoria, New South Wales, South Australia; other patents pending.)

Supplies the solution with the oxygen required for perfect extraction. Prevents settling, packing and channelling. Heats the solution and prevents freezing in winter. Doubles the capacity by requiring less than one-half the usual time. Saves the highest percentage of values at the lowest cost per ton. *"Mill rights" sold direct to users; no royalties.*

Send for pamphlet to THE PNEUMATIC CYANIDE PROCESS CO.,
306 BOSTON BUILDING, DENVER, COLO.

For Valves, Whistles, Lubricators, Oil Cups, Grease Cups, Oiling Devices, Brass and Iron Steam Specialties, Go to Headquarters. BRANCHES: NEW YORK, LONDON. GENERAL OFFICES AND FACTORIES.

ALL goods bearing the name "Lunkenheimer" are warranted first-class, and endorsed by intelligent steam-users everywhere. Specify "Lunkenheimer" make. Our catalogue will post you. Write for one.

The Lunkenheimer Company, Cincinnati, U. S. A.

RIVETED SHEET STEEL WATER PIPE

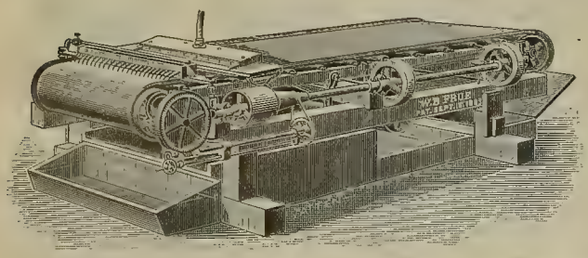
For Placers, Water Powers, Irrigation, Etc.

THE WEIGELE PIPE WORKS

2949-51 Larimer St. DENVER, COLO.

FOUR and SIX-FOOT FRUE VANNERS

With Brownell "Patent Lip" Flange Belts.



STANDARD MACHINE OF THE WORLD.

When a Concentrator like the Frue Vanner has been on the market nearly two decades, and the sales have constantly increased, it is safe to say it is the "Standard Machine of the World." More Frue Vanners have been sold during the last twelve months than for the same period at any time during the history of the machine. Practical mining men in all parts of the world where mining is carried on will testify as to its merits. It is the "standard" which all competitors are trying to imitate.

The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

FOR DESCRIPTIVE PAMPHLETS, ADDRESS

J. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.,

132 MARKET STREET, (Successor to Adams & Carter.) SAN FRANCISCO, CAL.

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leibers.

—MANUFACTURERS OF—

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines
OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

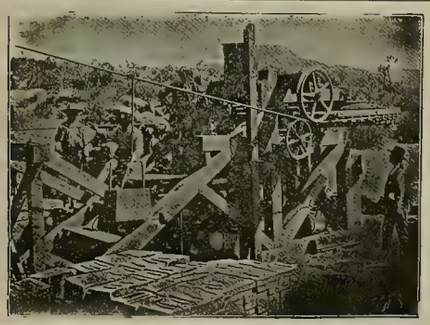
Send for Dredging Catalogues Nos. 15 and 16.

WE ALSO BUILD

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.



THE HALLIDIE ROPEWAY

For transporting Ore, Fuel, Merchandise, etc., in bulk or in packages. SIMPLE, ECONOMICAL, INEXPENSIVE, PRACTICAL.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY. Send for Ropeway Pamphlet No. 20.

THE CALHOUN EXCAVATOR.

A COMBINED POWER-SHOVEL AND CABLEWAY.
.....Ask for Circular.....

Cableways,
Double Rope Tramways,
Wire Rope Transmissions,
Incline Planes,
Logging Machinery,
Suspension Bridges,

DESIGNED, FURNISHED, ERECTED. Write for Estimates.

CALIFORNIA WIRE WORKS, - 330 Market St., San Francisco, Cal.

THE BARTLETT CONCENTRATING TABLE.

One of these Machines will take the place of TWO or THREE Belt Concentrators of any make and do as good work.

Separates ALL the minerals from each other at one operation.

Gives THREE CONCENTRATES on the one Machine at the same operation.

The Machine is especially adapted to the separation of Zinc and Lead.

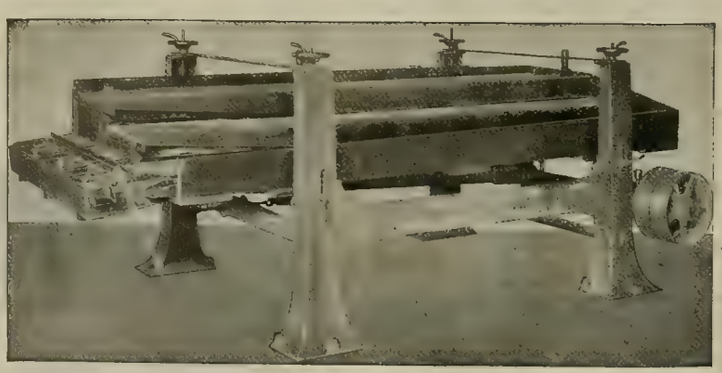
- PRICES: -

10-ft. Table, $300.

12-ft. " $350.

WEIGHTS.....1000 and 1200 respectively.

CAPACITY.....10 to 30 tons per 24 hours.



TWO SIZES OF MACHINES ARE MADE.

Table B, 6 into 1 to 16 into 1.
Table C, 12 into 1 to 32 into 1.

Parties desiring tests made can send 500 lbs. or more, charges prepaid, and a run will be made and reports forwarded of the results, free of all charges, except for the assays, which will not exceed $10.00.

CAN BE SET UP ANYWHERE.
REQUIRES NO SPECIAL FOUNDATION.

Licensee for the Manufacture and Sale, **PARKE & LACY CO.,** 21 & 23 FREMONT STREET, San Francisco, Cal.

AGENT FOR KNOWLES PUMPS and PULSOMETER PUMPS,
INGERSOLL-SERGEANT ROCK DRILLS and AIR COMPRESSORS.

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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2031.—VOLUME LXXVIII. Number 23. SAN FRANCISCO, SATURDAY, JUNE 10, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Cyanide Process.

How general the application of the cyanide process will become is a matter for the future to determine. In its early history it was thought that it could be successfully applied to almost every class of ore, but it was soon demonstrated that this was not a fact; the tide turned in the other direction and it was then thought that its range of application was limited to a few ores particularly adapted to it. Since then several years of experiment and successful application has broadened its field of operation very materially and at this time it cannot be said with assurance that it will not cover a still wider field.

In no other place, perhaps, has an absolute confidence in its ultimate success been better demonstrated than in Montana. After repeated and expensive failure every difficulty has been overcome in several localities, and where first it was an absolute failure it is now an unqualified success.

Experiments are constantly being made in the chemistry of the process and in its mechanical application. It has long since become evident that no one method will make it applicable to all ores or all conditions, but the process is a rational one and one which will not only endure, but will find much improvement in the future. The precipitation of gold on shavings, threads and granulated particles of zinc is not all that can be desired, but improvements may still be anticipated in this branch of the process. Electricity in some modifications of the process is already playing an important part and further development may be looked for in this direction.

Slimes of the most dense and impervious character are now successfully treated by agitation and decantation where vacuum filters and pressure tanks failed absolutely to produce the desired results. The illustration on this page of the agitator in a Montana mill shows one phase of the process in the treatment of slimes which will be found described on page 609. The contrivance used to secure a uniform agitation of the pulp is another ingenious device—the outcome of the necessities of the case. These are only isolated examples which exemplify the fertility of resource of the men who have made and are still making the history of the cyanide process.

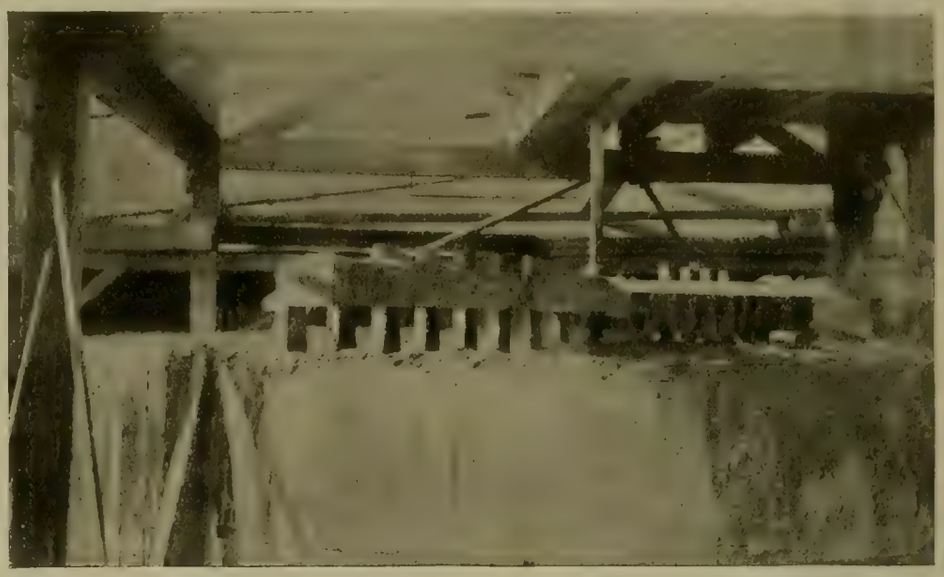

FIG. 3.—AGITATOR IN MOTION, FULL TO THE BRIM. (See page 612.)

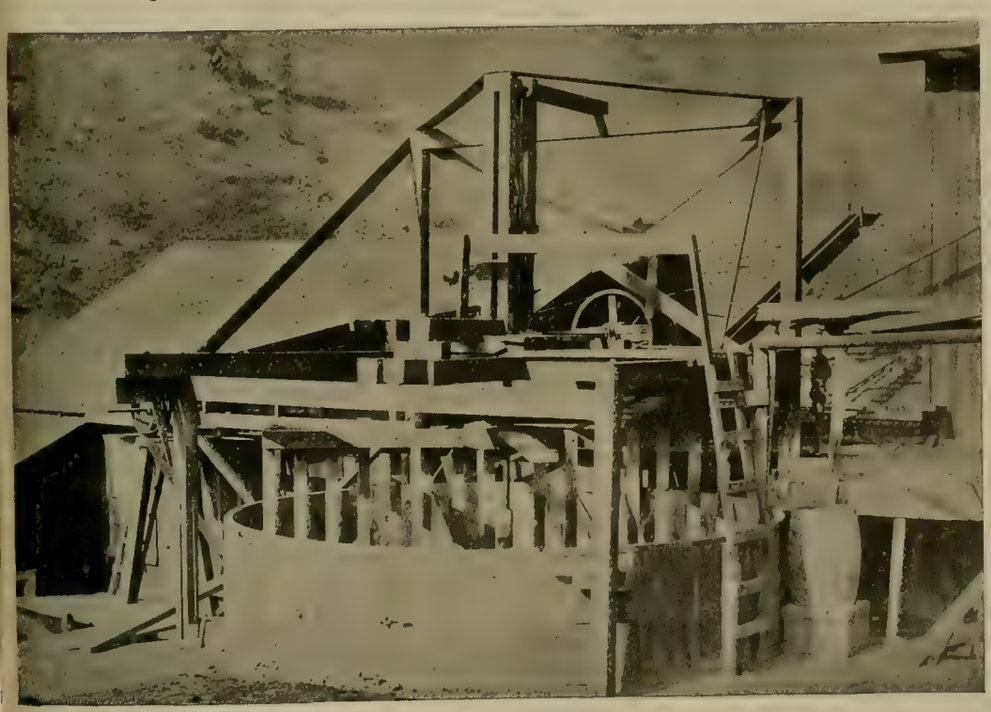

FIG. 2.—AGITATOR, READY TO LOAD, MOHEGAN MILL, MONTANA. (See page 612.)

Searching for Diamonds.

Considerable interest has been taken of late by geologists and scientific men generally in the occurrence and probable origin of diamonds. They are known to have a very wide distribution in numerous countries of the world, but under apparently greatly varying conditions. There seems to be little in common in the genesis of the South African gems and those of Brazil. In the aggregate a large number of diamonds have been found it California placer mines and there is not the slightest doubt that many more would have been obtained had miners been searching for them. All, or nearly all found to this date, were accidently discovered, no systematic effort to find them ever having been made. If it can be determined by scientific investigation what really is the genesis of the diamond—how it was formed and under what conditions to expect to find it, search for it in new fields might result in its discovery elsewhere. In California the diamond has been found in regions in which serpentine is more or less abundant, and in this regard it suggests an approach to the South African occurrence where the matrix is essentially serpentine or rock of similar lithological character. In America and in Brazil the diamond is usually found in a region tributary to coarse crystalline rocks, as pegmatite granite veins, and a certain micaceous sandstone noted for being flexible. This latter is common in the Brazil diamond fields, and it has also been found in the ancient river channels of California, notably in the Happy valley channel a mile east of Mokelumne Hill in Calaveras county, though no diamonds are reported from that vicinity. This channel, however, undoubtedly came from the direction of Rancheria and Volcano in Amador county, where diamonds were found. The channels where diamonds were discovered near these last named localities are filled with metamorphic rocks, chiefly schists, quartzites, etc., characteristic of the Calaveras formation.

As diamonds in California up to this time have been found by merest accidents, it is not unreasonable to believe a more careful search of the material of the sluices by miners may result in finding larger and more valuable gems than have yet been discovered in this State. The value of diamonds found in the State thus far aggregates several thousand dollars.

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PROSPECTORS in Calaveras county, Cal., have again demonstrated the usefulness of the well-boring drill in prospecting for gravel near Camanche, where in a hole 160 feet in depth they have discovered 20 feet of gold-bearing gravel.

AN effort is being made by Secretary Hay to reach an agreement with England which will temporarily, at least, arrange the disputed boundary question in Alaska, so as to end the existing trouble between American and English miners.

A CORRESPONDENT of the London *Mining Journal* insists that his estimate that $250,000,000 lie in the auriferous belt south of Bendigo, Australia, is too small, and he believes that an estimate of $1,000,000,000 in the mines of Victoria wholly within bounds.

BRITISH COLUMBIA miners in several camps have walked out, refusing to stand the cut in wages which followed the introduction of the eight-hour law. Thus far no trouble is reported. There is no objection on the part of the miners to the eight-hour shift but they demand the same pay for eight hours that they have previously received for ten.

A MORE complicated condition of affairs than appears to exist in the veins of Rossland, B. C., it would be difficult to find. The veins vary greatly in strike and dip and are dislocated by at least two series of faults, which do not tend to simplify matters. Where such a complex exists the extra-lateral right law is almost sure to result in litigation if there are adjoining interests.

THE statement of the president of a prominent Colorado mine which has paid several dividends and in which rich strikes were reported not long since, that the lower levels are looking badly and that the ore, while there in great quantity, is too low grade to pay, seems for some reason to be viewed by the public of Colorado with suspicion. Such candid statements, they argue, are unnatural.

THE idle, restless element which is usually found in mining camps everywhere in the western part of the United States have a choice of three fields to "rush to" this season, and although a great many are on the move the rush has in no case yet reached the proportions of a stampede. The three new fields are La Cerro Pintado in Lower California, Cape Nome in Alaska, and the Buffalo Hump field in Idaho. At this writing it is difficult to say which place will receive the most attention, but large numbers are already going to each of these fields.

The Cost of Mining.

A question frequently asked is, "How cheaply can a mine be worked in California?" There are so many factors entering into the economy of mine equipment, development and management that no arbitrary answer can be given this question. An important consideration is the width of the vein. Another question of almost equal importance is the character of the rock, whether hard or soft, easily supported or requiring close and immediate filling. Still another consideration of great importance is the manner of recovering the ore bodies, whether by means of tunnels or through shafts. The quantity of water, cost of timber, cost of labor and supplies, distance from mine to mill, kind of motive power and its cost—all of these are important considerations which have a direct bearing on the cost of mining. The beneficiation of the ore is a distinct branch and a large number of conditions have to be considered. Here the hardness of the ore has a direct effect on crushing capacity, but large capacity per stamp is not always productive of the best results. The fineness of the gold or its association with other minerals determines in a large measure the capacity of the mill. A free milling quartz can be milled more cheaply than one which is only partly free and requires concentration or other subsequent treatment. Some ores cannot be successfully milled at all, or at least milling cannot successfully compete with smelting.

To obtain the best results at the lowest cost is the object throughout, and to accomplish this result requires a careful consideration of equipment and methods of mining to be pursued. The ore, having been brought to the surface with as little handling as possible, should reach the mill as quickly as possible, and when dumped on the grizzlies it should pass automatically downward by gravity from one operation to another, until the pulp passes to waste down the gulch, having been relieved of all the precious metal it is economy to extract. Under favorable circumstances mines have been operated in California at less than 50 cents per ton, this covering all cost of mining, milling, etc., but in these operations the ore bodies were extensive and were mined in the open cuts; the tonnage per stamp was large, the rock an ideal free milling material, and the power employed free water.

An Official Location Notice.

Some weeks ago the MINING AND SCIENTIFIC PRESS suggested the advisability of the California State Miners' Association taking up the matter of the location of mines and simplifying this vexing problem of the prospector by the drafting of blank location notices of simple and proper form, which would at once become a recognized authority, and all locations made under them would be made in similar manner and thus would be avoided much of the litigation arising from improper location of claims. The California State Miners' Association has acted in this matter, and, as a result of the labor of Secretary E. H. Benjamin and the attorney for the Association, blanks have been drawn which have passed through and stood the test of the Supreme Court of the State. The blanks are of three kinds—for quartz and placer mine locations and for mill sites. They will soon be ready and may be had by members of the Association in good standing without cost upon application to the secretary.

ARIZONA has of late been enjoying something of a boom in mining. Ten years ago there were only a few gold mines in the entire Territory paying and now there are a number in each of several counties of the Territory. The hills east and southeast of Prescott are full of veins containing gold and silver ores and near the head of the Hassayampa copper also is prominent. There are a few mines developed to a point that would be called deep in other mining regions. The mines of Arizona without doubt will be found to go as deep as mines elsewhere. The fact that large amounts of gold have been found on the surface of the ground and near it is due more to the peculiar climatic conditions, particularly the character of the rainfall, than to any peculiarity of the geology of the region. All along the Hassayampa creek; in the Bradshaws, on the Santa Maria and near the Agua Fria, gold and silver veins are known which require development to prove their real worth and in many cases the surface prospects justify the expense.

THE largest increase in exports of manufactures from the United States is in iron and steel and manufactures thereof. The recent advance in prices of iron and steel led many to believe that our exports in those lines would fall off, but it appears that prices abroad have advanced in about the same proportion as in the United States, and that consequently the increase in price rather increased the number of dollars worth of material exported. At least the figures of the Treasury Bureau of Statistics show that in the ten months ending with April, '99, the exports of iron and steel and manufactures thereof have amounted to $76,251,736, against $56,264,165 in the corresponding ten months of '98, $46,565,116 in the corresponding months of '97, and $33,365,674 in the ten months of '96. Thus exports of iron and steel have increased 35% in the past year and have considerably more than doubled in four years.

AMERICAN manufacturers, particularly in the iron industries, are leading the world in the competitive race for trade. The secret of the largely increased foreign trade lies in the fact that they study the wants of the customers they desire to secure, and if standard shapes and sizes do not suit, the American manufacturer will make those which will suit. A London industrial journal says that "British manufacturers have lost two important orders for South Africa. Galvanized barb wire is in great demand, and America put in a price 20% below ours. For 40,000 tons of rails they got below our price to the same extent, and a large order for tubing was captured from a Scotch firm, who refused to make them in longer lengths than usual. These orders reached the total of half a million, and there are others of even greater value to follow shortly."

THE American Institute of Mining Engineers will convene in San Francisco, Cal., on Sept. 25th, '99. Arrangements for their reception and entertainment while in this State are being rapidly perfected and it will without doubt be one of the most pleasureable meetings ever held by the Institute. Arrangements have been made to have the members visit and inspect a number of the most important mining districts of this State and on their return eastward those who desire will have an opportunity to see some of the most important mines of Arizona. While in California several side trips to Yosemite, Big Trees and other points of interest are planned.

A PROPOSITION is before the State Legislature of Michigan in the form of a bill providing for a tax upon copper output, the terms of which are as follows: On mines producing over 50,000,000 pounds of copper per year, ½ cent per pound; on mines producing 10,000,000 to 50,000,000 pounds, ¼ cent per pound; on mines producing between 5,000,000 and 10,000,000 pounds, ⅛ cent per pound, and on mines producing less than 5,000,000 pounds, $\frac{1}{16}$ cent per pound. Whether the purpose of the bill is for revenue only or for other purposes of a political nature cannot be stated but the copper companies will offer a vigorous resistance to the proposed legislation.

WITH practically no exception, the system of eight-hour shifts was inaugurated in Colorado mines on June 1st. In many cases the plan was previously in vogue and needed no change. Thus far the wages remain generally the same for a day of eight hours as they formerly were for ten hours. The only exception noted is at Ward, Boulder county, where the scale by the hour effected a slight reduction per day. The result was a declination on the part of the miners to go to work.

ALUMINUM wires for transmission of electric currents have commenced to come into use and threaten to displace the further employment of copper for this purpose. The cost of the aluminum wire is 36 cents per pound and that of copper wire about 20 cents. As forty-seven pounds of aluminum wire can be made to replace 100 pounds of copper wire, it will repay some electric companies to replace their copper lines with aluminum, leaving a profit from the sale of the copper.

Concentrates.

IN electricity mica is occasionally employed as an insulator.

HYDRAULIC sizers are of inestimable value in concentrating ores.

WATER in a state of rest exerts pressure equally in all directions.

NATIVE LEAD is found in a few places only. It is claimed to have been found in Canada.

IN California twenty-eight mines, after an idleness of years, have been reopened successfully.

ON Sulphur creek, California, in Lake county, cinnabar is found in commercial quantities in basalt.

ANY inaccuracy in the survey of a mining claim may be investigated through the office of the Surveyor General.

CLAY is an aluminous silicate. Bauxite is an oxide of alumina and is used chiefly in the manufacture of aluminum.

WROUGHT-IRON pipe for carrying water should be coated outside and inside with asphaltum or coal tar or it will be short lived.

NO SAMPLE is of value which does not exactly represent the condition of the vein at the place where such sample was taken.

AN acre of land is about 208.7 feet square and contains 43,560 cubic feet. There are 20.661+ acres in a mining claim 1500x600 feet.

IT is said that rods of soft iron, when having stood in vertical position many years—as bars on a window—become magnetized.

AN automobile wagon recently made the trip from Cleveland, Ohio, to Albany, New York, a distance of 546 miles in thirty-seven hours and forty minutes.

THE only important tin producing region of Europe at present is Cornwall, England. Tin is also produced in Germany, Spain, Portugal and Finland.

A DEVICE has been invented to transmit messages electrically without the aid of wires, flashes of light being substituted for the sounder of the telegraph instrument.

YUCCA has been used to support ground in mine excavations in a few instances only on the Mojave desert. The ground and country are very dry and the rock stands well without timber.

THE surface velocity of water running in a flume or ditch of uniform size may be used to determine its volume of discharge, approximately, by multiplying the velocity by the average cross section.

THE courts have ruled that it is erroneous in making mining locations to make the end lines of a claim overlap the end lines of a claim previously located, for the purpose of making the end lines parallel.

CANVAS can be made waterproof by applying a mixture of gelatine, 50 grammes, boiled in 3 liters of water; alum, 100 grammes, dissolved in three liters of water; soda soap dissolved is 2 liters of water.

THE pressure of water on the sides of a vessel is equal to the weight of a column of water whose base is equal to the area of the side of the vessel, and whose height is equal to one-half the depth of the liquid.

AN armature is a mass of iron or steel, or a collection of pieces of iron designed to be acted upon by a magnet. Nickel and cobalt may also be used for the same purpose, but are not, excepting in experimental work.

A CAP SILL is a timber sometimes used in the square set system, and is so placed that one end rests in a hitch cut into the foot wall, the opposite end being placed on a post, and performing the functions of a cap.

A MONTANA court has fined the Anaconda Copper Co. $300 for failure to provide their mine cages with hoods for the protection of men. This is the minimum penalty. The company will appeal the case on a technicality.

IT is customary to have the riffles in a well-constructed sluice somewhat higher in the center than at the sides, for the reason that the largest amount of boulders and gravel travels along the center, where the current is greatest.

THE use of large timbers in the square set system has been largely discontinued, those of smaller dimensions being substituted, followed by filling, it having been demonstrated that no amount of timber will sustain the weight of a mountain.

COMPRESSED air locomotives have been introduced into the coal mines of Pennsylvania owned by the H. C. Frick Co. The engines are to be charged on each trip down and up the slope by means of an air compressor located at the foot of the main shaft.

FOR underground use a steel plate at the intersection of drifts is much better than a turntable. Where the expense is not too great, it pays to cut out the ground so as to turn a right angle on a curve instead of swinging a car on a turn plate or turntable.

ORDINARILY too little attention is paid to ventilation in mines, miners being obliged to work in smoky, gas-laden workings as long as they can stand it. Men cannot accomplish good work economically under such conditions, and it is a matter of economy to provide good air.

CHALCOSTIBITE is a combination of copper, antimony and sulphur and is a comparatively rare mineral. Handsome specimens occur in some of the copper mines of Butte, Montana, and these are rich in silver. The ore is steel gray in color and has a bright, shimmering metallic luster.

THERE is no law in California compelling mine owners to provide a ladder reaching to the foot of a shaft where sinking is in progress, but in case of injury to men by reason of the absence of proper facility to leave the bottom of the shaft the owner would be held responsible in case of lawsuit.

IN Montana the Legislature has enacted a law making the standard of water measurement 1 cubic foot, or 7.48 gallons, per second, 100 inches being equal to 18.79 gallons per second. This is equivalent to the California measurement and equal to a flow of 1¼ cubic feet per inch per minute.

WHEN drift sets require renewal in heavy ground it is always advisable to put in false sets before attempting to take out the old. If much subsidence of the old timbers has occurred prior to removal, the lost ground may sometimes be partly recovered by driving saddle wedges between the posts and caps.

NO CONCENTRATING machine of any type has yet been devised which will separate all classes of material without sizing. The machine that will make a clean saving of coarser heavy particles will not save the slimes of the same material, and the machine which will save the slimes will lose the coarse grains.

A SPRAG is a short timber placed between two larger timbers, usually posts, to afford greater rigidity to timber sets. They are often necessary in shifting ground, particularly in drift sets, where they are placed between the posts longitudinally with the drift, either near the top or bottom of the posts, or both.

A VELOCITY of 16 feet per minute of a stream of water will wear away clay, 30 feet will move fine sand, 40 feet per minute will lift coarse sand, 45 feet moves fine gravel; 120 feet moves pebbles, 320 feet moves cobbles, 400 feet will move rocks 6 to 8 inches in diameter and 600 feet per minute will move bolders 2 feet in diameter.

PROSPECTORS had better give their attention to the search for ores of gold, silver and copper, as when found they return the largest profit at least relative expense. Very few prospectors ever made a fortune by searching for or finding such minerals as molybdenite, wolframite, uranium, iridium, and other rare and high-priced metals and minerals.

AN ohm is the resistance of a column of mercury 1 square millimeter in cross-sectional area and 106.24 centimeters in length. In electricity it is the term used to signify a unit of resistance. The legal ohm is somewhat less than that of the true ohm, being the resistance of a column of mercury 1 square millimeter in area and 106 centimeters long.

THE difference between the terms horse power and actual horse power is the difference between a theoretical and an actual result. A horse power is equal to 33,000 pounds raised by a horse 1 foot in one minute and is termed indicated horse power. The actual horse power of an engine or motor of any kind is usually somewhat less than its theoretical horse power.

IT is unadvisable to attempt to work ore bodies or veins of greater width than 12 feet without employing sills on the floors of levels, owing to the difficulties encountered when it becomes necessary to stope out to the floor above. In smaller veins this may be accomplished by spragging the posts and in other ways, but in large veins these methods cannot be successfully used.

SYENITE is a crystalline rock consisting of orthoclase (potash feldspar) and hornblende, and is distinguished from granite by absence of quartz. When quartz appears in this rock it becomes syenitic granite. The substitution of plagioclase (soda lime) feldspar for orthoclase makes it diorite; and when both orthoclase and plagioclase, with quartz, mica and hornblende occur, it forms grano-diorite.

TO ASCERTAIN the average velocity and discharge of a flume, multiply the area of cross section in square feet by the grade in feet per foot and multiply by 9000. Divide the result by the wet perimeter in feet, and extract the square root. The result will give the mean velocity in feet per second. The area of cross section of the flume multiplied by the velocity gives the discharge in cubic feet per second.

STUDDLE is a Cornish miner's name for a corner post in shaft timbering. A stull is different and has a different use. It is a stick of timber reaching usually from wall to wall of a vein and may be put in for the purpose of supporting the hanging wall or may be placed nearly horizontal for the purpose of forming floors of lagging, which reach from stull to stull, upon which ore or waste are broken down from overhead.

FELSITE is an exceedingly close-grained rock, composed of an intimate mixture of quartz and orthoclase feldspar. So closely are these minerals intermingled that the microscope seldom resolves the crystals into distinct individuals. In some varieties distinct crystals of feldspar occur, when the rock is known as feldspar porphyry. In other varieties quartz blebs are found and it is then known as quartz porphyry.

BASALT consists chiefly of plagioclase, augite, olivine and abundant magnetite, or titaniferous iron. These are essential constituents. Numerous other minerals occur in basalts in small quantities as accessory. Basalt frequently takes a columnar structure, and is found in long prisms having four, five or six sides. The Giant's Causeway, Ireland, is of columnar basalt. There are numerous occurrences of this character in California.

WHEN a pipe line has been completed care should be taken when water is admitted to the pipe to exclude air, as far as possible. This is almost unavoidable and air in great quantities will be sucked in if the necessary precautions are not taken. A gate put in the pipe below the point of entry of the water furnishes a means of regulating the flow. Another method is to fill the pipe from a penstock which is kept full so that the water passes in quietly.

A RULE to find the area of a cross section of a ditch with sloping sides: Add together the width at top and bottom in inches, multiply this sum by the depth in inches and divide this sum by 2. This quotient divided by 144 will give the area in square feet. To find the cross-section area of a ditch or flume whose sides slope to a point at the bottom: Multiply the width at top in inches by half the depth in inches and divide by 144, which will give the area in square feet.

THE caps employed to discharge nitro powders, called commonly giant powder caps, primers, detonators, etc., are charged usually with fulminate of mercury, mixed with niter in the ratio of 1 to 6, or three parts of fulminate with five of chlorate of potash, one of sulphur and one of ground glass. When wet, it may be handled without extreme danger, but when dry it explodes violently upon the slightest abrasion, concussion or by coming in contact with nitric or sulphuric acid. The caps are made of varying strength indicated by marks on the boxes containing them, as X, XX, XXX, etc. These caps should never be kept in contact with or in the neighborhood of nitro powders. More accidental discharges of powder are due to the careless practice of keeping the two together than to other causes.

PROSPECTORS should look out not only for veins of quartz when in search of gold, but also all other rocks which have a vein-like appearance, as dykes of porphyry, etc., particularly where found stained red, brown or yellow by iron oxides, or green by carbonate of copper. A few years ago no one thought of examining dykes in search of gold, but they are now known to be very commonly gold bearing and often contain free gold as well as auriferous iron and other sulphides.

FULLER'S EARTH is a natural composition of silica, alumina and water, with a small amount of lime, magnesia and iron peroxide. The silica is 50%, alumina 20% and the water about 24%. It is a hydrous bisilicate of alumina and has some peculiar properties, notably that of absorbing oil and grease, and is used largely in fulling cloth. At one time it was considered so valuable in England that its exportation was prohibited. The mineral is found in several localities in the United States.

A CHILI MILL is a type of rock-crushing device used originally in Chili, and consists of an upright post secured to a square frame. Extending from the post are arms which travel horizontally, having at their farther end a heavy stone wheel. The rock or ore to be crushed is thrown into a basin having a stone pavement, in the center of which stands the upright post. The wheels are revolved by animal or other power. This device has been imitated by several manufacturers of iron quartz mills.

AMPHIBOLITE SCHIST is a rock derived from the alteration of diabase, diorite or other rock in which augite or hornblende is a primary constituent. In most cases it can be plainly shown that the schistose structure is induced and does not represent the original structure of the rock, for generally the schistose rock can be traced to the massive rock from which it was derived. Amphibolite schist is frequently gold-bearing; and, when so, usually contains auriferous iron sulphide and quartz in small grains.

PYROPHYLLITE is near talc in crystallization, but is an aluminous silicate instead of magnesian. It is white to pale green in color when not stained by iron or other oxides. It is soft and greasy to the touch. It occurs in foliated and fine granular forms, the folia often taking a radial position when they are grouped in clusters of star-like forms. It is found in some abundance in Mariposa county, Cal., on a small peak near the foothills bordering the San Joaquin valley, about six miles southwest of Indian gulch.

THE so-called cannon balls found on the Cannon Ball and Grand rivers in North Dakota are concretionary masses of silicious iron ore formed in the sandstone. They usually appear to have a small nucleal body at the center, probably of organic origin, around which the iron seems to have been deposited often in concentric layers. In size they vary from that of peas to large spherical boulders a foot or more in diameter. Often the sandstone surrounding these iron concretions appears to be almost destitute of iron.

REPLYING to the question from Hedges, Cal., "Does it make any difference at which end of the mortar the count of the sequence of dropping stamps begins?". The succession 1-5-2-4-3 of dropping stamps is undoubtedly a good one and is in common though not exclusive use. That the succession 1-4-2-3-5 is a "poor one," as suggested by Prof. Courtenay DeKalb in his paper entitled "Adjustment and Control of Stamp Mills," which appeared in the issue of May 20th, '99, is not apparent, for the succession 1-5-2-4-3, if viewed from the opposite side of the battery, produces the succession 1-4-2-3-5. It does not make any difference at which end of the mortar the count begins.

LETTERS are still frequently received from those desiring information concerning molybdenite. Molybdenite is the sulphide of molybdenum, a metallic, soft, usually foliated mineral about the color of galena but rather softer. It also occurs massive and granular; is found in granite, gneiss, granular limestone and in other crystalline rocks, and frequently in quartz veins. When associated with gold in veins, as at Meadow Lake, Nevada Co., Cal., it makes the amalgamation of the gold a matter of great difficulty. Molybdenum is used in small quantities in the manufacture of steel. The price is high, but any considerable amount would overstock the market and there would be no sale for it.

SILVER CYANIDE is soluble in an excess of potassium cyanide, and this fact is taken advantage of in testing the strength of cyanide solutions in mills by adding, drop by drop, silver nitrate to a solution of potassium cyanide. At a certain point in the operation of adding silver nitrate to a solution of potassium cyanide the silver becomes insoluble and falls to the bottom of the vessel as a gray precipitate. The quantity of silver nitrate necessary to be added before this precipitation occurs is measured by means of a burette and by it the strength of the cyanide solution determined. For this purpose a standard silver nitrate solution is made by dissolving 13.06 grammes of pure silver nitrate in one liter of pure water.

WHERE a partner or partners in a mining claim refuse to perform their share of the annual assessment work a remedy is provided by the United States statutes. The partner or partners who do not wish to abandon the claim shall perform the full one hundred dollars' worth of assessment work as required by law, and then serve a notice in writing upon the co-partners who have refused to do their share of the work, or by publication in a newspaper nearest the mine if personal service cannot be had, setting forth the fact that the assessment work has been done for the year (stating year), and demanding that they shall, in the language of the law, "within ninety days from the service of this notice (or within ninety days after the publication of this notice) you fail to contribute your proportion of such expenditure as a co-owner, your interest in said claim will become the property of the subscriber under section 2324." At the expiration of 180 days this notice should be recorded, together with the affidavit of the newspaper publisher that the notices were duly and legally published. Accompanying this must be the affidavit of the party who has actually performed or caused to be performed the assessment work, as required by law. This completes his record title.

Cyaniding Slimy Ores and Tailings.

Written for the MINING AND SCIENTIC PRESS by MATT. W. ALDERSON.

Part II.—Agitation.

The first agitator in Montana was a vat 10 feet in diameter, 3½ feet in depth. It worked successfully, and larger sizes were erected. Fig. 2 (see page 609) gives a good idea of one of these. It is a vat 16 feet in diameter by 8 feet in depth, the agitator being so arranged that it may be raised and lowered when in motion. It is operated from above and its speed should be from eight to twelve revolutions per minute. It can be loaded before starting by putting in the tailings, then the solution, and lowering the agitator through the material until all is in motion; or, adding the solution first, the vat can be loaded with tailings while agitating. Twenty tons of a fairly sandy material is a usual charge, or of a very slimy material, about twelve tons.

It will be seen that the agitator has wooden prongs extending downward from a traveling beam. These are simply 2x4's bolted on, they being found to be durable, cheap and easily replaced. Fig. 2 shows the agitator empty, ready to be loaded, and Fig. 3 (see page 609) shows the same in motion and full to the brim. While good work was done with this form of agitator, there was always difficulty in keeping all the contents of the vat in motion, caused by the heavy sands settling to the bottom near the center of the vat, where there was less motion. To remedy this, various expedients were resorted to, cultivator plows and plows of other shapes were attached to the bottoms of the prongs, and, while the material could be moved by them, they did not overcome the difficulty. Finally, it was decided to try the propeller form, and Fig. 4 shows the

FIG. 4.—PROPELLER FOR AGITATOR, SOUTHERN CROSS MINE, MONTANA.

first one, put in at the mill of the Southern Cross mine. It was hewed out of a log of wood and the edges faced with band iron. This was a decided success, and the agitators are now built on this principle, with steel propeller blades. A cast iron hub is made to fit on the bottom of the upright shaft, to which two steel blades are attached with one set of bolts. The blades are heavy boiler steel, 8 inches in width by 8 feet in length. At the central shaft they stand at an angle of 45°, gradually curving like a plowshare to the outer edges of the vat, where they are nearly flat. Two bolts on each side of the shaft hold the blades securely in place. This form of agitator does the work perfectly, and it is the acme of simplicity and inexpensiveness. Run at a speed of sixteen revolutions per minute, it keeps the contents of the vat agitated perfectly. At high speed such an agitation could be secured as would throw a large proportion of the contents of a vat out over the edges. Its throw is outward from the center, thus overcoming the tendency in other forms of agitators to settle and accumulate a very large mass of considerable thickness at that point.

In treating material by agitation and decantation, the first essential is to get the gold in solution. To determine this is a comparatively easy matter if care is exercised in charging. Thus, to each ton of tailings put in the agitator I would add a ton of solution, having found this amount usually sufficient, although a greater proportion of fluid will be necessary with some very slimy ores, in which case 1½ tons or 2 tons may be used. As assays can be made of the solutions much more quickly than of the ore, check on each vat can be kept while it is agitating. Samples can be taken from the agitator at stated periods, say, every hour, for from one to twenty hours, allowed to settle and the clear solution poured off, filtered and assayed, and the results will tell how long it will be necessary to agitate to secure the best results. If one evaporates his solution, or uses some one of the methods of precipitating, he can take ton for ton or 1½ or 2 assay tons where larger quantities of fluid are used. Greater accuracy can be secured, perhaps, by using larger quantities, and I would not favor taking an arbitrary measure, but a number of assay tons, and dividing the result accordingly. The length of time of agitation will depend on character of material. All that can be obtained in solution with one ore can be secured in an hour; with another twenty hours may be necessary. Generally speaking, few ores will be found where agitation of more than twelve hours will be productive of profitable results.

After agitating for such length of time as is found necessary to dissolve the gold, the vat is filled with solution, that as large a percentage as possible of the fluid contents may be secured when it comes to decantation.

From five to twelve pounds of lime are used to each ton of ore, and this is added when the charge is first put in and before the solution is first brought up to the desired strength in cyanide. The lime not only neutralizes any active acidity, but operates to flocculate or coagulate the material. The lime attaches the lighter particles to the heavier, and, being of greater specific gravity, also carries down some of the slimes themselves. By neglecting the addition of the lime, prior to letting the vat stand for the first decantation, the mass will be less homogeneous, the sands settling first and so compactly that difficulty may be encountered in reagitating the charge. No apprehension of any complication from excessive use of lime need be entertained, as repeated tests have demonstrated that but a limited amount goes into solution, and the constant tendency of the excess is to precipitation, thus clarifying the solution. Experience is the only guide as to amount of lime to be used, crushed ore requiring but a small amount in comparison with the general run of slimy tailings.

Some cyaniders prefer the powdered, air-slacked product for neutralizing the acidity of an ore and would use the same in agitation. Repeated tests have demonstrated, however, that the best results can always be secured with the freshest quicklime. It naturally follows that such should be the case, the chemical action of fresh lime being decidedly more vigorous than such as has lost a portion of its strength by exposure to the air. In the air-slacked material there is an absence of the essential agglutinative element needed to bring about a flocculation or coagulation of the slimes.

In Montana most work by agitation has been on tailings of such a slimy nature as could not be successfully handled by percolation. Such material has not been classified, as in South Africa, and it is a question if it would pay to classify it when 75% of some ores crushed to thirty-mesh will pass an eighty-mesh screen; but, if such were attempted here, the sands could be carried direct from stamps or other crushing power to percolating vats and the slimes to the agitator, thus making a continuous process. Any excess of fluid in the agitator is easily disposed of by decantation before adding the cyanide solution, or dissolved cyanide is added to the charge as it fills the agitator, as the millman prefers. The treatment of ores in this way, judging from my own experience in handling the entire product of a battery with an agitator, is much easier and more satisfactory than the treatment of most tailings, by virtue of the absence of organic matter and other interfering substances. Some of the tailings piles handled have been anything but prepossessing in appearance. At the Schmidt & Johns mill to-day tailings are being treated which are oftentimes one-fourth soil. Part of them are dug up from a meadow which has been under cultivation for over thirty years. Wagon loads of clods, many of them a foot or more in diameter, matted together with grass and other roots, find their way into the agitator, and, except for having to remove the roots after they have separated from the tailings and have risen to the top of the vat, are no trouble to handle. Everything is grist to one of these mills if it only carries the gold.

(To be Continued.)

Tamarack Dividends.

The following table shows the number and amount of dividends paid by the Tamarack Mining Co. of Michigan. That the dividends were very irregular in amount though regular in recurrence is doubtless an indication of varying price of copper and economic conditions at the mine:

1888	$11	1892	$12	1896	$6
1889	16	1893	12	1897	6
1890	13	1894	8	1898	8
1891	16	1895	8	1899	*4

* Semi-annual.

Share capital was 40,000 in 1888, 1889, 1890; 50,000 from 1890 to 1896 and 60,000 since 1896.

Some Experiences of a Working Miner.

NUMBER XIX.

Written for the MINING AND SCIENTIFIC PRESS.

When the W—— mine at C—— was in full blast, I was fortunate enough to visit it. The mine was well managed and was a large affair. The deposit or ore shoot, I suppose you would call it, was about 60 feet wide and the large stopes were timbered with square sets. I cannot recall another instance where such a clean foot wall was exposed as I found in this mine. I have seen polished walls, but usually they are striated and waving, but not so in the W—— mine. This wall was a perfect plane, as smooth and as true as though made to order. It could not have been more regular had it been built by first-class plasterers with scantling, lath, mortar and a coat of dark red kalsomine as a finishing touch. The wall would probably never have been touched had it not become necessary to cut hitches for timber, and this led to the remarkable and very important discovery that the fine foot wall was not a wall at all, for the rock found beyond it looked like that on the upper side of the slip and assay proved it to be fully equal to it in value. The result was that the stope was cut out about 100 feet wide in pay ore instead of 60 as at first. This was not the first nor the last instance in which I have seen an interior plane of fault mistaken for a wall.

* * *

In the early days on R—— creek placer mining was successfully carried on at a number of places, mostly on the bars along the canyon, but these operations were all conducted on a small scale, owing to the limited capital of the individual miners and small companies. After a year or two of fair success, operations ceased on most of the mines. Several years later a number of claims were relocated, some bonded and a few were purchased for small sums and the entire lot was consolidated in one concern known as the B—— B—— G. M. Co. of New York. Money seemed plentiful and some expensive improvements were started. Among other things a dam was constructed on R—— creek and a ditch and flume built to one of the bars owned by the company, and in course of time hydraulic mining was commenced—with what real success none but the manipulators of the enterprise knew, but it was published broadcast that the mines were far richer than they had ever dreamed, and regular monthly dividends commenced. In the summer of 1881 a flood carried out their flume and all mining operations ceased, nor were they resumed for years. The only man about the mines was a watchman who occasionally did a little work on the ditch line to hold the water right. Strange to say, during all these years of idleness the monthly dividends were advertised regularly and glowing reports were published frequently, telling of the progress of work and the splendid outlook for the future. No comment is necessary.

* * *

Few new mines start out under more favorable auspices than did the K—— S—— at T——. It had the backing of almost unlimited money and a high-priced superintendent. A splendid three-compartment shaft was sunk to a depth of 250 feet, fine machinery was installed and a house was built for the superintendent that was a marvel of comfort and even luxury. Stables, shops and stores were on all sides. Without warning, the mine was closed down and the machinery moved away. Inquiry developed the fact that a quarter of a million dollars had been spent, with little to show for the expenditure other than these surface improvements—another clear case of an over-managed mine. The same thing was done at the Q—— M—— mine, though not by the same people. Indeed, the Q—— M—— people fared even worse than the former, for they had expended nearly half a million in gold before they found they had nothing to show for it.

* * *

Conservatism is an excellent thing, particularly when tempted to engage in a new mining enterprise; but even conservatism can be overdone. I went with M—— to examine the C—— mine. It was a good little property, with high-grade shipping ore. Two ore shoots were exposed and one partially stoped; the other cut into, but undeveloped. After a careful examination, and making all necessary allowances, I was satisfied that there was enough in sight to pay for the mine, and, if we got no more ore, we would come out about even. The dump contained a large amount of low-grade ore which could be concentrated and the product shipped at good profit, but this required an additional outlay for machinery and was not included in the estimate. In my report I called attention to a small prospect shaft, only 15 feet deep. It was sunk on a vein 6 inches wide at the surface, which in the bottom of the shaft had widened to more than a foot and the ore was shipping grade. It had a particularly clean come-to-stay look, and I gave it as my opinion that this shoot would prove larger and richer than the other, and strongly recommended the purchase of the mine. In reply to my argument, M—— said I didn't know anything about it and could not see into the ground. I retorted that his judgment was no better than mine

if, after having come so far at such expense, that was the sort of opinion he entertained of my knowledge of mines. "You are sure to get your money back at least," I argued, "and the chance for the future is certainly not unpromising." "Well," replied M——, "what in the world do I want to put so much money in a mine for and be two years getting it back, and the future all uncertain." Argument was useless and we did not buy the mine. Within a month another man took it and began stoping the shoot in sight, at the same time sinking the little prospect shaft. In 50 feet he had opened a vein 5 feet wide, 2 feet of which was high-grade shipping ore, and he got back his money three times over in less than six months. I am sure you will agree with me that this mine was a good buy at the time I recommended its purchase. In my opinion, an investor is always justified in paying all there is in sight if the promise for the future is good.

I had one more experience with M—— which was not less unfortunate. I went to see the G—— mine. There were two claims; the veins were parallel and about 300 feet apart. One was a good-sized irregular vein 2 to 20 feet wide, the ore running from $8 to over $100 and averaging about $30 per ton in gold. The other vein was regular and about 4 feet wide. In it was a pay streak 6 inches to a foot in width and this ore would run $40 to $1500 per ton. The mine had no machinery, unless an arrastra be called machinery. I was more than favorably impressed with the property. The small streak was opened in a dozen places by shallow cuts and shafts all down to water. The big vein had a tunnel 100 feet long on the vein with 80 feet backs at the face. A shaft was sunk to the tunnel and a winze below the tunnel level. The winze was nearly full of water, but the owner assured me there was a very rich streak of limonite mixed with pyrite at the bottom. He had no samples of it, as he had shipped them all away. Considering the general character of the vein, I did not doubt his statement. Indeed, the mine was good enough for me at his price without it. This mine I recommended in the strongest possible way, assuring M—— we could ship ore from the rich streak and pay for the property in a few months. All my argument was vain; he would not touch it because the mine had only shallow working and the ore might pinch out. The ore was not in sight in this mine to pay for it, but this made no difference to me. I was more than satisfied. We did not buy the G—— mine, but another man did a couple of years later, and he did exactly as I had predicted—shipped the high-grade ore from the small vein, recovering the money laid out in first cost—and also paid for hoisting and milling machinery, and since then the mine has produced more than a million dollars. It has not pinched out yet.

MINER.

The Occurrence and Origin of Diamonds in California.*

NUMBER II.—CONCLUDED.

By H. W. TURNER, Washington, D. C.

Lewis does not appear to have visited South Africa himself, and his book is largely taken up with a description of the diamond rock and the fragments of other rocks included in it. According to Lewis the diamonds are crystallized in sharp octahedrons and dodecahedrons. Carbonados and black diamonds are not only found in large crystals but are very common as minute and almost microscopic crystals. The abundance of these crystals is proof that they are not inclosures brought up from some other matrix. Lewis states that only the peridotyte that is full of fragments of shale and other impurities contains the diamonds, which, judging from the description of De Launay, is an error. These shales are highly carbonaceous so that they burn readily. The fragments of shale enclosed in the peridotyte are more compact and have lost their shaly character, their bituminous or carbonaceous matter, and their sulphur. The microscope shows also that they have frequently been mineralogically altered by the heat of the lava and become filled with aggregates of micaceous minerals.

Lewis gives the following minerals as occurring in the peridotyte (kimberlyte): Olivine, enstatite, chrome-diopside, smaragdite, biotite, garnet, perofskite, magnetite, chromite, ilmenite, picotite; and more rarely apatite, epidote, orthite, tremolite, tourmaline, rutile, sphene, leucoxene; also an undetermined mineral, probably cyanite (disthene); and finally diamond. The olivine is often said to be fresh; the biotite is a prominent ingredient. Serpentine, in part bastite, calcite, zeolites, chalcedony, and talc occur as decomposition products. One occurrence of native gold in a Kimberley diamond is on record. This has been reported by Becker. This diamond is now in the Royal Polytechnic High School at Aachen.

Sir William Crookes, who visited South Africa early in 1896, a few months after De Launay, treats of the origin of the diamond more from a physical standpoint, placing great stress on the method of formation of artificial diamonds by M. Moissan, who used iron as a solvent for the carbon. The iron, which must be thoroughly purified, is placed in a carbon crucible together with charcoal made from sugar, and the crucible subjected to a temperature of 4000° C. in an electric furnace. As is well known, iron increases in volume at the moment of passing from the liquid to the solid state. The sudden cooling solidifies the outer layer of iron and holds the inner molten mass in a tight grip. The expansion of the inner liquid on solidifying produces an enormous pressure, and under the stress of this pressure the dissolved carbon separates out in a transparent, dense crystal; in fact, as diamond.

Many circumstances point to the conclusion that the diamond of the chemist and the diamond of the mine are strangely akin as to origin. It has been conclusively proven that the diamond has not been formed *in situ* in the peridotyte breccia. The diamond genesis must have taken place at great depth under enormous pressure. The explosion of large diamonds on coming to the surface shows extreme tension. There were probably many types of crystallization; differing in place and time, or we should not see such distinct characteristics in gems from different mines, nor, indeed, in the diamonds from different parts of the same mine.

The finding of diamonds in meteorites is also utilized by Crookes as further evidence of the origin of diamonds in association with iron. Moreover, iron is the most abundant impurity found in the ash of diamonds after they have been burned. Crookes regards the diamond as having been formed in a laboratory buried at vastly greater depths than we have reached or are likely to reach, where the temperature is conformable with that of the electric furnace, where the pressure is fiercer than in our puny laboratories and the melting point higher, where no oxygen is present, and where masses of carbon-saturated iron have taken centuries, perhaps thousands of years, to cool to the solidifying point.

Crookes regards the peridotyte breccia more as a mud lava than as a true igneous intrusion. While De Launay supposes water vapor to have accompanied the eruption of the peridotyte, he nevertheless regards it as an igneous intrusion, and Lewis likewise appears in the main to take the same ground, although he regards some of the material as a tuff. The specimens of kimberlyte that were shown in the collection of G. F. Kunz at the Chicago Exposition certainly presented all the appearance, both megascopically and in thin section, of a serpentine derived from a peridotyte porphyry, and the description of the rocks by Lewis and De Launay clearly shows that a large portion of it is serpentine derived from an olivinitic lava, and is not of the character of mud lava or tuff. Peridotytes resembling kimberlyte have been found in the United States at Syracuse, N. Y., and Elliott county, Kentucky. So far as known no diamonds, however, have been found in the vicinity of these peridotyte masses. None of the serpentines of California, so far as my information goes, are of the kimberlyte type. The association of the diamonds with serpentine may perhaps be due to the usually higher content of iron in these basic rocks. Diamonds might therefore be expected in any of the more basic igneous rocks.

However, it is by no means certain that diamonds are not formed under very different conditions from those described by Crookes. In a recent paper Derby writes of the occurrence of diamonds in Brazil. Derby states that for the question of genesis the most significant of the Brazilian localities is that of Sao Joao da Chapada near Diamantina. The diamonds occur here in thoroughly decomposed material, no absolutely fresh rock being found. So far as can be made out from observations on material the most unsatisfactory that can be imagined, the most plausible hypothesis as regards the various clays of Sao Joao da Chapada is that they represent a group of phyllytes of varied character but principally if not exclusively of clastic origin threaded with dykes of pegmatyte. The clastic origin of the schists is regarded probable from the worn character of the zircons found in the clay derived from the schists. The diamond-bearing streaks appeared to Derby to contain distinct bands composed in part of quartz, with plates of specular iron, and these bands he suggests may be pegmatyte dykes. The primary tourmaline and zircon and the secondary hematite and rutile found in the heavy residue after washing the clay are supposed to have originated in the pegmatyte, the hematite, anatase and rutile having formed from original iron and titanium minerals now gone. The staurolite and disthene found in the heavy residue are supposed to have come from the schists where they may have formed as a result of contact metamorphism induced by the intrusive pegmatyte. Derby is inclined to think that the diamonds have come from the schists along the borders of the pegmatyte dikes and not from the dikes themselves. In other words, he appears to regard it possible that the diamond is a product of contact metamorphism. Moreover, he states that no rocks of the peridotyte series have been found in direct association with the diamond-bearing beds at any point in Brazil. He lays some stress on the occurrence of tourmaline and disthene in fragments of schist in the South African peridotyte breccia. Disthene is characteristic of schists, and tourmaline often so; and, as De Launay states that there are schists mingled with the lower quartzites in the mines of South Africa from which the schist fragments in the breccia were probably derived, Derby suggests a possible analogy between the South African deposits and those of Brazil. He considers that in order to bring the Kimberley and Brazilian modes of occurrence into line as facies of a single mode of genesis, it seems necessary to put aside the idea that the recent interesting experiments on the artificial production of the diamond afford a solution of its terrestrial origin and also that the Kimberley type of rock and mode of occurrence are essential features. Derby would thus suggest the origin of the South African diamonds in the underlying schists as a result of igneous intrusions, a very unlikely hypothesis in light of the investigations of Lewis, De Launay, Crookes, Moissan and others indicating the deep-seated origin in molten material. It is regarded as certain by Derby that the Brazilian diamond must have had a different origin from that now ascribed to the South African occurrences.

* From the American Geologist. Published by permission of the Director of the U. S. Geol. Survey.

Some Characteristic Mines of the California Gold Belt.

Written for the MINING AND SCIENTIFIC PRESS.

Among the mines of the gold belt which have recently come into prominence is the Shawmut-Eagle mine, near Jacksonville, in Tuolumne county. One of the most striking features of the landscape is the massive croppings of white quartz on the vein in these mines. They rise above the tree tops and are visible for a long distance. The ankerite zone is broad here also, but not so wide as at Coulterville and Pinon Blanco.

The foot wall is serpentine, back of which lies a broad belt of black slate of the mariposa beds. On the hanging wall appears a large dyke-like mass containing auriferous iron sulphide. This material has a semi-slaty structure, due to pressure and movement, which is pronounced in this section. Heavy gouges of a serpentinous character are common. A granitic dyke lies along the east side of the lode for a mile or more in this part of the county. Its texture is variable, from felsite to a granular rock of granitic habit, in which the mica occurs sparingly; muscovite syenite and mica diorite also occur. Farther northward slate lies on the hanging wall of the lode, and diorite forms the foot wall, with serpentine distributed irregularly.

On the low eminence known as Poverty hill the Mazeppa, Jumper, New Era and Golden Rule form a group of mines, though not under one ownership or management. Their geological characteristics are similar in essential particulars. A crosscut tunnel in the Golden Rule mine from the west side of the hill through the foot wall country gives an excellent exposure of the relations of the various rocks.

The tunnel is started in a granular diorite and passes from it into serpentine, which here is 100 feet in width. Beyond it lies a broad zone of ankerite containing mariposite and separated from the serpentine by a heavy gouge. A dyke of diorite, similar to that in the west country, divides the dolomitic zone into two separate masses. In the ankerite occur irregularly large lenses of massive quartz, mostly on or near the hanging wall side.

East of the ankerite zone is a succession of diorite and diabase dykes, which are locally altered in part to amphibolite schist. Along one of these schistose zones appears a dyke of rock resembling diabase, but rather lighter in color and inclining to gray. This dyke is often found to contain a reticulated mass of quartz veinlets, and is frequently rich in gold. The chlorite schist, 2 to 10 feet in width, is also seamed with veinlets of quartz and calcite, in which gold is found in very rich streaks. Auriferous pyrite is distributed throughout the zone of chlorite schist. Narrow veins of quartz and calcite lie between the dyke and the schist, and these, too, are gold-bearing.

Gold-bearing zones also occur in schist near the mass of diorite, dividing the ankerite zone. For a distance of 1000 feet east of the ankerite vein the hanging wall country is amphibolite schist, in which appear numerous small dykes, striking with the inclosing rocks. Small, nodular lenses of quartz, and quartz seams are abundant. Many years ago the surface of this formation was sluiced by placer miners to bedrock, the soil being shallow, and much gold obtained. Elsewhere along the gold belt these hanging wall schists have been found to contain large auriferous zones and have been worked with profit, and it is quite reasonable to expect to find pay rock in this instance as well, but no systematic search for it has been made for it as far as the writer is aware.

The most irregular of the rocks appearing along this portion of the gold belt is the serpentine. First it appears on one side and then on the other of the main lode, and again it is entirely absent. At one time it was thought that the appearance of serpentine had a marked influence on the mariposite, but it does not appear that this is so, for mariposite is found where no serpentine is seen, and where serpentine is abundant in some places mariposite is wholly absent.

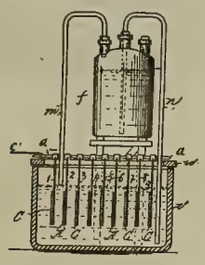
W. H. S.

Latest Mining and Metallurgical Patents.

Patents Issued May 30, 1899.

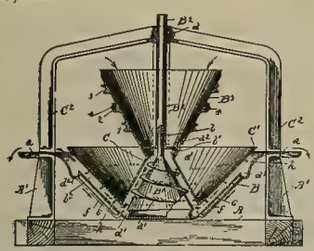
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

PROCESS OF OBTAINING CHEMICALLY PURE GOLD.—No. 625,863; Emil Wohlwill, Hamburg, Germany.



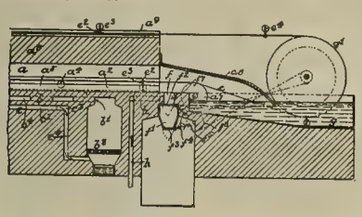
A process which consists in passing an electric current from an anode of impure gold or of an auriferous alloy through a gold chloride solution, to a suitable cathode, and maintaining in solution at all times during the passage of current hydrochloric acid in sufficient quantity to prevent the liberation of gaseous chlorine at the anode; also in passing a current of high density (500 amperes per square meter or higher) from an anode of impure gold or of an auriferous alloy through a gold chloride solution to a suitable cathode.

AMALGAMATOR.—No. 625,909; E. J. Verrue, San Francisco, Cal.



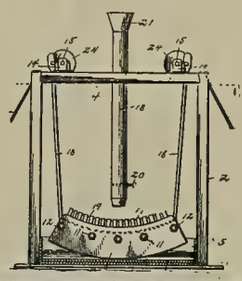
An amalgamator, the combination with the stationary amalgam pan, of the central cone-shaped worm-threaded hub upwardly projecting therefrom, the rotatable shell fitted within pan so as to form an annular passageway which holds an amalgamating bath, an inclined central wall in shell which fits over the cone-shaped hub of the pan, a drive hopper attached to the central wall of the shell, and a central supporting shaft connected to the wall of the hopper; the amalgamator having combination with the stationary dish-shaped amalam pan, of the central cone-shaped worm-threaded hub upwardly projecting therefrom, a series of pockets formed in the pan near its upper edge, a pipe connection between pockets and the bottom of the pan, a rotatable shell provided with an inclined central wall fitted within the amalgam pan so as to leave an annular passageway between the shell and the inclined wall and cone-shaped hub, a series of shelves or ledges projecting from the outer wall of the shell, and a drive hopper attached to the inclined inner wall of the shell, and a central supporting shaft connected to the hopper. The combination with the stationary amalgam pan, of a series of pockets formed therein near its upper edge, a pipe connection between pockets and the bottom of the pan, a rotatable inner shell fitted within the pan so as to form an annular passageway which holds an amalgamating bath, a series of shelves or ledges projecting from the outer wall of the shell, a feed supply for the material, and of devices for forcing the material into and through the bath contained in the annular passageway.

FURNACE FOR TREATING ORES.—No. 625,912; A. G. Wells, London, England.



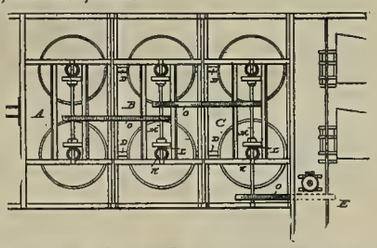
Apparatus for roasting ores, in combination, a closed roasting chamber wherein ores are roasted and reduced, a fire chamber, means for supplying reducing gases to closed chamber and leading them there from, the roasting chamber hearth, the transversely arranged zigzag heating flues below the bottom of closed roasting chamber serving to lead furnace gases from fire chamber to and fro under roasting chamber hearth, and air heating flues below heating flues serving to lead atmospheric air from an inlet at the cooler end of apparatus to fire chamber whereby it is heated, the fire chamber being arranged adjacent to the ore outlet end of the apparatus. A hopper with a flap bottom for supplying ore to be treated to chamber, hopper with superposed flap bottoms for removing treated ore and preventing access of air to chamber, means for supplying reducing gases to chamber and leading them therefrom, a water tank at each end of the chamber, and a hood at each such end dipping into the water tank and serving to seal and close the chamber end, and means for traversing the ore from end to end of the chamber adapted to emerge from and to re-enter chamber through water tanks and to be cooled thereby before re-entering the chamber, and to actuate both the ore inlet and the ore outlet hopper flaps, at regular intervals; apparatus for roasting ores in a closed or air-tight chamber, the combination of a chamber wherein the ores are roasted and reduced, means for admitting ore to the chamber, an exit for treated ore, a gas outlet communicating with chamber, tanks g, g, at opposite ends of the chamber and adapted to hold liquid, means for closing the ends of the chamber except through liquid in tanks, wheels g', g', axles therefor, wheels extending into the tanks below liquid level employed therein, endless chains passing around wheels g', one side of the endless chains passing through the chamber, the other side of the chain passing outside of the chamber, and means moved by chains for moving ore longitudinally through the chamber.

QUARTZ MILL.—No. 626,079; Norman McAulay, Hill City, S. D.,



A quartz mill, rocker plates connected in pairs, in combination with the interposed ridged or corrugated apron connected to and rocking with said plates for distributing material, the pans in which rocker plates operate underlying the discharge sides of the apron; rocker plates being connected by tie rods, of the longitudinally ridged and transversely corrugated apron overlying rods connected with rocker plates, to rock with them; the pans in which plates operate provided with removable wear plates and side openings with gates through which contents of the pan may be discharged, oppositely disposed cranks connected with the opposite ends of rocker plates for actuating them, the ridged and corrugated apron intermediate rocker plates, discharging laterally and upon opposite sides into pans, the feed chute for supplying the material thereto provided with means for controlling feed, and means for imparting a rotary notion to crank shafts actuating rocker plates.

APPARATUS FOR TREATING ORES.—No. 626,173; F. Leech, Boulder, Colo.



Combination of a series of arrastras arranged in sets after the manner of steps, conduits leading from the top of one set of arrastras to the next set below, and grinding mechanism arranged in the arrastras whereby the pressure upon the large fragments will force the finer particles to raise and pass through the overflow conduits to the next set of arrastras below and receive further reduction, each arrastra consisting of open horizontally disposed receptacle, a radial arm or support carried by a vertical shaft, and vertically yielding or adjustable drag stone or drag appliance, so that each succeeding arrastra will be adjusting itself to and operating upon more and more finely reduced material.

PRODUCTION OF CHEMICALLY PURE GOLD BY ELECTROLYSIS.—No. 625,864; Emil Wohlwill, Hamburg, Germany.

A process of obtaining pure gold, which consists in passing an electric current from an anode of impure gold or of an auriferous alloy to a suitable cathode through a gold chloride solution and maintaining in solution at all times during the passage of such current another chlorine compound in such quantity as to prevent the liberation of gaseous chlorine at the anode and so as not to dissolve the silver that may be contained in anode.

The Eight-Hour Law in Colorado.

TO THE EDITOR:—Colorado's eight-hour law goes into effect on June 15th, and while there is some friction incident to the adjustment of shifts and wages to meet the new condition, it is apparent that there is a disposition on the part of both employe and employer to make such reasonable concessions as will obviate a contest. The State never had before her a season of greater activity and more substantial prosperity than is now presented. But thinking men of every rank realize that it could all be shattered in a day by precipitating a clash between organized labor and organized capital. While there has been no little apprehension felt over the State for the past month, at this writing there is a clearer atmosphere, with a strong probability that any serious difficulty will be averted.

In many of the larger mines the eight-hour shift already prevails, and in such cases no changes will be required. In those mines where nine and ten hours constitute a day's work, there seems an almost general intention on the part of the owners to adopt the eight-hour day and pay the same wages for eight-hour shifts as are now being paid for nine and ten hours. It is conceded that in such cases full eight hours' work will be insisted upon and freely given, and it is generally believed the result will be the accomplishment of as much as under the former system. A few mines are heard from where it is announced that their miners are to be paid by the hour at such figures as will result in a reduction of wages, differences arising from which seem in a fair way to be settled.

The smelting plants belonging to the American Smelting & Refining Co. at Denver, Pueblo, Leadville and Durango have announced a plan of paying their employes by the hour, requiring no person to work longer than eight hours in twenty-four, but giving all the privilege of putting in extra time—this being optional with the workmen. Following this comes another announcement of a general advance in wages to all employes of about 10%, to be in effect from June 1st. It is claimed this advance practically restores the wages in vogue prior to '93. In Denver the furnace men will get 24½ cents per hour, side men and charge wheelers 20½ cents, common laborers 17½ cents. In Leadville the scale of wages is higher, by reason of living expenses being higher than those in Denver. When the pay by the hour system was announced at Durango the force there declined to continue at work and the smelter at that point closed down, but that was prior to the promulgation of the 10% advance in wages. The differences there are still unsettled at this date.

Denver, Colo., June 3rd, '99. WASCOTT.

Nickel and Cobalt.

Many of the old sources of the world's nickel supply are practically exhausted. A certain amount of ore is still obtained from Norway and Hungary. South Africa supplies an arsenide containing 25% cobalt, but only in small quantities. South America was formerly a great source of nickel and cobalt, some of its hydrated arsenites testing 25% in the ores of nickel, and 17% in the ores of cobalt. A. F. Johnstone, who is a very good authority on the subject, says that the only mine in Connecticut has been worked for many years, while Sweden has yielded nickel from the Klefra and other mines. In Germany the supply of nickel is obtained principally from the Mansfield mines. The rich nickel deposits of New Caledonia now furnish a large proportion of the supply, and important shipments of the ore are going forward to Europe. This ore is a double silicate of nickel and magnesia, the percentage of nickel ranging from 7 to 10. Nevada, however, is the latest source of supply, both of nickel and cobalt. In '80 a powerful impetus was given to the utilization of nickel for manufacturing purposes, by the invention of Wiggin & Co., Birmingham, for rendering the metal malleable by the use of manganese. A year later a German inventor, Dr. Fleitman, accomplished the same result by the use of magnesium. Thus produced nickel may be drawn into wire or rolled into plates, and be stamped, beaten, raised, or welded. The adoption of nickel for coinage purposes by Germany in '73, raised the price of the material from 4s to 16s per pound, but this inflation was only temporary, and the average price to-day is about 2s per pound. The oxide of the metal is used in the Staffordshire potteries for giving a soft brown tint to china and earthenware. Cobalt is used chiefly as an anode in plating, and for some parts of scientific instruments. It does not whiten copper to the same extent as nickel. The oxides of copper are of very great value in the coloring of china, earthenware and glass, and form the basis of the pigment known as cobalt-blue. The present-day tendency is to replace brass and electroplate by white alloys which have nickel for their basis. These alloys are known by such names as "silveroid," "argentoid," "navoline," "nickeline," etc., but they are all varieties of German silver, mixed either with tin, lead, or cadmium, according to the requirements of the metal. Nickel and cobalt ores are very largely smelted in and around Birmingham.

When is an Undertaking Feasible?

It is an old adage that "Nothing risk, nothing gain." This maxim might well be read, "With no great risk there is no great gain." But the "risk" is a relative matter and not an absolute one. That which in the hands of one person would inevitably fail, may, in the hands of another, be successful. Not infrequently an enterprise which from one view-point has already failed has, in fact, merely reached the first tollgate on the highway to success. In a paper read a short time ago before the American Association of Inventors and Manufacturers, F. A. Richards, apropos of this, made the point that the probability of success is measured by the environment and the resources available. One person, examining a certain enterprise and finding the risk of too hazardous a nature to warrant his attention, may very properly decide the enterprise to be impracticable, or, as to himself, impossible of accomplishment. This decision under the circumstances does not in the least indicate that, from the standpoint and experience of some one else, the same enterprise cannot be safely undertaken and effectually carried on to a successful conclusion. The real question, therefore, is not so much whether a risk exists, but what relation the existing risks and uncertainties bear to the ways and means that are available for overcoming them.

This principle is well illustrated by many of those newer institutions which are classed among the "necessaries" of modern life. Consider, for instance, the many facilities which are now accomplished facts but which not so very long ago, as history is measured, could not have been produced by any one anywhere in the world. The electrical propulsion of cars, for instance, is an accomplished fact of almost immeasurable practical importance, and yet only a century ago such an achievement was not only undreamed of, but was literally impossible of accomplishment under the conditions then existing. The same is true of the steamship, the modern locomotive, the ice-making machine, the reaper, the telegraph and ocean cable, the telephone, the newspaper, the modern postal system, and many other instrumentalities which come to be considered necessary not only to the progress, but even to the sustenance of the race. The times and circumstances, therefore, rather than the risks and the difficulties involved, determine, broadly speaking, the feasibility at any given time and place of every undertaking which is "possible" within the limits of natural laws.—Cassier's Magazine for June.

Aluminum Feed Wires.

The Pittsburg Reduction Company has received an order from the Chicago Northwestern Elevated Railway Company for 150,000 pounds of aluminum to be used as feed wires on that road. This will be the first electric road in the country that has attempted the use of aluminum for feed wires.

Three sizes of aluminum cable will be used. The largest feeder is about 1½ inches in diameter, and the railroad company is buying over ten miles each of the two larger sizes. The feeders will be placed in a wooden box or trough, covered by the board walk between the tracks of the elevated. They will be supported on vitrified clay blocks, about 9 feet apart and designed with an umbrella drip. Every 100 feet a special malleable iron chair will be used, the cable being carried in split spool insulators to carry the slack. Experiments have been made by J. R. Chapman, chief engineer of the Northwestern.

It is estimated that forty-seven pounds of aluminum wire will answer the same purposes of a hundred pounds of copper wire, while the difference in cost, considering the equal conductivity, will make the aluminum cheaper. The copper costs about 20 cents a pound, while the aluminum can be had for about 36 cents a pound. The installation in Chicago was caused by the rising price of copper and the success of the aluminum lines at Niagara Falls and at Snoqualmie Falls on the Pacific coast. — American Manufacturer.

A New Building Material in Germany.

Consul Warner writes from Leipzig that under the name of "keramo," a building material, composed principally of glass and manufactured at Penzig, Silesia, has been placed on the market. As far as known, this material is made from powdered glass waste, which is hardened by a special devitrifying process and combined by means of strong pressure. In this way the transparency, brittleness and fragility of the glass are destroyed, but other prominent properties — extraordinary hardness, stability against exposure to the weather, non-conduction of heat, non-inflammability, insensibility to oil, grease, acids, etc.—are retained in this new material.

Keramo can be used with good results for wainscottings in the interior of buildings, for covering floors in houses, kitchens, washing rooms, verandas, balconies, etc., for rough casting of walls exposed to the weather, as well as for staircases which are to be fireproof. The color depends upon the color of the glass used in the manufacture. The price of keramo is about $1.60 per square yard, and so far the trials which have been made with this product have been most successful.

SIGNS are that there will be no summer shutdown in the iron and steel mills this year. Manufacturers are far behind in their orders and a closedown would mean the loss of trade. Therefore, contrary to the usual routine of wage settlements in the iron, steel and tinplate industries, conferences on the new lists will be held in Detroit immediately following the adjournment of the national convention of the Amalgamated Association on May 30. The manufacturers want to abolish the usual suspension, which is inaugurated on June 1, the time the Amalgamated sliding wage scales expire, and continue until the new rates are agreed upon, which is generally a month later.

WOOD crackles when it is ignited because the air expanded by heat forces its way through the pores of the wood with a cracking noise. Green wood makes less snapping than dry, because the pores contain less air, being filled with sap and moisture which extinguish the flame, whereas the pores of dry wood are filled with air which supports combustion.

Industrial Notes.

—The United States M. Co.'s works at Bingham, Utah, are to be equipped with a full electric plant this summer.

—A contract for 10,000 tons of 65-pound steel rails has been let to the Colorado Fuel & Iron Co. by the Pacific & Idaho Northern R. R. Co., which is now building into the Seven Devils copper region from Weiser, Idaho. The road is to be 100 miles in length.

—The south mills of the Illinois Steel Co. at South Chicago, it is claimed, has broken the world's record of steel rail making in a twelve hours' run, turning out 1310 tons of rails. The former record of 1301 tons was also held by the South Chicago plant.

—Satisfactory experiments made with compressed air in anthracite coal mines has induced the Philadelphia & Reading Coal & Iron Co. to use cars operated by compressed air in some of the mines, with the intention of a general substitution later on. The Shenandoah district will be equipped first.

Commercial Paragraphs.

FLINT & LOMAX, electricians of Denver, Colo., report a busy season in electrical work.

NOCK & GARSIDE, machinists of Denver, Colo., occupy new quarters at 1650 Wazee street.

THE Colorado Iron Works' city office is now 721 Seventeenth street, Denver, where they have larger and finer quarters.

THE American Steel & Wire Co., headquarters in Chicago, is represented in Denver, Colo., by O. B. Barrows, 1627 Blake street,

WHEELER, FRANTZ & MCRAY have opened a shop at 1516 Eighteenth street, Denver, Colo., where they are equipped to build gasoline engines.

Personal.

E. M. SPARHAWK represents the Carnegie Steel Co. in Denver, Colo.

W. A. FARRISH of Denver has gone to Boise Basin, Idaho, to examine mining properties.

THE Siemens & Halske Electric Co. of Chicago is represented in Denver, Colo., by A. L. Searles.

C. M. FASSETT, assayer and mining engineer of Spokane, Wash., was in Denver on the 5th inst.

C. D. LANE, Woodson Garrard and Dr. Spalding of Angels, Cal., leave for Alaska on the 10th inst.

JAS. A. MCCLURG recently returned to Denver from Los Angeles and points in Lower California.

C. W. VAN LAW of Denver has a position with the New England Exploration Co. at Telluride, Colo., as millwright.

ROSS E BROWNE has returned to San Francisco, Cal., after an absence of several weeks in Mexico and later in London, Eng.

D. W. THAYER, one of the owners of the Japan mine near Telluride, Colo., recently returned to Denver from Los Angeles, Cal.

CAPT. THOS. MEIN, who was reported very ill at Seattle a few days since, is much improved and has returned to San Francisco, Cal.

W. G. SCOTT, who for several months past has been Supt. of the Mt. Shasta Gold Mines, Ltd., has resigned, being succeeded by O. G. Rogers.

W. C. RALSTON, Vice-Pres. California Miners' Association, left San Francisco on the 5th inst. for a visit in the East. He will return in three weeks.

F. F. COFFIN has resigned the superintendency of the Griffin mine in El Dorado Co., Cal., near Diamond Springs, being succeeded by James Richards.

J. T. O'BRIEN, foreman at the Griffin mine near Shingle Springs, Cal., has gone to the Jumper mine near Stent, Tuolumne Co., Cal., to take charge of that mine.

W. B. MURDOCH of San Francisco has returned from a trip through western Nevada, where he has been investigating copper properties in which he is interested.

THE Grass Valley Exploration Co. has appointed Mark B Kerr general superintendent of its mines and works, and H. Pengelly superintendent of the W. Y. O. D. mine.

FRED HOWE BOSTWICK of the Hendrie & Boltboff Mfg. & Supply Co., Denver, Colo., is out for a trip through Idaho, Montana, British Columbia, Washington, Oregon and California.

S. W. TRAYLOR and Smith McKay, representing the Colorado Iron Works, are in San Francisco, Cal. They have been making an extended trip through California mining regions and visiting pleasure resorts.

JOHN D. ROCKEFELLER of New York is in California visiting the Yosemite valley and other places of interest. While in the State Mr. Rockefeller has been investigating the oil fields on the western side of the upper San Joaquin valley.

E. H. BENJAMIN, secretary of the California Miners' Association, left San Francisco, Cal., Wednesday, the 7th inst., for Sierra county, Cal., accompanied by Prof. A. G. Lawson and H. Hirst of the University of California at Berkeley. They go to make an extended examination of the Gibsonville and La Porte divide, to determine the extent of the gravel channel system of that section in the interest of the Feather Fork Gold Gravel Co., also known as the Thistle Shaft Co.

THE Executive Committee of the California Miners' Association in charge of arrangements for entertainment of the American Institute of Mining Engineers are making good progress with the work on hand. The personnel of this committee, which was appointed by President J. H. Neff, is as follows: W. C. Ralston, S. B. Christie, C. H. Lindley, W. S. Keyes, J. F. Halloran, E. H. Benjamin, Capt. T. Mein, C. G. Yale, A. A. Watkins, E. A. Belcher, H. T. Power, W. B. Bourne, A. D Foote, G. Starr, F. Zeitler, B. S. Rector, W. S. Hammon, W. F. Detert, F. F. Thomas, D. R. Oliver, M. B. Kerr, T. Hender, F. Wilmans, P. A. Buell, W. H McClintock, F. A. Leach, C. C. Derby, J. J. Crawford, H. E. Picket, P. G. Gow and L. E. Aubury. As a Committee on Reception President Neff appointed H. T. Gage, T. L. Ford, J. D. Phelan, D M. Burns, J. M. Scott, A. J. Ralston, W. W. Montague, R. S Moore, J. Spiers, Jr., B. T. Lacy, T Henshaw, S. J. Hendy, H. T. Lally, S. Mooney, G. H. Wallace, A. Carrigan, J. Sloss, J. M. Wright, J. F. Davis, J. Bermingham, J. Sonntag, E. Coleman, W. A. Doble and J. S. Brownell.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

TYPEWRITER DESK.—Henry B. Sanders, Willows, Cal. No. 625,852. Dated May 30, 1899. This invention relates to a desk which is adapted to be used in conjunction with typewriting machines. The desk has a two-part surface, one of said surfaces being permanent and the other so mounted as to stand in the plane with the permanent portion when closed and thus form a complete desk top. This portion has connections by which it may be depressed and thrown forward into line with the typewriting machine which is normally contained within the back part of the desk. When the top has been thus depressed, the front of the back portion and an extension connected therewith serve as a track upon which the machine may be drawn forward into position for use. When the machine has been pushed back into the receptacle, the desk top is raised and a front and sliding top piece which are connected therewith are simultaneously moved into position to close up the whole of this part of the desk so that it corresponds with the other half.

VACUUM TANK AND WATER LIFTER.—L. L. Gross, Petaluma, Cal. No. 625,882. Dated May 30, 1899. This invention relates to an apparatus for filling tanks with water or other liquid, or semi-liquid, and a means for producing a vacuum within the tank. The tank has inlet and outlet openings and controlling valves or cocks, a chamber adapted to contain carbide of calcium, having a sleeve at the lower end, a charge-measuring chamber upon which the sleeve of the carbide chamber is turnable, with means for submerging the charge in the tank so as to produce a gas. The gas, rising, fills the tank, and by means of an igniting device, the gas is exploded and a subsequent vacuum is produced, which causes the liquid to be drawn into the tank.

SPOON AND LEADER BOX.—E. A. Moeker, San Francisco. No. 625,893. Dated May 30, 1899. This invention relates to a box which is especially designed for the use of fishermen, and to carry spoons, leaders and other parts. The box is constructed with an open-top hinged cover, a horizontal partition intermediate between the top and bottom and parallel therewith, and an absorbent material between which the leaders may be carried. Vertical partitions extend from the lower part of this horizontal partition to the bottom of the box, forming compartments which are adapted to contain spoons and like articles. Openings in the ends and side with suitable doors serve to give access to these various compartments.

BURGLAR ALARM.—W. P. Murphy, Willowglen, Cal. No. 625,080. Dated May 30, 1899. This invention is designed to protect doors, windows and like openings from being tampered with by burglars and others, by producing an explosion or sounding an alarm which will awaken the occupants whenever the window is disturbed. It consists of a spring-pressed pivoted hammer, a cartridge holder in line with the head of the hammer, a spring-pressed lever fulcrumed upon the second sash and normally engaging the hammer so that the hammer is raised whenever either part of the sash is moved. When the lever has drawn the hammer back, the continued movement of the sash will release the hammer from the lever and allow it to fall upon the cartridge, which will thus be exploded.

MASSAGE MACHINE.—W. W. M. Hickey, San Francisco. No. 625,976. Dated May 30, 1899. This invention relates to an apparatus which is designed for the massage treatment of persons. It consists of a standard having parallel counterbalanced arms pivoted to the upper part, a curved yoke connected with the opposite ends of the arms, with bars and rubbers attached thereto and carried by the yoke, an intermediate mechanism by which the bars and rubbers are reciprocated, and a means for turning the standard consisting of semi-globular footpiece, a correspondingly-shaped base and socket within which the footpiece is turnable, said footpiece having holes made around it, and a spring-pressed foot pawl with point adapted to engage the holes so that the standard may be turned and the parts carried by it, moved horizontally around the circle.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING MAY 30, 1899

625,917.—FLEXIBLE SUPPORT—W. S. Arnold, S. F.
625,920.—LAWN SPRINKLER—W. Ballerstedt, Los Angeles Cal.
626,145.—BICYCLE GUARD—B. C. Crane, Montesano, Wash.
626,003.—SHEATHING—O. R. Dahl, Seattle, Wash.
626,159.—SHIP'S VENTILATOR—G. M. Eaton, S. F.
626,153.—INSECTICIDE—E. F. Eichholtz, Conway, Wash.
625,926.—ICE TANK FLOOR—Graham & Pierce, Sacramento, Cal.
625,882.—VACUUM TANK—L. L. Gross, Petaluma, Cal.
626,022.—ENGINE—I. B. Hammond, Portland, Or.
626,006.—METALLIC ROOFING—W. Heidt, S. F.
625,975.—NESTING BOX—J. Herfert, Tucker, Wash.
625,976.—MASSAGE MACHINE—W. W. M. Hickey, S. F.
625,778.—FRUIT DRIER—C. J. Krutz, Salem, Or.
625,934.—CAKE TURNER—E. D. Middlekauff, S. F.
625,893.—SPOON AND LEADER BOX—E. A. Mocker, S. F.
625,980.—BURGLAR ALARM—W. P. Murphy, Willowglen, Cal.
625,981.—MOWING MACHINE—J. Mussell, Sucker, Or.
626,099.—GAS REGULATOR—F. O. Robbins, S. F.
625,052.—TYPEWRITER DESK—H. B. Sanders, Willows, Cal.
625,988.—LAWN SPRINKLER—A. T. Snell, Los Angeles, Cal.
625,989.—PADLOCK—J. A. L. Snyder, Somis, Cal.
625,813.—FOLDING SCAFFOLD—W. C. Stull, New Whatcom, Wash
625,909.—AMALGAMATOR—E J. Verrue, S. F.

Recent Mining Incorporations.

Kings River Oil Co., Bakersfield, Cal; capital stock, $100,000—subscribed; J M. Elwood, G. Wiseman, J. Elwood, B. Elwood, J. C. Marlar.

Wild Goose M & T. Co., San Francisco; capital stock, $1,000,000; subscribed, $50; C. D. Lane, E. J. McCutchen, J. D. Arnold, H. C. Stevenson, A. H. Winn.

Great California Co., San Diego, Cal., to buy, sell and develop gold mines; capital stock, $3,000,000—paid; C. H. Atkins, N. Alexander, W. Llewelyn, A. C. Meyer, G. N. Atkins, G. W. Ingils, W. L. Rose.

The MacArthur - Forrest Cyanide Process.

TO THE EDITOR:—Having been the first to introduce the cyanide process to the public of California and Nevada, through the columns of the MINING AND SCIENTIFIC PRESS, and having been out of the literary field respecting it for some five years, a little explanation may be in order, as some have argued from my silence that my earlier expressed views of the great value of the process to the mining world had changed, but this is not the case. From practical operations when I first spoke I knew what I was talking about, and here I might as well say my silence was caused mainly by a difference of views as to royalty, which was then set at $1 per ton. This I regarded as unjust to the miner, as I was not going to lend my pen for the furthering of the interest of any company placing such a tax on the mining public. This royalty is now changed in all the mining States, and much to the benefit of the miner and, as I consider, also for the company holding the United States patents.

In an article published in the MINING AND SCIENTIFIC PRESS in 1891, answering some criticisms deriding the process, I said regarding it: "Those opposed may fight and wear themselves out; the process has come to stay and will swim above all denunciations of it." Well, it is staying all over the mining world, as the millions of dollars it produces yearly clearly prove. That the MacArthur-Forrest process is a most valuable boon for the mining public rests in its great simplicity, efficiency and cheapness of manipulation, for by it the highest per cent can be obtained at less cost per ton than any other system for extracting gold yet known, and, I must say, where ores are suitable for it, and most of our gold ores are. When working gold the getting of all of the value is simply a question of profit and loss, time being one of the main factors. What can be better than this?

As backing for the above assertion, I will quote from an address of Dr. Loevy, president of the South African Chemical and Metallurgical Society, who said: "Speaking on the essential possible improvements of the cyanide process, I unhesitatingly give it as my opinion that we have arrived at the top, as far as the chemical part of the process goes—this regarding the solution of gold by cyanide."

Here I will say it must be remembered that the great majority of mills working in South Africa are using the MacArthur-Forrest process. From the time of my first knowledge of it I have been a great believer in its value, and in consequence during the intervening years have kept a watchful eye on its progress and all the presumed "improvements," which, as I see and analyze them, are wandering away from the simple, economical and efficient plan of its first conception, and this without adding a compensating per cent in return, as in about every instance there is an extra expense involved. In this connection I will say that I have read about all the cyanide literature put forth, and find more or less of the material invariably too scientific for the practical operating miner to be interested in or to study out. Some writers are so intensely scientific that they lose sight of the practical side, while others are so practical they pass over all formulæ as Greek, the mode of work being all that is desired, and with it the question of profit and loss; and it is this practical feature of the system I have kept uppermost and in all correspondence want to make clear.

When it comes to working the process it is simplicity itself; and yet it requires practical and intelligent knowledge of its several important features, all of which a man of sense and experience can soon acquire. I am not now speaking in a scientific sense, but a purely practical, money-making sense. Respecting the process, it is grandly scientific and as grandly practical, and that it is one of the important metallurgical inventions of the age the millions of dollars it has put into circulation proves, and the sooner the miners of California take to it the better it will be for the State and for themselves.

I say California, for the reason that of all the mining States here are the ores most suitable, carrying, as they do, less bases; and again because California is further behind in the introduction of this advanced system than any of the mining States.

As to the great value of the system, we have only to recall the early failures of South Africa, and after the introduction of this process its great and growing prosperity. Last year in the Transvaal the yield by cyanide alone exceeded $9,000,000, being more than half of the entire gold yield of California.

Thus it will be seen that the process has done a great deal for South Africa—and I must say South Africa has done a great deal for the process, as they no sooner started in to work than they grasped the importance of the system, and in a remarkably short space of time hundreds of thousands of dollars were rushed into plants for the mills, and to-day they are working on the most thorough and extensive scale, some having tanks of 500 tons capacity to the charge. By this California can comprehend how far she is behind, while we think we are very progressive.

Not only has the process benefited South Africa, but Australia, New Zealand and, I may say, some of the several mining States of our own country. The Mercur of Utah was a failure until it operated the MacArthur-Forrest process, and since its introduction the Mercur has paid $1,266,000 in dividends. What has been done in South Africa and elsewhere can be done in California—and I think better in California, as a whole, than elsewhere, our gold ores being certainly cleaner than any of the gold-producing States. And I must add that one of the remarkable features of this discovery is that the very class of gold which up to the time of the introduction of the MacArthur-Forrest process had baffled the chemical and mechanical skill of the world now takes first rank as being the easiest saved when worked by it.

No one can appreciate the system more than myself, as for more than thirty years before its introduction I experimented extensively for the better saving of gold, and wrote much on the wastage of the precious metals. My system of dry amalgamation was a good advance, as respects per cent, but when the question of comfort and expense of operation was concerned I dropped my own pet and accepted the MacArthur-Forrest as more economical in operation. So much for the process. The next important feature to know is the proper erection of a cyanide plant. This depends more or less on the locality, yet all is simple and within the scope of any fair mechanical head who will carry order in his work and knows what he is constructing through suitable drafts.

When it comes to handling a plant after erection there are only two very essential skilled men required. One is the man who knows the rationale of the process in all its bearings, and the other is the assayer; and you do not want to be too economical in this department. You want to know where you are in your work all the time. First, you want to know the value of your ore, and then, as you go along, at every stage. This means careful attention and steady work, but it pays and pays well. It is this careful attention to assaying—the knowing what you are doing—that our mill men have ever been too neglectful of, they too often estimating the value of their ore by what they saved, and in the majority of instances run off fully 40% of the value, and for twenty-five years ran off all of 60%; and I may say even now the majority do not take the pains they should to find out what they lose, they being satisfied by saying "they get about 75%." But saying so does not make it so.

In building or working mills for the cyanide treatment there is no need of making failures if the proper precaution is taken. No one should start in without a thorough test of the ore he contemplates working. It is better to expend $25, $50, or even $100, if needs be, before building a plant, than make a loss of $1000 or more afterwards.

Failures do no one any good, and the greatest care should be taken to know all and be sure you are right, when right is so easily obtainable. I built a 10-ton mill on a 12-pound test, and had better per cents in the mill than the tests gave. I would not be afraid to build a 100-ton plant on a proper test of 100 pounds.

My object is to give the general mill man an idea of the simplicity of the process, that he need not consider he has to go through a course of chemistry, as he is likely to think, when he starts out to read up the process in the several excellent works published, and that he need not have any fears of getting into the insane asylum before he can fully comprehend it. As before stated, what can be done in South Africa, Utah and elsewhere can be done in California, if our mining men will wake up to the possibilities about them. California ought to be producing $40,000,000 per annum, when we consider the vast mineral field she possesses and the great strides that have been made in the last ten years in chemical, mechanical and metallurgical systems for the extracting of the precious metals.

As expansion is the order of the day, let us expand on the lines of acknowledged progress. ALMARIN B. PAUL.

San Francisco, June 1st, '99.

The Milling of Arsenical Gold Ores.

The ore of the Eureka & Excelsior mines of Cracker Creek, Utah, is a gold ore of good grade, and the vein is more uniformly mineralized than the average gold-bearing veins. The vein is a fissure in slate with arsenical iron pyrites (mispickel). In the upper or oxidized portion of the vein the gold is largely independent or free, but it exists in such an extremely fine condition that only a very small percentage of it is capable of amalgamation, even by the pan process, and the difficulty is further increased by the incompleteness of the oxidizing process that nature has been carrying on.

In the unoxidized portions of the vein the gold is in chemical combination with the mispickel, and these sulphurets exist for the most part in an extremely finely divided condition, making very fine crushing essential to their liberation.

The milling plant originally provided for the E. & E. mine was designed to crush dry, roast, and then to amalgamate in pans. Had the ore been of as high grade as then supposed, some profit would have accrued, but with the average grade of ore that existed a failure followed.

The next attempt was in the direction of milling by wet crushing and concentration upon vanners. This proved fairly successful and many tons of concentrates going $60 to $100 and upwards have been shipped.

Subsequently it was demonstrated that these concentrates could be given a dead roast in a revolving furnace and the gold extracted, by leaching with cyanide, to within 85% of the assay value.

In this case it is not simply a matter of expelling the sulphur and arsenic, but also of liberating the gold from its chemical combinations.

The crude oxidized ores can also be treated profitably by the same method of roasting and cyanide leaching.

Another example of the successful milling of low-grade arsenical gold ore is that of the Mercur district in Utah. In the case of the Mercur ores the gold is in a free condition and the arsenic exists as realgar, a chemical combination of arsenic and sulphur. It is therefore a question of thoroughly expelling the arsenic and sulphur and of leaching by cyanide, as in the free ore of the district.—Salt Lake Engineer and Miner.

Copper Salts on Amalgamated Copper Plates.

A well-known authority claims that the greenish or greenish-grey film forming on copper plates, often showing various colors, is due to the oxidation of copper in the amalgam; or it may be due to the effect of sulphates in the ore, in which case it would be at least partly a basic sulphate of copper. On good electro-silver-plated copper plates it is probably never seen. It certainly does cause a loss of gold in amalgamation. When it appears the stamps should be hung up and the coppers cleaned. This may be done with ammonia, a solution of caustic soda or potash, or a dilute solution of cyanide of potassium. After removal a little more quicksilver should be rubbed in. If it then appears it should be removed as before, all the amalgam scraped off, and a good coating of silver amalgam rubbed in. If pure silver can be obtained this silver amalgam can be easily made by using about three parts of silver to one of quicksilver. It requires about one-fourth ounce of amalgam to each square foot of surface to be amalgamated. If pure silver cannot be obtained, a good way to make it is to use silver dollars. Dissolve them in a porcelain evaporating dish, or any chinaware dish if such be not at hand, in dilute nitric acid, and evaporate it to dryness over hot water or a water bath. Heat the dry mass gently till it fuses and all the bluish tinge in it is changed to a greyish black. When this point is reached the copper alloy in the silver coin will be changed to an insoluble oxide. Then dissolve all that will dissolve in a very little water and filter into a glass jar. To this add the quicksilver required, and drop in a few bright nails or other iron. The silver will be deposited as metallic silver and form amalgam with the quicksilver, and in two or three days it will be complete and ready to use without other care. It is a good idea to always use silver amalgam on the plates rather than pure quicksilver, because it keeps the surface cleaner and, it is believed, causes a better saving of the gold.—Butte Mining World.

A New Abrasive.

Carborundum, the new abrasive, manufactured in large quantities at Niagara, is about to be applied to the same purposes as emery, and will be offered to the public spread upon cloth, paper and possibly leather. In view of this extension of their business, the proprietors are about to add largely to their premises and plant. This departure will place carborundum in direct competition with the emery, garnet and flint cloth manufacturers of the United States, of whom there are seven or eight. While it has long been recognized that there were great possibilities for carborundum in this field, the manufacturers have been busily developing the wheel and kindred industries. In the new field it is highly probable that the consumption of carborundum will exceed the amount used in wheel and other trades, and it is likely to lead to a large increase of the capacity of the Niagara Falls plant.

Homestake Mining Company.

A special meeting of the stockholders of the Homestake Mining Co. has been called for July 18th, in San Francisco, to vote on an increase on the capital stock of the company from its present amount of $12,500,000 to $21,000,000. This increased capital, represented by 85,000 shares, will be used for the purchase of other dividend paying properties of great use and advantage to the company. For 37,500 shares there will be acquired all of the properties and the entire capital stock of the Highland Mining Co.; for 37,500 shares all of the properties and capital stock of the Black Hills Canal & Water Co., and for 10,000 shares the entire capital stock of the Black Hills & Fort Pierre Railroad Co. It is also proposed to increase the number of directors from five, the present number, to seven.

Mining Summary.

ARIZONA.

(Special Correspondence).—Chloride is enjoying a genuine boom. A great many new buildings have recently been constructed and many new people are coming in.

The Mollie Gibson mine is being equipped with the new machinery which has been arriving for some time. The main shaft of the Tennessee mine is down 300 feet on a vein 12 feet wide.

New discoveries at Stockton Hill are attracting attention to that camp. Some of the old mines are being cleaned out and will be worked again. The ores of this camp, though high grade in silver with some gold, usually contain a large percentage of zinc.

Kingman, June 3d, '99.

Phœnix *Republican*: The San Xavier mine, twenty miles south of Tucson, one of the oldest producers of silver in southern Arizona, was recently purchased by Meyer, Clark & Rowe of the Kansas City Smelting Works, and since then they have had forty men developing the bodies of ore. A. Forbes, Supt., will put men at work in the mine as soon as arrangements can be made. The development of the mine is said to be extensive.——A strike of gold quartz is reported to have been made six miles east of Bisbee. The gold in the rock runs as high as $160 and there are values in silver and copper also. A shipment of ore has been made by the owners, and in the same vicinity a great many claims have been taken and prospecting work is being pushed.——Thirty-five per cent copper ore was struck by the Lowell & Arizona Copper Co. in their shaft. The vein was penetrated at a depth of 168 feet.——The payment of $20,000 has been made on the transfer of the White Star, Challenge, Mountain Star and four other claims, fifteen miles from Phœnix, to the Arizona D. & M. Co., recently organized, with T. Weikal, T. J. Boltz, A. H. Traux, F. M. Thomas and G. Wickler as stockholders. The company will begin work with a force of men and a stock of mining supplies will be sent down. A new steam hoist has been ordered.——A strike in J. D. Lee's mine on Big Bug, near Wood gulch, is said to be very rich. The ledge is 3 feet wide and throughout is rich in free gold. Some of the ore, it is alleged, carries $15 to $20 to the pound, the loose dirt at the sides of the ledge also carrying free gold. This ledge is an extension of one worked by G. Whitaker, from which thirty-six pounds of ore yielded $400. Another report is that a ledge 2 feet wide, carrying free gold, has been struck on the 200 level in the Phœnix mine on upper Big Bug, and ore from a cross ledge 6 feet above the new strike assays six ounces gold per ton.

Kingman *Miner*: In the Merrimac mine at Chloride ore is in sight in every opening. Sixteen feet of ore of good milling value has been cut.——A discovery was recently made by Gerritt & Kier on the east slope of the Walapai mountains. The vein is 5 to 15 feet, carrying $5 gold, forty ounces silver and 50% lead to the ton. Three claims have been located on the lead and all show ore. The lead ore is carbonate. Two shafts have been sunk, one 30 feet and the other 40 feet.——Sinking on the Midnight mine at Chloride has reached a depth of 125 feet. Ore that was being thrown over the dump was assayed and found to contain 11 ounces gold and 133 ounces silver to the ton, besides copper. How much of this character of ore there is in the mine is unknown, as it was cut sinking.——J. Jackman has located the Overland mine on Wallapai mountain, upon which he has been at work. The vein carries good values in gold and silver.

CALIFORNIA.

Amador.

The new shaft of the Kennedy mine being sunk in the hanging wall is calculated to reach the vein upon which the company has worked for years at a depth of 3500 feet.

The Oneida shaft is down 1880 feet. The vein which lies west of the vertical shaft and dips toward it has been opened by crosscuts at the 1500 and 1700 levels and extensive drifts driven. The shaft is calculated to reach the vein at 1900 feet or thereabouts. It is reported that recent development in the mine has discovered several feet of ore worth $15 per ton.

Jackson *Republican*: At the Butte Mountain mine the tunnel has reached the ore body 100 feet below the outcrop, and the ledge has been followed by a drift northward 100 feet. The ledge shows free gold and sulphurets, and it is said to be rich near the hanging wall. The gangue of the vein is different from that of other mines in this vicinity, being similar to that of the Rawhide mine. Supt. Marsh exhibits specimens recently taken out.——The Red Hill mine, owned by H. Eudey of Jackson, is now operated by four men as partners, by agreement with the owner. They state they are doing well. They are prospecting and paying expenses from the ore taken out.——Under the supervision of D. Fisher, work at the Spagnoli mine is progressing favorably. The shaft is down 70 feet.——For fifteen years H. F. Vogt has been developing his gravel and quartz properties at White's Bar. His property consists of a homestead, which is joined on the river side by a gravel claim. Down the river, and adjoining the gravel claim on the river bank, is his millsite. Adjoining this is the Vogt mine, joined on the west by the Golden Cora mine. There are several ledges on the property, the most valuable for milling running from the river through the Vogt and Golden Cora claims. The development consists of a tunnel from the river, an open cut 500 feet vertically above the tunnel and various holes sunk on the ledge from there to the top of the mountain, 1500 feet in elevation. On the river the thickness of the ledge is 70 feet; in the open cut and in the holes sunk its thickness has not been proven. Mr. Vogt has taken a water right to 10,000 inches on the Mokelumne river, above White's Bar.

Calaveras.

San Andreas *Citizen*: The Culbertson & Strouth mine, on the Mokelumne Hill road, three-quarters of a mile from town, is making a promising showing. A tunnel has been driven 600 feet, tapping the vein 155 feet from the surface. There the vein matter runs from 30 to 35 feet in width.——The Big Horn mine, near Murphys, recently passed into the hands of Fresno capitalists, who have organized the Big Horn M. Co., with a capital of $50,000. The president is G. H. Monroe.——The Veritas M. Co., operating the Bode or Fellowcraft mine, has started up the mill. The mill is working on ore that has been taken out long ago. As yet no work is being done in the mine.

Jackson *Ledger*: Burton & McSorley are prospecting for gravel on the J. Kavanero ranch, Camanche. The hole was drilled by machinery and is 8 inches in diameter and 160 feet deep, 20 feet of which is in gravel that prospects well. They have recently bought some property from the McLaughlin estate, on which to continue mining operations.——The new shaft at the Tellurium mine, near Pine Grove, is down 40 feet in ledge matter. The quartz taken out is hauled to the Reward mill, together with that which lies on the dump of the old shaft. Grading is progressing on the old shaft for the erection of a hoist.

Jackson *Republican*: The Del Monte mine, near Railroad Flat, is owned and operated by J. O'Neil & Son of Jackson. They have opened the mine through a tunnel and are milling rock which yields $10 per ton. When the mine was operated twenty-five years ago the ore milled $25 per ton. There is a 10-stamp mill on the property.

El Dorado.

Placerville *Democrat*: At the Boulder mine everything is activity.——Col. Jackson has put a pump in the Darling mine. He will sink the shaft 300 feet farther.——There are 1200 miners employed in this county at the present time.——Work has been commenced at the Blue Gouge under direction of E. Bind. Stoping and drifting are being prosecuted.——During the week the Cosumnes copper mine, near Fairplay, the property of J. Theisen, was sold to a San Francisco company. This property has lain idle thirty-four years, and at one time was equipped with a smelter.——The Cambrian G. M. Co. are increasing the capacity of their mill at Gold Hill to ten stamps.——A new 1300-foot cable was put in the Griffith shaft recently and they have three eight-hour shifts on the engine.

Inyo.

Inyo *Independent*: Supt. Hoskins of the Reward states that his company expects to resume operations soon and will give employment to a large force.

Kern.

Randsburg *Miner*: A. T. Stewart of Los Angeles will do some development work on the War Eagle lying west of the Yellow Aster mines.——Twenty tons of ore from the Continental Chief was recently crushed at the Red Dog mill.——L. Faval, from the State Range, brought in five tons of ore which went $175 per ton at the Red Dog mill.——The Wedge mine had thirty tons of ore crushed at the Red Dog mill which returned $2500. They are getting out more of the same kind of rock.

Los Angeles.

(Special Correspondence).—It is reported that the old King of the West mine near Acton is to be reopened. The shaft is down 150 feet and is very wet. The vein on which the shaft is sunk is 4 feet wide, but is illy defined. It carries carbonate of copper and copper glance, with iron oxide. The ore contains gold also. The high hill near the Southern Pacific Railway, between Acton and Ravenna station, has had many shafts and tunnels driven on copper prospects and some rich ore found, but nothing was ever followed to a conclusion. Under the impetus of a high price for copper and a successful method for recovering the gold, something may be found of more value than heretofore.

Acton, Cal., June 4th, '99.

A test run has been made on ore from the Escondido-Grande mine, seven miles north of Acton, in the Red Rover mill, which demonstrated that but a small part of the values can be saved by battery amalgamation.

On Mount Gleason the Padre mine is being put in order for operations.

Madera.

The Lucky Bill mine on Potter Ridge, four miles southeast of Grub Gulch, has been closed down, cause not stated.

Mariposa.

The matter of ownership of the Big Oak Flat ditch, now before the United States Circuit Court, which in the issue of May 27th was reported settled, and in which the Shawmut & Eagle M. Co. were mentioned as defendants, was an error, through common report. The Shawmut & Eagle M. Co. does not appear as party to the suit. The title of the suit is Merced G. M. Co. vs. Dorwood, et al. The court records do not show that the matter has been settled.

Nevada.

The tunnel of the Cherry Hill gravel mine, near Nevada City, now in 600 feet, is to be extended.

Placer.

The Eureka Con. workings, near Forest Hill, have at last reached the channel after numerous raises and crosscuts to determine the position of the channel. The wash includes many boulders of good size, all much rounded, and the quantity of water is large. A drift has been extended some distance and a crosscut will be run to determine the width of channel at that point. The long bedrock tunnel is 200 feet lower than the channel; and as it passes underneath the channel, about two miles from the lower end of the company's holdings, they will be able by a series of raises to drain all that portion of the channel below them and also that portion above the tunnel, about six miles in all. At present the gold is fine, but too little development has been done to determine much about the general character of this ancient stream. The development of the channel will probably produce sufficient water for sluicing. In addition to this source of water supply, the company controls water in the canyon at the mouth of the tunnel. This discovery is at a point between the old Dix mine below and the Greek mine above, and is presumed to be on the same channel.

Nevada City *Transcript*: The Gravel Hill hydraulic mine at Canada Hill, which has been in operation for several months, has suspended operations, the enterprise proving unprofitable.

Plumas.

Quincy *Bulletin*: During the past winter and spring the Round Valley Con. M. Co., in which D. McIntyre is the principal stockholder, has been extending the lower drift on a 3½-foot ledge. This vein runs east and west and prospects well. Recently the tunnel cut the north and south lode. This was found to be of the same size as the other vein and to prospect equally well. On Monday the tunnel cut a deposit richer than had been exposed before. Two pans of ore and dirt from the face of the tunnel, without crushing the quartz, secured a prospect of $2 in value. The backs are 200 feet high and will be increased as the drift advances. The Arcadia mill will be moved below the mouth of the tunnel.——A. D. McMillan of Crescent says there is copper development on the North Fork three miles below Meadow View. The ore deposit is represented to be 100 feet across. Little work has been done. The property has been bonded to Mr. Carlisle, who expects to open up and test the ore. On the opposite side of the river a continuation of the ore body has been located.

San Bernardino.

It is reported that J. R. DeLamar has bought the Gold Mountain mines, owned by E. J. Baldwin of San Francisco. These mines are on the summit of the Black Hawk range of mountains, forty-five miles east of Victor, and overlook the Mojave desert. The gold-bearing shoot occurs in a deposit of quartzite 40 feet or more in thickness and extending over several square miles of the country. The gold is found in those portions of the rock which are greatly crushed by the movements to which the rock mass has been subjected. The quartzite is stained yellow, red and brown by oxidation of iron sulphide, which is dissiminated throughout the mass in small crystals. Several attempts have been made in the past to operate these mines, but without success. At one time Mr. Baldwin built a 40-stamp mill at the foot of the hill upon which the mines are located, but as the ores are only in part adapted to amalgamation, the process failed. Some of the quartz shows free gold, but usually the gold is too fine to be seen even in panning. It is said Mr. DeLamar will build a cyanide plant of large capacity as an auxiliary to the stamp mill. Should this prove a profitable operation, there is a large amount of material to be operated upon within a mile of the original Gold Mountain mine. This deposit is similar to the Gold Chief mine, at the southern end of New York mountain, six miles west of Manvel, in this county.

San Diego.

(Special Correspondence).—It is publicly stated that the mines at Hedges, owned by the Golden Cross M. Co., and comprising a number of claims, two stamp mills and water pumping plant, pipe line, etc., are to be sold to Col. Isaac Trumbo, who has organized a company for the purpose of purchasing and operating the mines. The price is stated to be $1,000,000. Ever since the appointment of C. W. Pauley as receiver by the courts, the mines have been managed on business principles and have paid largely. The principal mines of the group are the Golden Cross, Golden Queen and Golden Crown. The camp is situated four miles from the railroad in a direct line and is in a sort of cul de sac in the rugged hills. The water is pumped through a double pipe line twelve miles from the Colorado river.

Yuma, June 2nd, '99.

Shasta.

(Special Correspondence).—F. Hurst is developing a property one mile from Shasta which he has bonded from F. Dobrowski on a basis of returning 50% of the net proceeds. The wagon haul to the smelter is three and one-half miles. A recent shipment of twenty-five tons yielded $14.72 per ton. Four men are employed.

J. M. Basset, who has reopened the Eureka mine, one mile west of Shasta, is making a 100-ton haul to the smelter. The ore assayed from $14 to $23 per ton.

C. D. Galvin is employing eighteen men, developing forty copper claims near Iron Mountain.

A San Francisco company is pushing development on the Ballakalela and Windy Camp copper properties, which are under bond.

R. R. Watts is opening a property near the Mt. Shasta mine that has an 8-foot ledge of ore.

Development at the Mt. Shasta mine continues on a large scale. Eighty men are employed. Sinking is to be continued to 500 feet depth.

Howell & Co. are shipping ore from the Swasey mine and opening the Thompson property, about a mile south of Shasta.

A. Turner has bought the Le Roi prospect at Middle Creek and put men to work.

At the Black Bear mine, near Muletown, four men are breaking ore in a 4-foot ledge. This is another ante-smelter-day property reopened recently.

Shasta, June 6, '99.

Siskiyou.

Yreka *Journal*: The Brokaw hydraulic mine is working one giant on the 60-foot bank.——The Howard mine has been producing high-grade gold ore of late.——The New York Co.'s quartz mine, under the superintendency of J. Thornton, employs thirty men. The main working shaft is down 100 feet and the tunnel has been extended to 175 feet.——Burke, Jordan & Thornton are owners of a prospect near the New York Co.'s property and report the vein 30 inches wide at the surface, the average value being $30 per ton. A mill test will be made.——Work will commence at the Erno gravel mine. A 70 H. P. boiler is on the way and will replace the old one. Page & Co., who are running the mine, have determined that there are two pay channels and have sunk a shaft between them.——Drake Bros. have discovered a cinnabar deposit two miles northwest of Oak Bar, one and a half miles from the Klamath. The deposit shows a width of 50 feet.——A quartz discovery has been made on Horse creek by C. F. Grader. The vein shows a width of 2 to 8 feet. Gold shows plainly in the ore; the owner has been working with a hand mortar. An arrastra is being constructed.——H. S. Bartons has reopened his Oak Bar mine. Bedrock has already been reached.——In extending the tunnel on one of the ledges in their group on Sugar creek, Hathaway Bros. found a body of copper ore 7 feet in width. It carries gold values.——It is reported that the Paymaster quartz mine has changed hands and the title is now vested in Bass, McCaw & Neal of the Sheba mine, in Patterson creek district.——The tunnel at the Golden Eagle mine has reached the vein, which shows a width of 17 to 31 inches. A mill is in consideration.

Tuolumne.

Carters *New Era*: Gloucester & McDonald have made a discovery in their mine near Carters.——F. McPherson has completed a new concentrator on his mine, a quarter of a mile from Sugar Pine.——A 125-light dynamo is being placed at the Providence mine. The Providence sawmill, four miles from the mine, is in operation.——Thirty-five men have been taken from the Dutch mine payroll.——At F. C. Culler's mine, near Arrastraville, the vein averages 1 foot in thickness and mills $50 to the ton in free gold. The ore is crushed in a mill the capacity of which is four tons daily. One hundred tons returned $5000.

COLORADO.

BOULDER COUNTY.

(Special Correspondence).—It is believed that most of the milling ores from the Ward district go to the Culbertson mill, near Boulder, where they are treated by amalgamation and concentration.

The B. & M., near Ward, works forty men and ships five cars of ore per week to the smelters.

The Utica mine, one of the steadiest producers in the county, is running lightly now, pending an adjustment of interests among owners.

The Ni Wot, shipping ore from the old workings through lessees, is stated to have produced ore valued at $15,000 within two months.

The new electric power plant of the Dew Drop Co. is in operation, supplying power for the compressor and hoists. Changes are being made in the Dew Drop mill, which is to start up about August 1st.

The Dew Drop and Adit tunnels will be connected by a 300-foot upraise, which has demonstrated the continuity of the ore body between the two.

Col. Brainard, who owns an electric power plant near Ward, is operating a group of mines.

The Ward pyritic smelter has been enlarged, and it is claimed the furnaces will be blown in about July 1st.

The Colorado & Northwestern Railway Co. are considering the extension of a branch from Ward to Eldora, a distance of twelve miles. WASCOTT.

Boulder, June 5th, '99.

CLEAR CREEK COUNTY.

(Special Correspondence).—A recent shipment of ore from the Onie Bell, on McClellan mountain, near Silver Plume, was divided into three classes as follows: First class, 4 ounces gold, 45 ounces silver; second class, 2 ounces gold, 31 ounces silver; third class, .96 ounce gold, 26 ounces silver.

A concentrating mill is to be built on the Mendota mine by Mr. Maxwell.

The Griffith mine, at Georgetown, shipped 250 tons of ore in May. The lower tunnel has been driven 1600 feet. Four levels are being driven on the vein. The value of the ore is 20% lead, 5% copper and over 2 ounces gold. The mine employs forty men.

Idaho Springs, June 2d, '99.

J. H. LeMoyne of Denver, who managed the Hot Pot mine for a long time, has secured the Freeland Extension mine at Freeland and will assume charge. He will put a plant of machinery at the shaft and sink to greater depth. Parties have recently opened up a good grade of mineral through these workings. The adit levels from the old Freeland workings will be driven ahead and connection made.

Amos & Erickson, working the east blocks of ground in the Black Lion, have another body of mineral, that found a couple of months ago having proved a pocket. Development is now proving the entire streak to be of smelting value.

Denver parties have a lease and bond on the Humboldt and Mary Foster mines, provided one of the levels of the Humboldt is driven 500 feet to connect with the Mary Foster, which had some rich ore when formerly worked.

DOLORES COUNTY.

The Emma gold mine of Rico is again producing. The output is thirty tons of high-grade concentrates per week.

The Enterprise mine of Rico is increasing its shipments. The mine gives employment to 125 men and is sending sixty tons per week to the Durango smelter.

GILPIN COUNTY.

(Special Correspondence).—The shaft on the Prompt Pay in Russell gulch has reached 180

feet depth; and an 18-inch streak of ore has been found, running well in copper and lead.

A new shaft house will be erected on the Gladstone & Firenzi, this property being now under bond and lease to the Gilpin & Boston G. M. Co., in the sum of $15,000.

A new shaft house with modern hoist and compressor is being put up on the Rialto under direction of Supt. C. K. Colvin of the Cook M. Co.

Blackhawk, June 3d, '99.

HINSDALE COUNTY.

(Special Correspondence).—A State road is being surveyed, to be completed this year, from a point above Lake San Christoval, this county, to near Animas Forks, San Juan county. This means the establishment and maintenance of a good wagon road from Lake City to Silverton. Gradually the points in the San Juan country are being brought closer together by good roads. WASCOTT.

LAKE COUNTY.

(Special Correspondence).—The production of the Fannie Rawlings, at Leadville, the past seven months aggregated 5537 tons of ore, of the gross value of $209,100. Of this sum, $40,000 went to the company as royalty, $120,000 to the lessees, $50,000 for smelting charges.

The Fortune mine of Leadville is beginning shipments. Its ore is said to average $25 per ton.

Leadville, June 3d, '99.

Leadville *Miner*: La Plata G. M. Co.'s property on Rock hill was an important lead-carbonate mine in early days. The company also owned a smelter. The property has been worked for years by small lessees. J. Harrison and associates are now leasing the property and have been working it for some time. A good stope is opened, from which ores run 74 ounces silver, 40% lead and .06 ounce gold. The lessees have opened a large body of gold ore, which proves the extension of the gold ore channels to the west of the Mike fault. Three hundred feet southeast from the La Plata shaft and at a depth of 300 feet an immense porphyry dyke has been cut which is all ore. The ore is almost all silica, 2 ounces silver, 1¼% lead and 9-10 of an ounce gold. The ore is dipping toward the Hall shaft workings of the Nisi Prius Co. While the ore will hardly pay at the smelter, it is important as proving the extension of gold ore shoots in the silver lead area. Gold values in the ores of the Crown Point are also increasing. Mr. Harrison will erect a stamp mill to handle this new ore body.——The Bray lease has a body of lead-carbonate which nets $20 per ton. The Baker & Wallace lease, in the same shaft, has stopes of lead sulphides which are being sold to the Arkansas Valley Smelter. The lessees of the No. 3 and Klondike shafts are making a heavy output of iron.——The work of the Leadville Pumping Association is progressing. The water in all of the Association shafts is being handled without trouble. The Leadville Home M. Co. is getting the main working levels from the several shafts in order. The recent discovery east of the Starr shaft on the Estrella Co.'s ground has proven to be a strong ore shoot, lying between the porphyry and quartzite. Two drifts are being driven into the ore; one drift shows 5 feet, the other 3 feet of ore, rich in chloride of silver, carrying 40% lead, and will average $100 per ton. At the Weldon shaft 40 feet of the connecting drift is yet to be retimbered. The work of breaking ore has commenced. Mgr. T. S. Schlessenger has adopted the eight-hour system, commencing June 1st. Wages at the Weldon mine are $3 per day.

MINERAL COUNTY.

(Special Correspondence).—The Nelson tunnel, in Creede district, which is in nearly 6000 feet, is cutting through Bachelor mountain in a southeasterly direction, paralleling the one great vein of that mountain on which the mines of the Bachelor, New York, Last Chance, Amethyst and United Mines Co. groups are located. The tunnel strikes the ground of all these properties at from 1400 to 1600 feet depth on the slope of the vein. Its main object is that of drainage and ore haulage. Ten days ago this tunnel was connected by a crosscut with the Last Chance workings, speedily relieving the latter of surplus water. The breast of the tunnel is now within 2000 feet of the Amethyst workings, with which crosscut workings are soon to be made. As the tunnel advances the grounds of the other mines will be reached in the same manner, with the result that probably by July or August all the big mines of Bachelor mountain will be drained and their deeper workings put in shape to produce. The Commodore, the largest producer in the district, is on the same vein as are the others named, but having its own tunnel, and will have no connection with the Nelson project.

Creede, Colo., June 5th, '99. WASCOTT.

MONTEZUMA COUNTY.

The Omaha placer at Mancos has found a large deposit of gravel in a rift in the rim rock, extending far into the bank. The gravel is rich and the gold coarse.

SAN JUAN COUNTY.

Denver *Republican*: The Silver Ledge mine, Chattanooga district, has again commenced operations, J. B. Warner of Denver having organized a company which will operate it. The mill has been remodeled by Mgr. Warner. It has a capacity of fifty tons per day. Several men will be worked on development of the ore bodies. The new company is composed entirely of Ohio capitalists, with M. I. Armes Pres.

SAN MIGUEL COUNTY.

(Special Correspondence).—The Japan mine and mill in Savage basin are running full force. A recent strike on this group was in quartz, rich in free gold, at 250 feet depth. By reason of this the Japan Co. are planning to enlarge their mill and to provide amalgamating facilities, the ore on the original group being purely a concentration proposition.

The Columbia, at the foot of Savage basin, is working a small force in the mine and the management is preparing to start up the mill. Nicholson & Newhouse are in control.

The mill of the Liberty Bell, near Telluride, is operating with forty stamps, the product being a concentrate. The ore, which carries gold values in sulphides, is delivered from the mine to the mill over an 11,000-foot tramway line.

The Smuggler-Union, now belonging to the New England Exploration Co., will add 200 tons daily capacity to their present large concentration mill at Pandora. N. T. Mansfield resigned the management of this property when the present owners took possession and has been succeeded by Mr. Miller of Aspen.

It is reported that the Bessie M. & M. Co. are making such changes in their mill in Turkey Creek basin as are necessary to provide for cyanide work.

Parties are at Telluride who contemplate putting up a 100-ton custom mill between that town and Pandora.

The Meidrum tunnel, driving from near Pandora to Red mountain, is in about 3000 feet. Recently a vein of good width was crosscut, on which they are now drifting. The product is said to be a good concentrating ore.

At Ophir the Suffolk is running with forty stamps, and the Carribeau mill, which was damaged in a snowslide, has been repaired and is operating as formerly.

The Butterfly mine and mill at Ophir loop, which belongs to J. K. Benson of Silverton, is operating again. Robt. Neely is Supt.

The Alta mine, in Turkey Creek basin, is shipping two cars a week of high-grade ore. The Alta belongs to N. T. Mansfield, A. J. Clark and others, who contemplate erecting a concentrator.

The Gold King mill, of which Col. McCoy is Mgr., has started up on Gold King ores.

F. Butterfield has completed a mill in Bridal Veil basin to run on Waterloo ores in Gray's basin.

The Nellie mill, up Bear creek, recently resumed work with twenty stamps. E. J. Field is Mgr.

The Tom Boy mill, in Savage basin, is treating 200 tons of ore per day, being an increase of forty tons over that of six months ago.

Pandora, June 2nd, '99. WASCOTT.

Work on the new 200-ton mill of the Smuggler-Union mine at Telluride has commenced and it is expected that the mill will be completed the present season.

The recent strike in the Silver Tip mine, Ophir district, is one of the best ever made in the district. The paystreak is 10 to 12 inches wide and carries assay values of from 1200 to 1300 ounces in gold, the average of the entire streak being $350 per ton.

TELLER COUNTY.

(Special Correspondence).—The C. O. D., whose workings were submerged in water for months, has been pumped out. The property, owned by outside parties, is under lease. Sinking is to commence and shipments of ore from the eighth level will begin.

The Woods Investment Co. are now owners of the Clyde, on Bull hill. A vein of ore was encountered in sinking a shaft at 165 feet depth.

A good showing of ore was found on Friday on Tenderfoot hill by T. Fagin.

N. B. Williams, Pres. Isabella M. Co., whose group of mines is on Bull hill, is reported as saying that the vein matter encountered in the tenth level is from 30 to 50 feet wide, but that the ore therefrom is too low grade to ship; that since February 25th there had been 2000 feet of new work in sinking and drifting on the tenth level, under stopes of higher levels, without finding ore of paying grade.

The output of the Legal Tender, on Bull hill, Cripple Creek, for the month of May was 3600 tons. It is given out that new ground is being opened and more men put on.

The production of the Los Angeles mine on Bull hill for the year ending June 1st, '99, was 2848 tons of ore. The average value of the product for the first seven months was $20 per ton, for the last five months $42 per ton. The Los Angeles is being worked by lessees.

The Last Dollar, of which C. Walden is Supt., is situated on Bull hill, near the Los Angeles. Its shipments for May amounted to fifty-three cars.

The Zenobia shipped twenty-five tons of two-ounce ore on the 2nd inst.

The Whipp & Glenn lease on the Pinnacle is in good ore and better hoisting facilities are being provided. A two-car shipment of ore was made last week.

Cripple Creek, June 2d, '99.

Denver *Republican*: The production of the Gold Sovereign for the current month will, it is estimated, be the largest in the history of that company. In April 290 tons were shipped by various sub-lessees, and this month it is thought the output will be 300 tons. This result has been obtained without the assistance of the heaviest producing sub-lease, that of the Associated Co. This company has not encountered ore in its crosscuts from the bottom of the winze. The crosscut has now been driven 75 feet. The heaviest shipping lease during May was that held by Stumps & Co. on the Wisper shaft. Sub-lessees from Stumps & Co. have the past week broken into shipping ore across 7 feet. The find was made in the 170 level. A 50-ton shipment from this sent out last week gave $39 per ton. The lessees are prospecting for the same shoot at the 213 level. Lessee Cummings struck a continuation of it in his lease on the Close Shave shaft of the Dante. He has a lead 5 feet wide, 2 feet of which carries as high as five ounces to the ton. The production from Nash sub-lease of the Gold Sovereign for the past two weeks amounted to fifty tons, taken from the level run at the bottom of the winze sunk co-jointly by the Associated Co. and Nash. Stoping has been commenced in the ninth level. This winze is down 100 feet from the tunnel level. It is equipped with an underground electric hoist, is 4½x9, and the lease stipulates it is to be deepened an additional 150 feet.——The Bowling Green, O., Co., which formerly had a lease on the main workings of the Burns, of the Acacia Co., has abandoned it. The property was secured by John Grant, an Aspen operator. The Grant lease covers the Barnes ground to the south end line, and is for a term of two years. Work is to be commenced the first of the month.——Hubbard & Hurley, lessees on the Grouse of the Bankers Co., have a year's extension on their lease from July 1. They made money from their former operations on this ground. There are five parties to this lease, and lately a dividend of $1000 per share per month has been distributed.——Extensive improvement work is now under way on the north block of the Deadwood at Victor. The ground is that operated by the Consolidated Gold Mines, one of the organizations controlled by the Woods Investment Co. of Denver. A new working shaft 4½x9 has been sunk to connect with the winze from the first level. Carpenters are erecting a shaft house, to be 80x66 feet. The company will resume sinking in the new shaft to the 600 point. From the first two levels a heavy production has been maintained for some months. At one point in the first level the stope measures 40x40 feet. Nearly everything broken from this stope was sent to market. ——The recent strike on the old Boyd lease of the Morning Glory of the Work Co. was made while the lessees were deepening the shaft for a 60-foot lift from the 230-foot level, and were within a few feet of the 280-foot point, when the ore began to show in the shaft. The shaft cut the find on the dip, and the width has not been learned.

IDAHO.

Spokesman-Review: The Big Buffalo at Buffalo has a 2-foot pay streak that is rich, and ore taken from this chute is kept separate. Much of the ore is of a chalky nature, similar to the Republic ore. The wood for timbering has to be hauled in by hand on toboggans on a down-hill pull.——The new map of the camp made by Engineer McIntyre shows the camp to be nine miles long and one-half mile to one and one-half miles wide.——Several snow locations are proving good. A number of ledges are being worked on the east side of the belt, in the vicinity of Fish lake, but the values are not high.——The Monte Cristo is crosscutting and shows 6 feet of ore. Assays have not been made public, but samples pan out free gold.——Buffalo camp is divided into two towns—one at the Big Buffalo mill, on Lake creek, the other on the top of the hill, two miles distant, at the Big Buffalo mine.——Snow about Lake creek has settled to 4 feet, but upon the higher levels it still lies 10 to 12 feet deep, making work and travel almost impossible.

MONTANA.

Virginia City *Madisonian*: T. Biesinger, who is working the Zebra mine near Barton gulch, is taking out some rich silver ore. He is reported to have taken out 150 pounds of almost pure silver. He has ore which assays $9,000. It is said the vein is 5 feet wide; the pay streak is narrow.——The Black Eagle in Barton gulch is being worked by J. Kripper, who has found a body of ore which carries 100 ounces of silver and 20% lead. He shipped 1000 sacks of ore to Butte for treatment; he expects to have his ore treated at Twin Bridges as soon as the smelter there begins operations.——There has recently been found fine copper ore in Barton gulch, one ledge being 7 feet wide, the ore carrying 9% copper. ——C. E. Damours reports having found rich gold ore in the Lesarge mine at Summit.—— C. Lane and F. Walker, who have sub-leased a part of the Bamboo Chief of Devlin & Grove, have a vein of ore 8 to 12 inches wide, which will average 800 ounces in silver with value in gold.

NEVADA.

The Virginia Miners' Union has demanded that the electricians employed at the underground stations of the C. & C. shaft by the Comstock Pumping Association shall become members of that union. Gen. Mgr. Ross of the Comstock Pumping Association sent the following telegram to the main office:

"VIRGINIA, Nev., June 7th, '99.

"*To Aug. Waterman, Room 23, Nevada Block, San Francisco*: Miners' Union threaten in a written communication to prevent our electricians working at their stations underground unless they become members of the Miners' Union. The men so far have refused to join the union. The union demands that I take action to-day. Telegraph instructions.

"G. McM. Ross."

At a meeting of the executive committee of the Pumping Association June 8 a resolution was passed inviting a committee of the Miners' Union to meet the Pumping Association in San Francisco to discuss the matter.

Reno *Journal*: The Silver Peak property, fifty miles from Candelaria, in Esmeralda county, is reported to have been sold for $1,000,000. The purchasers are said to be Eastern capitalists. This property consists of 200 claims on a number of lodes of gold and silver ore. For the past five years watchmen have kept the camp from being deserted, except for a time when tailings were being worked by the cyanide process.

NEW MEXICO.

The Santa Rita copper mines, sixteen miles northeast of Silver City, have passed into the hands of Eastern capitalists, understood to be the Amalgamated Copper Co. The matter has been pending since June 30th, '98, when the managers of the Hearst estate secured an option from J. P. Whitney of Boston and the companies controlled and operated by him and known as the Santa Rita Copper & Iron Co. and the Bonanza Development Co. for forty-six patented claims and thirty-three unpatented claims, comprising what is known as the Santa Rita mining camp, Grant county, the consideration being $1,200,000 and the term of the option being for three years. The Hearst estate receives $200,000 for its option.

C. F. Grayson has bought a three-quarter interest of T. B. Catron in the Hanover mine, two miles from the town of Hanover, Grant county. The remaining interest is owned by J. B. Gilchrist of Santa Rita. The new owners have commenced operations.

WASHINGTON.

Spokesman-Review: C. W. Barger in February struck a placer on Salmon river, three miles above John Day creek, and gets nuggets in size from that of a pea to one containing $13.20, and he has one larger. The dirt is rich, and one pan of picked dirt gave $16 in gold. J. H. Barger has a small bottle containing $2.35 in coarse gold which he got from one pan of dirt on his brother's claim.——The Palmer mountain tunnel is in 1900 feet and 1000 feet in depth, and is entering a section of the mountain which was rich on the surface. Within the next 1000 feet the Black Bear, War Eagle and Wisconsin Central veins will be cut at a depth of 1300 to 1500 feet. Mgr. Boyd has begun drifting on two of the last ledges cut, with satisfactory results. Twenty men are now employed in the mine. The water power is being developed under the supervision of L. Craddock.——J. Boyd has added to his interest in the Utica, on Douglass mountain. The claim runs in copper and gold. Considerable work has been done and work starts up again on Monday, when a shaft will be sunk on one of three veins which run through a porphyry dyke 120 feet wide. The Utica is a short distance from the Little Falls, recently bought by Spokane parties under the management of D. Hart, who has been doing preliminary work, and has started a force to develop the property. He will begin shipping ore.

FOREIGN.

BRITISH COLUMBIA.

Work continues steadily on properties that have not reached the shipping stage. Among them are the Virginia, Iron Colt, Iron Horse, Homestake, Deer Park, Southern Belle and Snowshoe, Mascot, Coxey, Gertrude, No. 1 Josie, Nickelplate, Great Western, Velvet, Leiter, Wallingford, Sunset No. 2, Mabel, Douglas, White Bear, Evening Star and others. Some of these are nearing the productive stage. The Velvet is in a position to ship, as it has reserves. The Douglas has a vein opened 30 feet in width. The Evening Star has a large chute of ore in condition for shipping. It will market the ore on its dumps and that taken out in development. The Columbia and Kootenay and the No. 1 will market their ores.

Spokesman-Review: On the 1st inst., in accordance with their notice, all the mines in the Slocan and Nelson mining divisions reduced the rate of miners' wages from $3.50 to $3 in consequence of the Legislature having prohibited the employment of men underground for longer than eight hours in twenty-four. The miners' union has threatened to strike around Nelson, although this action has not been universal. The Hall mines are working on the new scale and there has been no trouble. The miners of the Granite mine have gone out, but not the muckers. No one has quit work at the Royal Canadian and the Duncan Mines, Ltd. At Sandon the Whitewater Deep people, who did not join the association, are working fourteen men, paying the old scale for eight hours. The Vancouver and one or two smaller properties near Silverton are employing miners at $3.50 for eight hours. At Ymir all the miners employed at the Ymir mine have quit work in consequence of the reduced rate of pay offered. Both sides are firm. The mine authorities give no hopes of paying more than $3 per shift of eight hours. The miners, backed by the miners' union, refuse to accept less than $3.50. The mill will continue to work, as the mill hands are not demanding any change in the rate of pay, and there is ore on hand to keep forty stamps running night and day for three months. So far the Ymir mine is the only one where a strike has taken place, and it is probable that nearly all the men going out will find employment in the Porto Rico mine. On the Porto Rico, Tamarac and other mines in the vicinity the rate of $3.50 will be paid for the eight-hour day. At New Denver the mines are idle. The union miners employed underground quit work with the last shift in May and refused to go back to work under the $3 scale adopted by the Miners' Protective Association, to date from June 1. The Last Chance mine closed on Saturday, the Noble Five on Monday, and the Payne has reduced its force to thirty-five men.

NEW ZEALAND.

During the first three months of this year the Waihi mine produced 19,391 tons of ore which returned £58,212. Up to date the mine has yielded £958,091 6s 8d.

The directors of the Woodstock mine have determined to have the battery power increased, and half a dozen more vanners have been ordered from America. The development at No. 5 level is proceeding, and the reef shows a width of 12 feet, the ore carrying considerable sulphides. Other levels in the mine are being worked and quartz of average quality is being broken.

NOVA SCOTIA.

The Cape Breton Copper Co., Ltd., has concluded a deal for the purchase of two square miles of copper land at Eagle Head, Gabarus bay, Cape Breton. The property has been bonded with the right to conduct prospecting and mining operations pending the term of the bond. A. Whyte, formerly Mgr. of the Little Bay copper mine, Newfoundland, has been engaged as Mgr. Three veins of chalcopyrite ore crop out on the shore of Gabarus bay. On the middle one a shaft was sunk 75 feet several years ago. The location is seven miles from the Louisburg terminus of the railroad, and there is sufficient water in Gabarus bay, close to where the veins crop, for a vessel to load.

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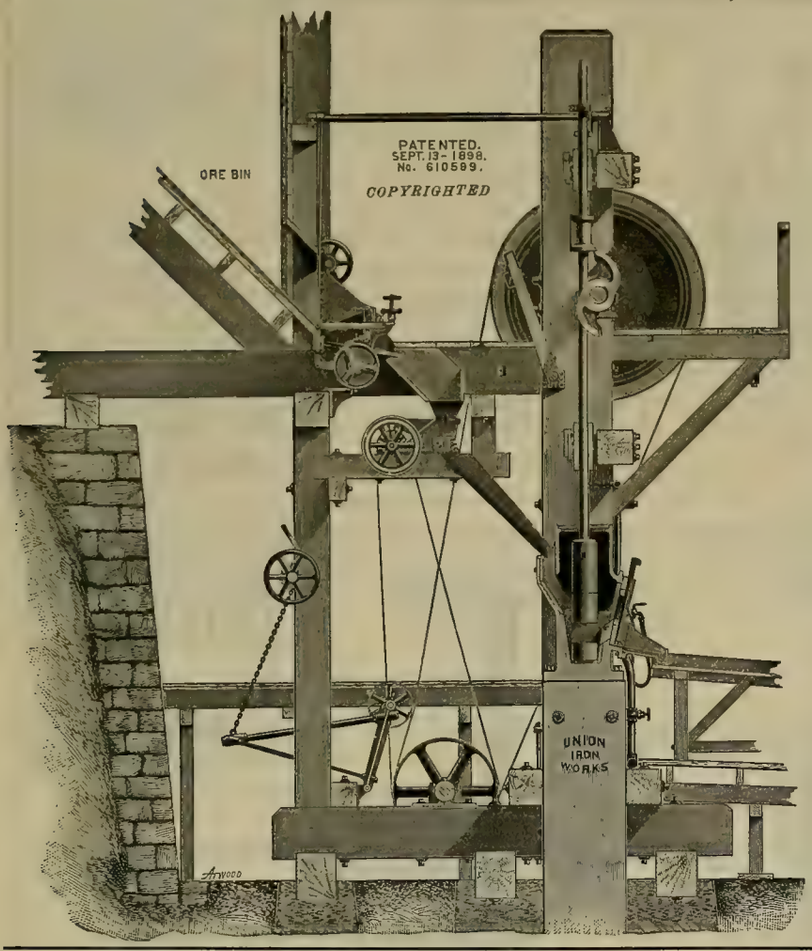

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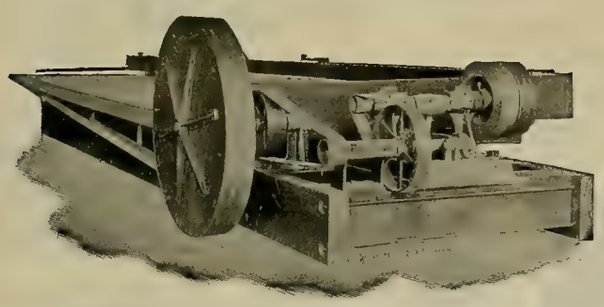

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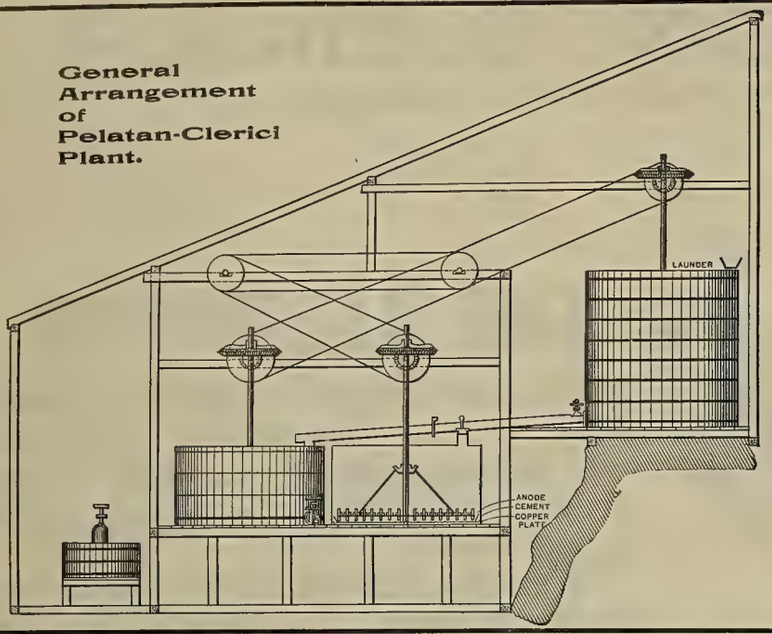

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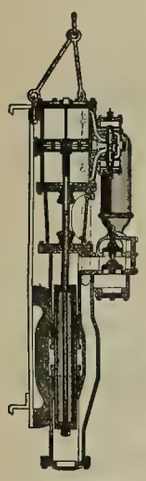

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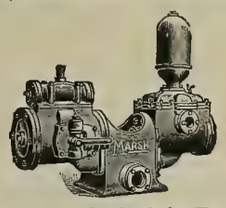

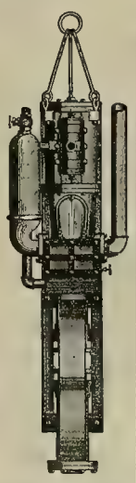

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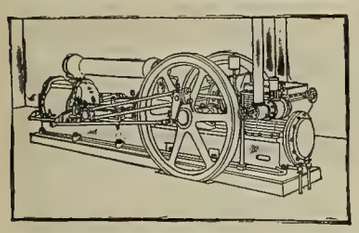

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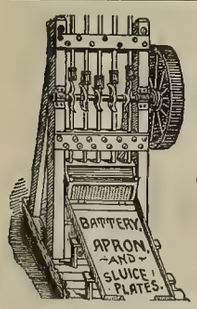

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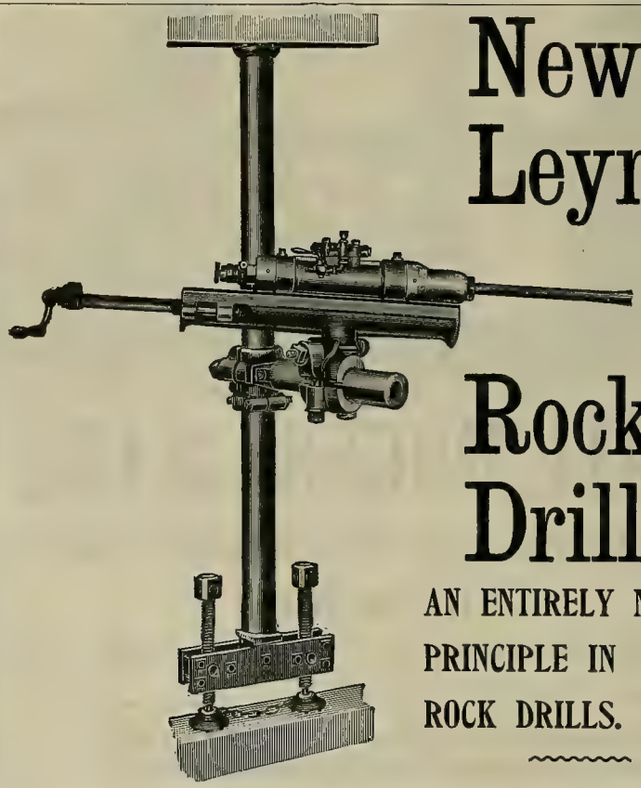

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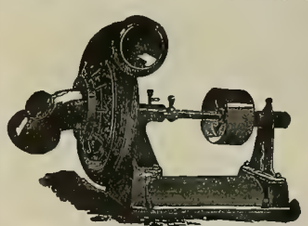

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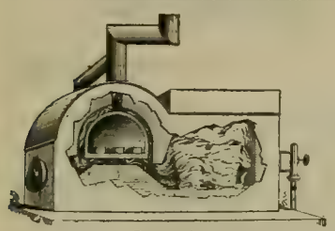
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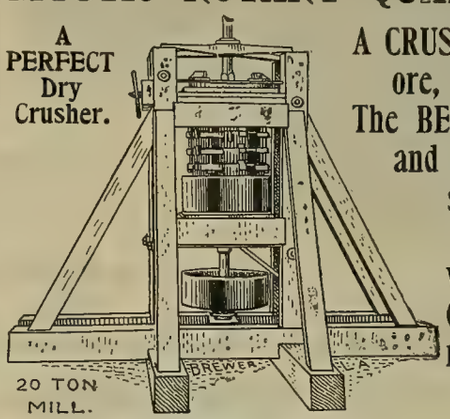

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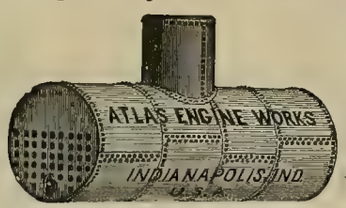

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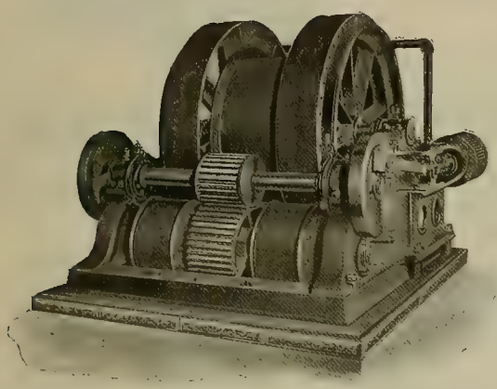

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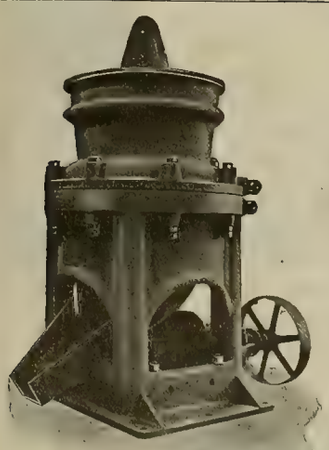

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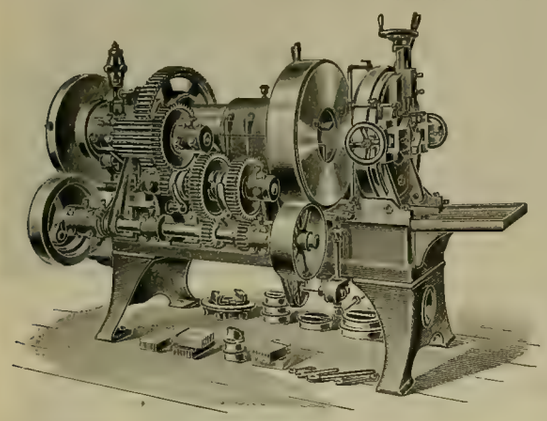

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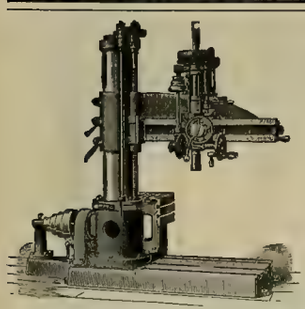

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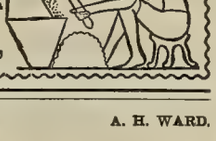

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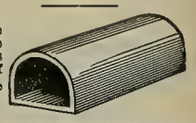

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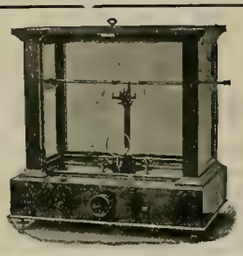

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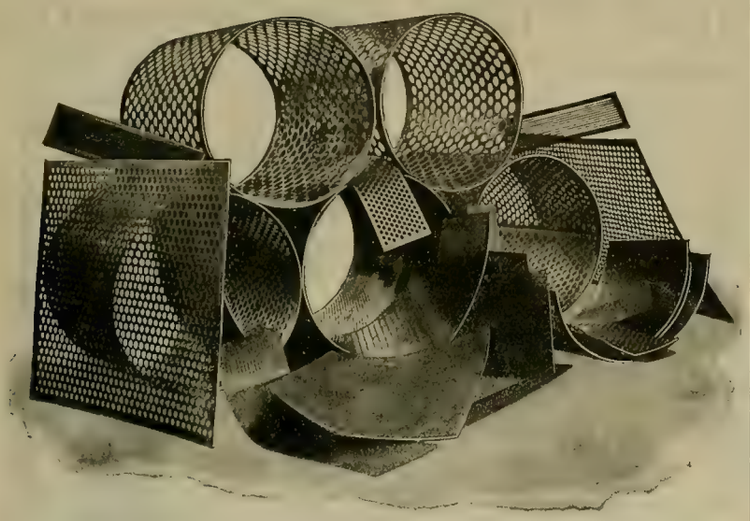

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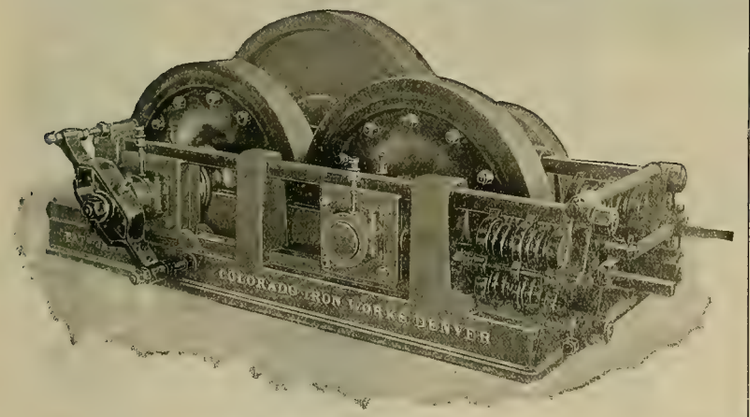

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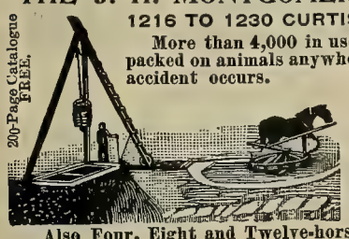

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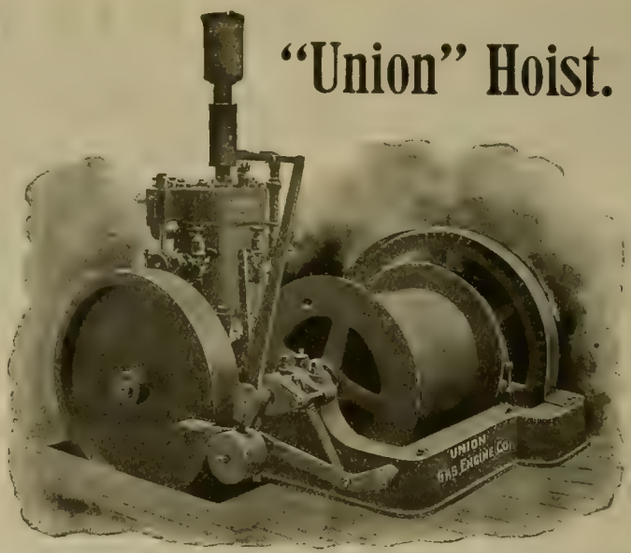

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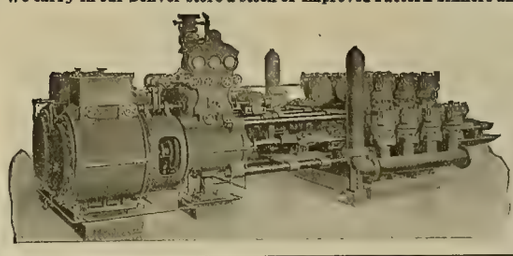

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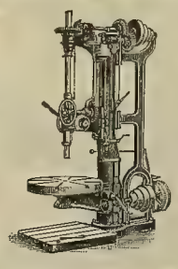

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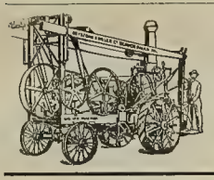

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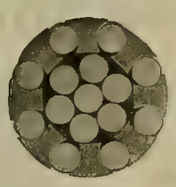

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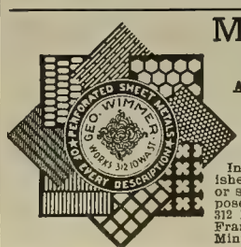

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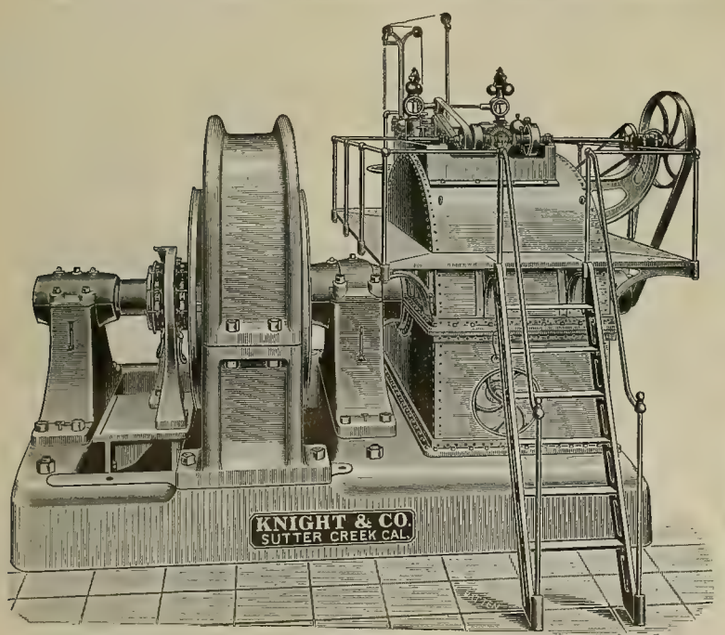

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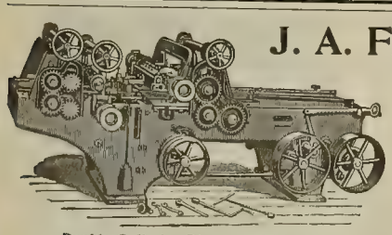

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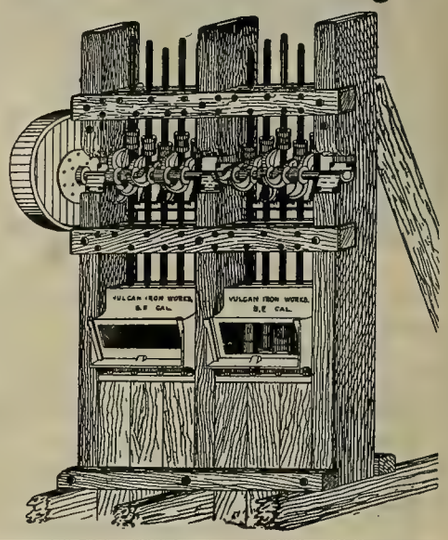

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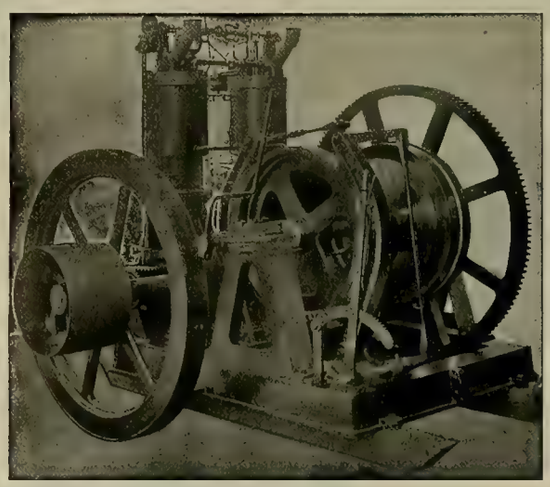

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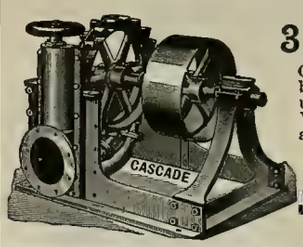

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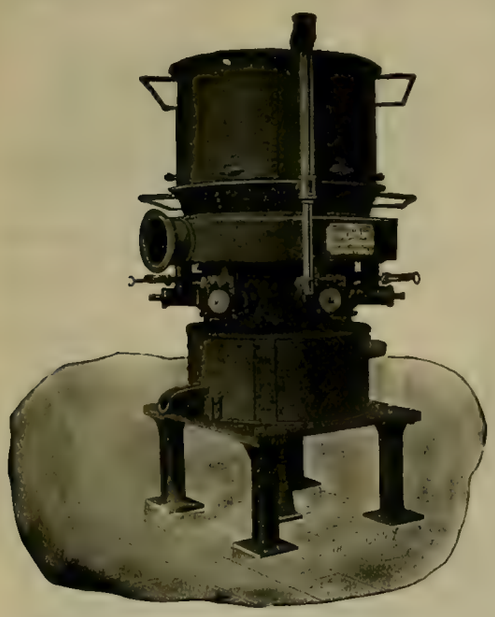

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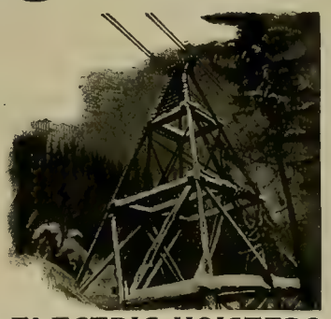

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Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Etc.

THE MINE AND SMELTER SUPPLY CO.,.....Denver, Colorado.
THE MINE AND SMELTER SUPPLY CO.,.....Salt Lake City, Utah.
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

THE CAMMETT CONCENTRATOR.

THE MOST RECENTLY DEVELOPED AND SCIENTIFICALLY DESIGNED CONCENTRATOR ON THE MARKET.

Capacity—15 to 30 Tons Per Day.

PRICE, with all extra attachments, $450, DENVER, COLO.

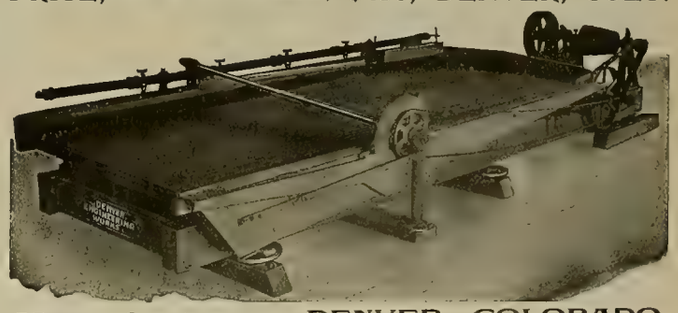
YOU ARE A MILLMAN,

or you would not be looking at this ad.

YOU ARE AN INTELLIGENT ONE,

because having naturally seen the picture first, your instinct said, "That's a good looking machine," and you are reading this to find out about it, which proves our judgment of your intelligence is correct.

Our circular will tell you more. Write for it—it's free.



DENVER ENGINEERING WORKS, Sole Manufacturer, DENVER, COLORADO, U. S. A.

CHAS. C. MOORE & CO.,

ENGINEERS AND DEALERS IN

BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES, HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES, GREEN'S ECONOMIZERS, WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS, HOPPES LIVE STEAM PURIFIERS, EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS, SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS, GOUBERT FEED WATER HEATERS, ATRSTTON STEAM SEPARATORS, SNOW STEAM PUMPS, QUIMBY SCREW PUMPS.

Watch this Space for Description of the Above Machinery.

Send for Catalogues and Full Information.

32 FIRST STREET, SAN FRANCISCO, CAL.

Market Reports.

SAN FRANCISCO, June 8, 1899.

SILVER.—London, 27 11-16d; New York, 60¼; San Francisco, 61; Mexican Dollars, 48¼. New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.—New York reports quiet, $4.45 bid, $4.50 asked; brokers' price, $4.25.
Local, pipe, 7¼@7¼c; sheet, 7¼@8¼c; pig, 7c; bar, 7¼c.

COPPER.—New York reports Lake nominal at $18.50; brokers' price, $18.25; mill copper plates, 23¾c.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Pig, 31c per lb.; Bar, 35c. New York weak, $23.35 bid, $25.50 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $42; export, $38.50 @39; carload lots, special rates.

PLATINUM.—London, 63½s per ounce; York, $16.25; San Francisco, $16.75.

RED LEAD AND LITHARGE.—One ton and over, at one purchase, 6¼c; 500 lbs. and less than one ton, 6½c; less than 500 lbs., 7c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5¾c; 6s, 10 oz., 5¼c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 52c; cs., 57c; raw, bbl., 50c; cs., 55c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 47c; cs., 52c; raw, bbl., 45c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18½c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 20c; do., cs., 25c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 52c; cs., 57c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia	9¾	10¾
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¾

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 8, 1899.

9:30 A. M. SESSION.

300 Belcher	39c	300 Sierra Nevada	71c
300 Con. Cal. & Va.	$1 70	100 Union Con	42c
100 Crown Point	29c	500 Yellow Jacket	41c
100 Overman	19c		

2:30 P. M. SESSION.

100 Ophir	$1 10	200 Seg. Belcher	09c
100 Gould & Curry	28c	400 Overman	22c
200 Savage	25c	300 Alta	06c
400 Potosi	43c	500 Caledonia	83c
100 Crown Point	30c	200 Challenge	40c
200 Yellow Jacket	43c		

Utah Mining Districts.

Bingham, Tintic, Park City, Mercur, Marysvale, Gold Mountain, Deep Creek, La Sal, described and illustrated in a sixty-four-page pamphlet, together with a prospector's map of Utah, and claim (grouped) maps of Bingham, Tintic and Mercur, ready for delivery June 20th. Send six cents in postage for this, the most complete and reliable write-up of the mineral resources of Utah ever published. F. A. WADLEIGH, General Passenger and Ticket Agent. Salt Lake City, Utah.

Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

WANTED.

Position as Assayer and Bookkeeper.

References: Abbot A. Hanks, Baldwin & Howell, S. F. Address W. B. HOAG, Berkeley, Cal.

A University Graduate Desires a Situation

with mining company. Understands assaying, surveying, metallurgy, etc. Best references. Address D. L., this office.

OPEN FOR ENGAGEMENT.

A Mining Engineer, Geologist and Metallurgist; associate of the Royal School of Mines, London; first-class Government certificated mine manager, England, (39) is open to an engagement with responsible gold or copper-producing company as General Manager or Superintendent. Has had 21 years' practical experience in all branches of mining work and held the position of Manager at some of the largest and most important mines both in Europe and this country. Highest testimonials and references. Address "QUARTZ," care of Mining and Scientific Press, San Francisco.

WANTED—Stamp Mill Tailings.

Will buy or work on shares. State quantity, value, character and terms. Address C. R. P., care Mining and Scientific Press.

FOR SALE.

One 150 H. P. Corliss engine, in first-class condition; size of cylinder, 18x48. Also, one Buckley condenser. For particulars, apply O. N. B. & C., P. O. Box 2096, San Francisco.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.

For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

MINING PROPERTIES.

Capital wanted to continue development on partially developed, promising mine. Will give an interest or bond, with option for purchase. Near good ore market. Also a group of six claims, developed, ready for mill. Likewise a partially developed prospect containing eight ledges, smelting character, near ore market.

J. N. ROSA, BOX 5, ... SHASTA, CAL.

..CRIPPLE : CREEK..

FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

Quicksilver

—FOR SALE BY—

The Eureka Company,

OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

AMERICAN AND FOREIGN TRADE MARKS

SCIENTIFIC PATENT PRESS AGENCY

PATENTS

CAVEATS

DEWEY, STRONG & CO. 330 MARKET ST.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

Cable address Edbec Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.

GRAHAM, GARRETT & CO.,

211-212 Peyton Block, SPOKANE, WASH.

MINE PROMOTERS, AND BROKERS.

Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

DOBLE ROCK DRILLS AND AIR COMPRESSORS.

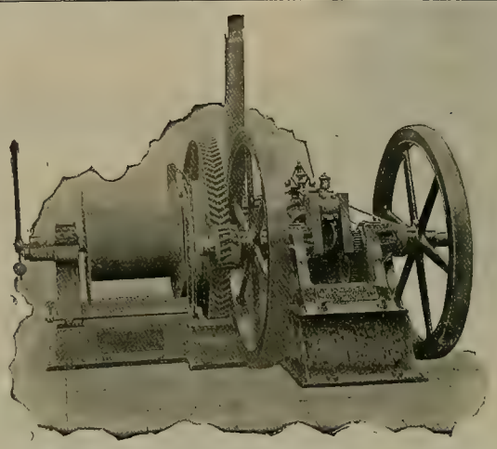
SIMPLEST.

BEST.

Write for Catalogue.

Miners, Investigate!

ABNER DOBLE COMPANY, S. W. COR. FREMONT & HOWARD STS SAN FRANCISCO, CAL.



FRESNO, June 25, 1898.

Hercules Gas Engine Works, San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,

305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,

MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,

ALSO REPAIR AND JOB WORK OF ANY KIND.

Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.

509-511 Howard St., - San Francisco.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

REPUBLIC and ROSSLAND Mining Stocks

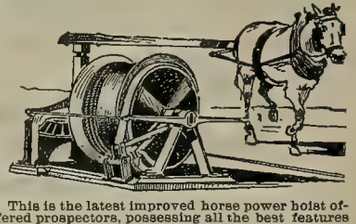
Bought and sold for non-residents. SOLID DIVIDEND PAYERS as an investment. Prospective producers as a speculation. Write for information.

H. P. PALMER & CO.,

Exchange Nat. Bank Bldg., SPOKANE, WASH.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from J. H. Southwick, in the North Hill Placer Mine, near Milton, Calaveras Co., to deposit tailings in Rich Gulch; from T. B. Bennett, in the Ohio Mine, near Wash. Plumas Co., to deposit tailings on a flat below the mine; from W. E. Duncan, Sr., in the York Ranch Placer Mine, near Spanish Ranch, Plumas Co., to deposit tailings on a flat below the mine; and from Alfred Schofield, in the Klondike Mine, at Whiskey Diggings, Sierra Co., to deposit tailings behind the dam of the Washington Mine in Slate Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on June 12, 1899, at 1:30 P. M.

EL PASO Automatic Horse Whim.



This is the latest improved horse power hoist offered prospectors, possessing all the best features of other styles with improvements added. The end thrust is entirely done away with, thus increasing the efficiency and saving considerable wear. The Automatic Safety Brake is so arranged that accident is impossible, being in position until held out by operator to lower bucket. ::::: It is made entirely of iron and steel. Weight, about 1400 pounds

THE HASSELL IRON WORKS CO.,

COLORADO SPRINGS, COLO.

Two Styles: STAR and U.S. Made in Brass Also. ★

STAR PATTERN for Heavy Pressure.
U. S. PATTERN for Ordinary Pressure.

We warrant them for all service where a quick, reliable action is required.
It will pay you to investigate.
Full particulars from any jobbing supply house, or direct from the manufacturers.

THE WM. POWELL CO., CINCINNATI, O.

Assessment Notices.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of May, 1899, an assessment (No. 2) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of May, 1899, an assessment (No. 13) of Ten Cents (10c.) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of June, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California.

The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of May, 1899, an assessment (No. 19) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of June, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3rd day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, Cal.

BOULDER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1899, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 27th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for salent public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

BADGER HILL AND CHEROKEE GRAVEL MINing Company.—Location of principal place of business, San Francisco, California; location of works, Cherokee, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of May, 1899, an assessment of Three Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 27th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of May, 1899, an assessment (No. 3) of ten (10) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of June, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 11th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson street, San Francisco, Cal.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of May, 1899, an assessment (No. 12) of two cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3d day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary.

Office—Room 9, 320 Sansome street, San Francisco, California.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of June, 1899, an assessment (No. 21) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 8th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of June, 1899, an assessment (No. 7) of five (5) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

Stockholders' Meeting

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines.—In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated mines, a meeting of the stockholders of this company will be held at 11 o'clock in the forenoon on WEDNESDAY, the 12th day of July, 1899, at its principal office, 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Hundred Thousand ($200,000.00) Dollars in 200,000 shares at the par value of One Dollar each.

Dated: San Francisco, May 25th, 1899.

JOSEPH H. MOOSER, Secretary.

SPECIAL MEETING.—A special meeting of the stockholders of the Electric Placer Mining Co. will be held at the office of the company, 204 McAllister street, room 12, San Francisco, Cal., on SATURDAY, June 17th, 1899, at 2 o'clock P. M.

A. R. VINING, Secretary.

DELINQUENT SALE NOTICE.

HEAD CENTRE CONSOLIDATED MINING COMPANY.—Location of principal place of business San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. C. Parsons, Trustee	108	100	$20 00
H. B. Parsons, Trustee	112	100	20 00
H. B. Parsons, Trustee	116	100	20 00
H. B. Parsons, Trustee	145	100	20 00
H. B. Parsons, Trustee	152	100	20 00
J. W. Pew, Trustee	536	500	100 00
S. B. Wakefield	361	3	60
J. W. Pew, Trustee	384	100	20 00
J. W. Pew, Trustee	389	100	20 00
J. W. Pew, Trustee	390	50	10 00
J. W. Pew, Trustee	463	100	20 00
J. W. Pew, Trustee	504	5	1 00
J. W. Pew, Trustee	536	50	10 00
G. B. Root, Trustee	564	20	4 00
G. B Bayley, Trustee	674	50	10 00
J. W. Pew, Trustee	710	100	20 00
J. W. Pew, Trustee	711	100	20 00
J. W. Pew, Trustee	712	100	20 00
E. B. Deane, Trustee	717	100	20 00
S. Ichauer, Trustee	820	100	20 00
H. H. Shinn, Trustee	873	700	140 00
F. A. Benjamin	875	5	1 00
W. Steele, Trustee	890	500	100 00
J. W. Pew, Trustee	898	50	10 00
J. W. Pew, Trustee	905	100	20 00
H. W. Hasselgren	908	100	20 00
H W. Hasselgren	909	100	20 00
Peter Lane	910	630	126 00
M. Rehfisch, Trustee	917	1,250	250 00
M. Rehfisch, Trustee	918	1,250	250 00
M. Rehfisch, Trustee	922	300	60 00
M. Rehfisch, Trustee	923	200	40 00
M. Rehfisch, Trustee	924	400	80 00
J. W. Pew	946	1,333	266 60
John Sinclair	951	500	100 00
A W. Foster	957	8 000	160 00
A. W. Foster	958	4.000	80 00
Rehfisch & Co., Trustees	960	100	20 00
Jas. Rolph, Trustee	968	500	100 00
S. B.Wakefield & Co., Trust's	969	1.500	300 00
S. B.Wakefield & Co., Trust's	971	3.833	766 60
J. W. Pew, Trustee	975	400	80 00
J. W. Pew, Trustee	989	40	8 00
A. W. Foster	1010	3.000	600 00

And in accordance with law, and an order of the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

POSTPONEMENT.

The day of sale of the delinquent stock of the above named company is hereby postponed to MONDAY, June 12th, 1899, at the same time and place. By order of the Board of Directors.

J. W. PEW, Secretary.

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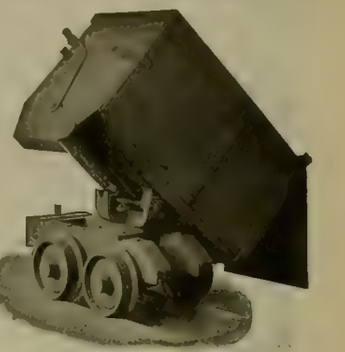

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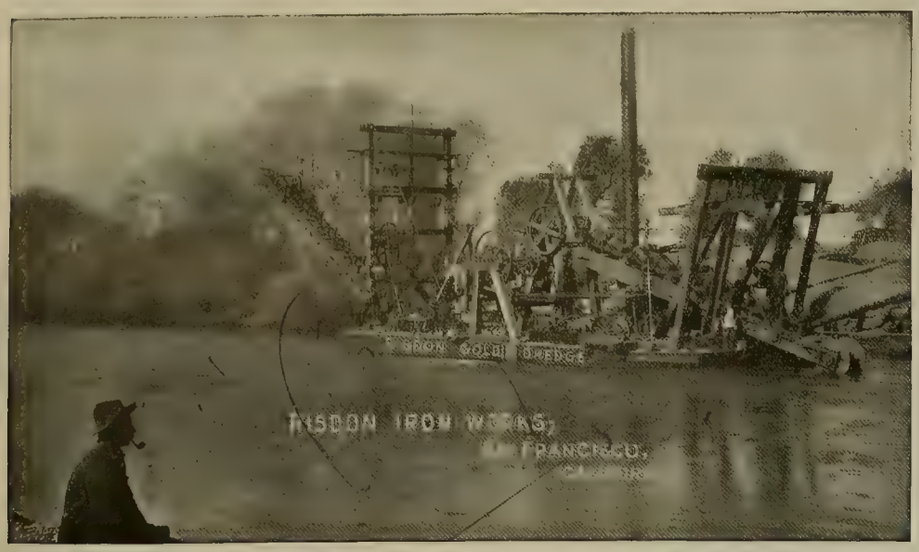

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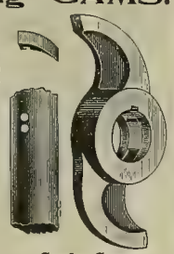

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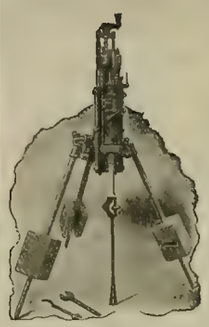

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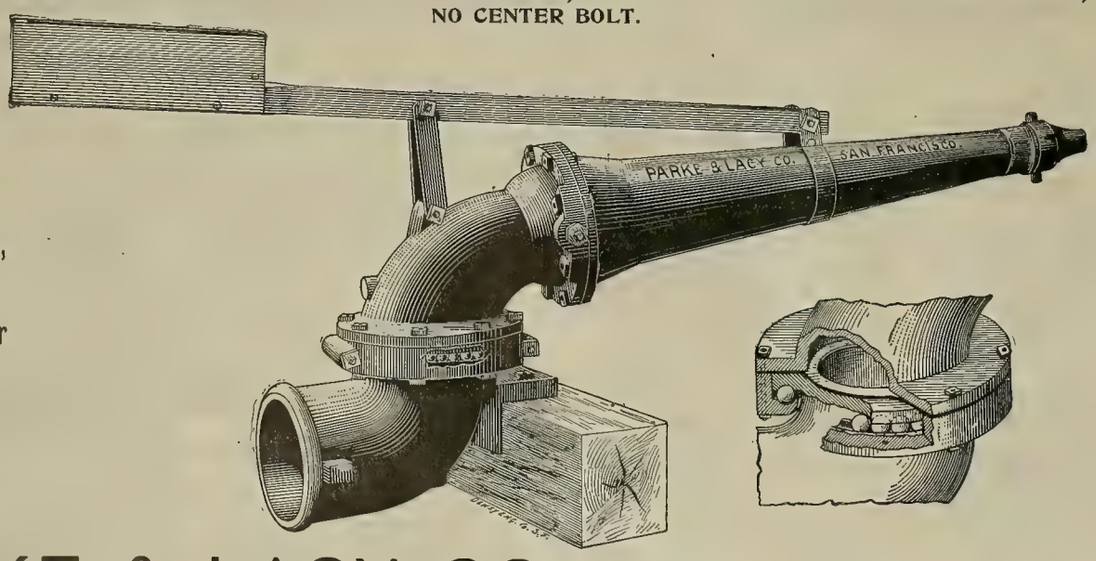

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No. 2032.—VOLUME LXXVIII. Number 24. SAN FRANCISCO, SATURDAY, JUNE 17, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Value of Comparisons.

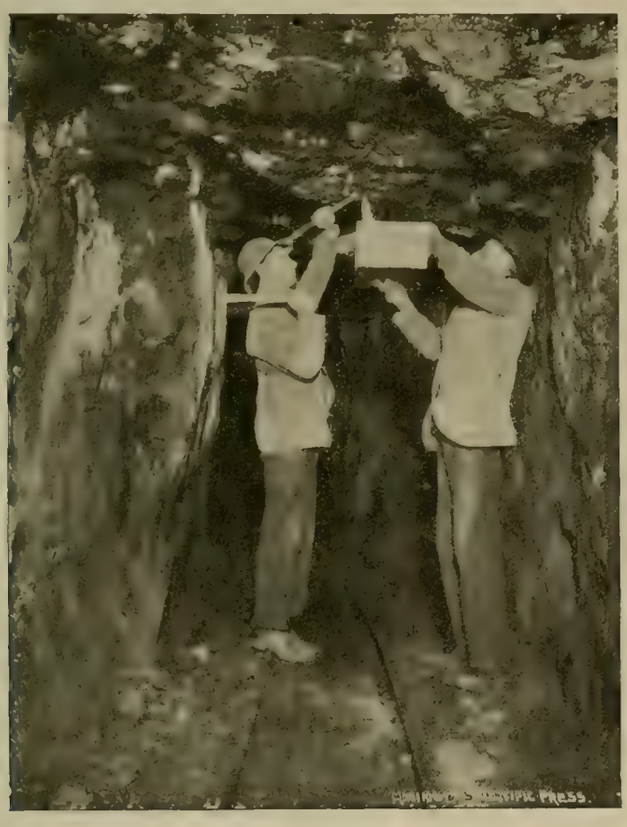
Considering the importance of the mining industry to California, too little attention is given to securing accurate information relative to the cost of operating mines under varying conditions. The simple statement that this or that mine is operating at a cost of $1 or less per ton has no particular significance unless the statement be accompanied by a description of the mine—its geology, character of rocks and of the ore, quantity of water handled, etc. It is only by comparison that these statements are made valuable. If a mine of a distinct type, isolated from all others, and unlike all others, can be operated at a cost so low as to attract attention from mining men everywhere, it has no particular value further than it concerns that mine; but if a mine is only one of a number similar in character and similarly situated, any radical difference in cost of operation would attract equal attention and a remedy would doubtless be sought, for what can be accomplished at one place under certain circumstances should be accomlished at another place where the conditions are the same. A mine may be more cheaply operated with steam, where fuel is very cheap, than one with water power, where the cost of water is very high. The question of wages is also an important one. With a plant of given capacity and a mine of equal size and character, it would cost more to operate a mine in Butte City, Montana, where wages are $3.50 per day than in Tennessee, where wages are about $1.25. It may be that there is greater efficiency in the higher priced labor, but it is not likely that the difference is in the ratio of the respective wages. The same difference exists in the treatment of ores. No comparisons of value can be made when all the conditions having a bearing on the matter are not known. It is to enable mining men to make valuable deductions by comparison that such detailed and accurate information should be sought and made public.

New Old Mines.

Among the most prominent and the best paying mines in California are several which, after the abandonment of years, have been reopened and are now operated successfully. Among these are the Kennedy mine at Jackson, Amador county, and the Gwin and the Utica mines in Calaveras county, also the Rawhide and App mines in Tuolumne county. Besides these, there are a number of others which will probably soon be added to the paying list, including the Central Eureka and Oneida in Amador county, the Melones Con., Sheep Ranch and Angels mines, in Calaveras county, and several smaller mines in Tuolumne and Mariposa counties. Among the most important factors in the development and success of these new old mines are improved methods, superior management, better machinery, lower wages, cheaper supplies and mill processes which save a higher percentage of values at less expense than in former years. The possibilities of these old mines which were once operated with profit and then closed down is fully demonstrated in these recently opened mines, and there are numerous similar opportunities awaiting the investment of capital.

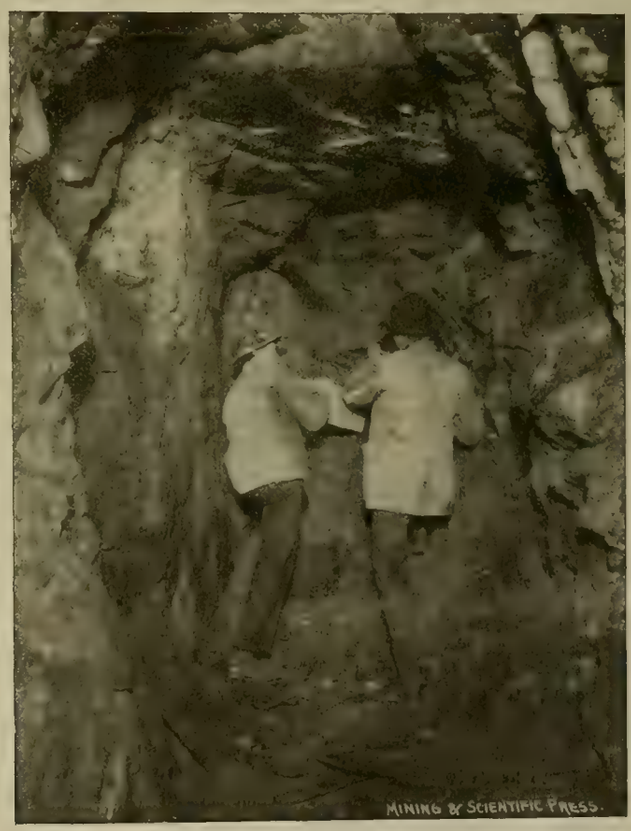
Mine Sampling.

No duty which falls to the lot of the mining engineer calls for an exercise of greater caution than the sampling of a mine. It is a well-known principle that a sample which is not a sample is worthless for either owner or prospective buyer. Often the obtaining of samples is accomplished under great difficulties. The illustrations appearing on this page are those of men in the act of sampling the Independence mine at Cripple Creek, Colo. Under some circumstances the use of the moil is undoubtedly the best for taking samples, as the rock detached by this means can usually be secured in the desired amount, and can be prevented from flying off under the force of the blow, as is often the case in the use of a pick or hammer. The value of the services of a man who can correctly sample a mine cannot very well be estimated on a basis of time.



TAKING SAMPLE IN BACK OF DRIFT, INDEPENDENCE MINE, CRIPPLE CREEK, COLO.

(See page 636.)



TAKING SAMPLE IN FACE OF DRIFT, INDEPENDENCE MINE, CRIPPLE CREEK, COLO.

THE Sauerwald Development & Promotion Syndicate, Ltd., is the title of a new English concern which has gone into the business of gold winning—from sea water. No one will deny that the business is legitimate if they can make a success of it. Metallurgy has made great strides lately, but it has not yet reached a point where the water from the ocean can be made to yield up its gold in profitable quantity. These enterprising promoters doubtless claim to have a sure thing, as did certain New England people not long since. The credulity of some people surpasses belief, for people are said to be actually subscribing for the stock of this salt sea bubble.

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STEEL and iron are still rising in price. The unusually large demand for steel and iron and the lateness of the arrival of vessels from the Lake Superior regions at the Lake Erie ports with iron ore combine to keep up the price.

THE new Washington State mining law requires a 10-foot shaft on all quartz mining claims before the act of location is completed. An equivalent amount of work is required on placer locations. The law went into effect on the 7th inst.

PROSPECTORS continue to leave for the new gold fields in Lower California. Some of the most recent reports tend to the belief that gold cannot be obtained more readily there than elsewhere without a proportionate amount of labor.

ON June 1st, when the eight-hour law went into force in British Columbia, 400 men in the Slocan district quit work, for the reason that the mine managers would only pay for eight hours work at the same rate per hour as had been paid for ten hours.

COMMISSIONER OF PATENTS DUELL reports the receipts of the Patent Office for last month to be $116,386.87. For the corresponding month last year the receipts were $88,558.41. The number of applications for patents, including designs, for May, 1899, was 3856, as against 2870 for May, 1898.

A NEW MINING COMPANY has recently been incorporated in Arizona which claims to have 8,000,000 tons of copper, gold and silver ores in sight, in Pima county. This may be considered a very fair start for a new enterprise. No statement as to the value of this ore and cost of mining and treatment is at hand.

THE average cost of the production of gold is lower at the present time than at any time in history, and, as a result, a decided impetus is given the gold mining industry. Attempts to work low-grade ores, where failure resulted a few years ago, are now meeting with success as a result of the changed conditions.

NO CLASS of men in new mining regions do more to retard the development of mines than those who stake all the ground they can possibly cover regardless of the law or the rights of others. Those who would locate and work on claims if they could have the opportunity are unable to buy out these wholesale locators and do not wish to take issue with them at law for obvious reasons, though their case would in most instances be won in the courts. Local rules should limit the number of claims which one person could locate.

Effect of the Eight-Hour Law.

The result of legislative interference, in the passage of the eight-hour law, with a condition of affairs which, if not wholly satisfactory, was at least peaceful, and under which the mining industry and all concerned in it were prospering, is in evidence in Colorado and British Columbia.

Ever since the passage of the eight-hour law by the Colorado Legislature trouble has been anticipated when the time arrived for the law to go into effect, June 15. It is learned that 3000 men employed in various smelting concerns at Denver, Pueblo and Leadville have quit work owing to the differences arising between the workmen and smelter managers as to hours of labor and wages. Several days since notices were posted in and about the smelters stating that thereafter men would be employed by the hour, no man being required to work longer than eight hours during twenty-four, but giving the privilege of working extra time, this being wholly optional. Later a raise of about 10% in wages was announced. That these arrangements did not meet the approval of the workmen is evident. It is asserted that unless the matter is speedily adjusted upward of 40,000 men will be thrown out of employment, as the mines, unable to find a market for their ores, must also close down. The railroads running into the mining districts would also be heavy losers.

In the Slocan region of British Columbia the miners have quit work, refusing to work eight hours for less than the pay formerly received for ten hours' work. That eight hours work is enough in twenty-four in many mines where there are floods of water and poor ventilation, there can be no doubt; but this condition does not obtain in all mines, and the claim that the miners will accomplish as much or more work in eight hours as in ten will scarcely be credited, even if it were so.

In some instances mining companies have also offered to pay by the hour with the overtime privilege, which would be satisfactory, perhaps, in many cases, but would be a violation of the law which makes it unlawful to employ men in a mine longer than eight hours in any twenty-four.

These affairs have reached an unfortunate stage, but it is to be hoped that a just regard for the right on both sides of this question may ultimately prevail. Such things necessarily adjust themselves, as they always have.

"DEEP-LEVEL mining in the Transvaal, as far as the first row of deep mines is concerned," says the *South African Mining Journal*, "has thus far, under careful, experienced management, proved an unqualified success, and the time is not far distant when the second line of deep shafts will enter the ranks of producers." The difference between very deep mining and that which is moderately deep is in some cases so radically different that success may not attend the efforts of those who do not fully grasp the situation in its broadest sense and who are able to meet the changed conditions with the necessary financial outlay. Deep mining—that is, mining deeper than 3000 feet—involves, usually, very heavy surface plants, the lifting of larger quantities of water to greater heights, and, possibly, increased temperature; but, from a mechanical standpoint, it may be said that mining will be carried on to a depth as great as it is possible to sink shafts and hoist heavy loads with a single cable. When a cable is very long—3000 feet or more—the "springing" of the rope is the cause of some difficulty, but the inconvenience caused by this is usually overcome by the use of chairs at the stations. To how deep a point mining can be carried on successfully is not known, but it is believed to a much greater depth than the deepest mines of the present day—about 5000 feet. Economic conditions usually determine the depth to which a mine is worked; but, if the value of ore deposits warrant it, it is safe to say the depth to which mines will be worked will be very materially increased.

WHAT is alleged to be a "petrified man" is being lugged about the rural and mining districts of California by men who claim to have discovered the "man" in Death Valley while prospecting. When last heard from they were headed for Oregon. This sort of "fake" has been worked on the people so often and so frequently exposed, it is amusing to see that the old trick still works, and people actually pay to see such a creation. On second thought, perhaps people who are so easily taken in might spend their money more foolishly. Such a thing as a petrified human body does not exist, and never has. Bones sometimes become petrified, but the fleshy tissues are not subject to replacement in the same manner that bones, wood and some other organic substances are, for the simple reason that the tissues are destroyed by decomposition before the atomic replacement of inorganic for organic matter can be accomplished.

THERE is usually a vast difference in current reports from a mine that is being boomed by every conceivable device for what can be made in a stock operation and one which is worked for what there is actually in it. A great deal of free advertising has recently been given a noted mine location in the Northwest. Statements of fabulous values are commonly made, in connection with enormous breadth of ore bodies. The papers are full of it. During the last four months a large force of men has been reported engaged in development work and have succeeded in sinking a small shaft 60 feet in soft rock. In comparison with this is a gold mine in the Southwest which for months past has shipped several hundred thousand dollars monthly and yet its name in print is a rarity. These two make a decided contrast.

SOME of the United States Consular reports, particularly those which deal with mining and the mineral resources of foreign countries, are of unusual interest. Consul Fowler, writing from Chefoo, China, Feb. 16th, '99, says that, at his request, E. D. Sims of Tai-au-fu has sent an interesting report on the coal and other mines of that department. In his report Mr. Sims writes: "I send you a very good specimen of galena, very rich in sulphide of lead, and I am told it would make very good German silver." The correspondent also writes of a "vein of pure silver assaying from $600 to $1000 per ton." It is unfortunate that consular reports, which should consist of reliable information from the most responsible source, contain such foolish statements as the above.

AT the mines of the Mountain Copper Co., near Keswick, Shasta Co., Cal., 450 miners have quit work owing to a refusal of the management to meet a demand for an increase of 40 cents per day for all classes of labor. Various complaints are made by the men. They assert that the mine is worked in a reckless manner; that the ore is stoped from large masses without sufficient precaution being taken in the way of supporting the ground, to insure the safety of the men, and that, as a result, the ground is settling. This condition of affairs, if it exists, is in itself sufficient cause for refusal to work. It is also claimed that the accommodations are insufficient and squalid and that the food provided by the company is of inferior quality.

A FEW WEEKS AGO every one interested in affairs commercial and political in the Transvaal looked forward to the meeting of President Kruger and the British Commissioner, Sir Alfred Milner, with much hope for an improvement in existing conditions. These gentlemen met, but contrary to the hope entertained by many, failed to arrive at a satisfactory solution of the problems presented. It now looks as though the difficulties are multiplying instead of otherwise. The Uitlanders demand equal political rights with the Boers, and also numerous "reforms" in matters relating to mines. Thus far the Boers have declined to meet these demands.

A FURTHER ADVANCE in the price of silver is predicted by some who are looked upon as authority. The reasons given for this happy anticipation is largely increased use in the arts and manufactures due to low prices of silver, and the greatly extended use of the metal as a circulating medium in Oriental countries now about being opened up, particularly in China.

THE latest in the world of practical science is the effort of Prof. Dewar of London to cast steel in a vacuum, by which means it is thought gas bubbles and blow holes, so detrimental to steel, will be avoided.

Concentrates.

A LEAD and zinc mine is being opened at Bristol, New Hampshire.

LOCATION certificates when placed on record do not require stamps.

A PLACER LOCATION may be made in contiguous tracts of ten acres each.

COPPER and silver ores occur in quartz porphyry in the Lava Beds district of San Bernardino county, Cal.

THE Ontario vein at Park City, Utah, is a vein in quartzite, from which $13,559,500 have been paid in dividends.

IN drifts the bottoms of which are soft and wet, sills should be placed to afford firm support to the posts of the drift sets.

LAND in California more valuable for limestone or marble than for agricultural purposes may be located under the mining laws.

LANDS lying between high and low tides belong to the State, and placer claims located thereon cannot be sold by the United States.

THE slow backward movement of abrupt rock faces due to weathering has been called the recession of cliffs, a very appropriate name.

THE slates of the Mariposa beds of the California gold belt are proven to be of Cretaceous by the appearance of casts of the fossil aucella.

SEDIMENTARY STRATA to a depth of 11,000 feet have been removed by erosion in some portions of the Grand Canyon region in southern Utah.

MICA of merchantable character is found in several localities near Custer City in South Dakota. The mineral occurs in coarse granitic veins.

A SURVEY of a mining claim made before the date of recording the location of the claim cannot be regarded as the official survey contemplated by law.

IT is not necessary that the "discovery shaft" should contain mineral or ore. If mineral in place is found on any portion of the claim, it is all that the law requires.

MINERS can survey their own claims with considerable accuracy by using a common open-sight compass provided with sights and by taking care in making measurements.

WHEN estimating the $500 worth of work necessary to secure patent, any work done by former owners who had abandoned their claim cannot be considered as part of the expenditure.

WHEN making application for a patent to placer ground care should be taken to determine the exact classification of the land, and the clearest evidence possible should be presented.

QUICKSILVER is obtained on the Pacific coast from four minerals—cinnabar, metacinnabarite, native quicksilver and tiemannite (mercuric selenide). This latter occurs in Piute county, Utah.

THE development of a mine is exploration. The stoping and working of a mine after it is developed is exploitation. A good maxim in mining is keep exploration well in advance of exploitation.

A NORMAL FAULT is one in which the hanging wall has sunk relatively to the foot wall, and a reverse or thrust fault is one in which the hanging wall side has moved upward relatively to the foot wall.

A MINING CLAIM is not subject to relocation by other parties until an abandonment by the original locators is established. Non-compliance with the laws, federal and local, constitutes an abandonment.

IT has been asserted that all pyrite contains gold in some amount, but careful tests have been made by some of the most expert chemists of the United States Geological Survey and pyrite frequently found which showed no trace of gold.

IN the early stage of development of a quartz mine it is often impossible to tell whether or not the ground is more valuable for mineral or agricultural purposes. A vein small and low-grade upon the surface may develop into a very valuable mine in depth. Several such instances are of record in California.

THE zone of oxidation in the copper mines of Butte, Montana, ends very abruptly, usually, the oxides and carbonates giving place within a few inches to ores of the normal sulphide type. In the Homestake mines of South Dakota, sulphide ores are found on every level below the 100, but oxidized ore is found as low as the 400 level.

AN anticlinal fold is one in which the strata dip in both directions from the crest of a fold. A synclinal fold is one in which the strata dip toward each other from opposite directions. A quaquaversal fold is one in which the strata dip away in all directions from the crest of an uplift. A monoclinal fold is one dipping in one direction only.

A SIMPLE fissure vein is one having well defined walls, a nearly straight or slightly curving strike and dip. Pieces of the country rock are often included, as though they had fallen into an open crevice. Such a vein as this not infrequently has a banded structure. This is the type of vein frequently figured in textbooks but not often seen in nature.

WHEN using hanging bolts in shafts, use only large sized iron washers. There is no economy in small washers. A 4 or 5-inch washer is far better than one 2½ inches in diameter, for should any downward pressure exert itself the small washers will sink into the plates and there is sure to be a subsidence in the shaft sets. Large washers will obviate this to a great extent.

CHLORIDE OF SILVER is soluble in a solution of hyposulphite of soda, from which the silver may be precipitated in the form of black sulphide of silver by the introduction of sodium or calcium sulphide. These reactions are the basis for the lixiviation process of working silver ores. When ores are not naturally in the state of chloride, they are chloridized in a furnace and the roasted ore leached.

OVER 5,000,000,000 gallons of petroleum are now produced annually in the world. Of this amount 2,500,000,000 are produced in the United States, 2,250,000,000 in Russia, and the remainder is distributed among a dozen countries, Austria 87,000,000, Sumatra 72,000,000, Java 30,000,000, Canada 29,000,000, Roumania 24,000,000, India 15,000,000, Japan 8,000,000, Germany 7,000,000, Peru 3,000,000, and Italy about 1,000,000 gallons.

IN the Manzanita mine on Sulphur creek, in Colusa county, Cal., cinnabar occurs associated with gold. With these minerals are pyrite, and marcasite, chalcopyrite, stibnite, calcite and quartz. The gold is often visible in groups of feathery crystals sometimes in contact with cinnabar and sometimes deposited on the calcite, which is usually more abundant in the ore than quartz. A large amount of native sulphur occurs in the mine.

THE spectroscope is employed to determine the elements in any body when heated to an incandescent state. Distant stars—not planets, but burning suns like that of the solar system, show the lines in the spectrum characteristic of many elements familiar to chemistry. The moon's rays produce none of these characteristic lines on the spectrum, hence it is impossible to say what elements exist in the moon, but the elements of some fixed stars are, according to the spectroscope, singularly like the earth.

EARTHQUAKES are supposed to be due to the readjustment of the earth's surface or crust enveloping the heated interior, which is believed to be slowly cooling. The unequal contraction due to this causes the seismic disturbances. A period of repeated earthquakes is often, if not always, followed by a more or less violent eruption of some volcano. Whether there is a direct connection between the earthquakes and the volcanic outburst, or whether it is only a coincidence, can only be surmised.

WHERE shafts are sunk through ground which is not solid enough to afford good support to the timbers by wedging, reachers should be put in every 30 to 50 feet. These are let into the walls, the ends resting on hitches cut deep enough to hold, and the timber firmly wedged. The plates of the shafts rest on these reachers at intervals and they support the weight of the several sets above as far as the next reacher, or at least such weight as there may be. This keeps the shaft sets firmly in place, and there is little danger of collapse.

THE swelling of rock in mines is due to various causes, among them being a molecular enlargement of the constituents of the rock mass upon being exposed to the atmosphere. In some cases very soft rock is forced into the workings by pressure from the surrounding rocks. The pressure exerted by swelling ground is almost irresistible, and cannot be held by timbers without relieving the ground. It is cheaper in the end to sink the shaft of a mine in the hard rock of the foot or hanging wall rather than in the soft crevice of a vein, the walls of which are swelling ground.

WHEN shafts are sunk in rocks firm enough to stand without timbering the shaft may be divided into two or more compartments by means of heavy timbers placed vertically above each other at stated distances, these timbers reaching from wall to wall of the shaft. To these may be secured the guides in vertical or steeply inclined shafts. In some inclined shafts even these dividing timbers are dispensed with, only plates being put in on the footwall side to carry the runway for skips or buckets, ladders, etc., and only such dividers as are necessary to support air, steam and water pipes.

NOT infrequently one reads of and hears of dykes of quartzite. Quartzite is a metamorphic sand rock formed by an infiltration of some cementing material, such as iron, carbonate of lime, or silica, usually the latter, and in many if not all cases where silica is the cementing material, a secondary enlargement of the individual grains of sand making up the rock mass has occurred, each grain taking on a normal crystalline form. The envelopes of silica which surround the grains coming in contact with each other fill all the interstitial spaces and form a firm, solid rock, so it will be seen that quartzite is in no sense a dyke rock. These beds of quartzite are sometimes also called reefs, which is a more appropriate term.

ON what grade must a flume be built for it to discharge a given quantity of water in a given time? Divide the number of cubic feet of discharge wanted by the area of the section of the flume in square feet. This will give the necessary velocity. Multiply this result by itself and multiply the product by the wet perimeter, in feet, of the flume and multiply the product by decimal .0001114. Divide the product by the area of the section of the flume, expressed in square feet. Call this A. Multiply the velocity in feet per second by the wet perimeter, in feet, and multiply the product by decimal .00002426. Divide the product by the area of the section of the flume, in square feet. Call this B. Add A and B. The result will be the grade expressed in decimals of a foot.

A VERY small amount of iron has been manufactured on the Pacific coast, at Clipper Gap, Placer county. In 1891 furnaces were erected at Roseville near the mouth of San Diego bay for the manufacture of iron direct from ore by the Eames process, but further than the construction of furnaces of the reverberatory type the proposition did not go. By this process the ore was to have been ground to pulp, mixed with retarded coke (coke which has been dipped in clay water and dried) and spread on the hearth of the furnace. Petroleum under blast was to to have been utilized for fuel. The process seemed reasonable, and was in actual use in Pennsylvania, where it is known as the Carbon Iron Company's process, where natural gas was the fuel used, about 30,000 cubic feet of gas being consumed in making a ton of iron.

THE determination of rocks is made in two ways—by chemical analysis and by means of the examination of thin slices of the rock under a microscope. The latter method possesses many advantages, as it shows not only each mineral composing the rock mass, but it also shows the structure and the relations which the rock constituents bear to each other. Internal strains and movements of the grains or crystals composing the rock can be detected as well as alterations from one mineral to another, as the alteration of augite to green hornblende (uralite) and the further alteration of the uralite to chlorite and alteration of the latter to epidote. Each of these minerals may sometimes be observed in a single rock section grouped about a central crystal of augite, showing clearly the transition of one mineral to another, giving information which would be wholly lost by chemical analysis. The use of the polarization microscope, more than anything else, has thrown light upon the alteration of massive eruptive rocks to schistose and slaty condition.

IT is generally conceded by the highest authority that the existence of open spaces are necessary for the formation of ore deposits of any kind. These open spaces may be extremely minute, interstitial openings in fractured, crushed rock mass, or they may be of considerable size in a coarse breccia. The ore may have been deposited in these open spaces between the pieces of the fractured rock mass or in the small cavities between the grains of porous rock, as sandstone. Some ore deposits undoubtedly have been formed by replacement—that is, as the mineral-bearing solutions passed through the rock, atoms of the rock mass were dissolved and carried away in solution, being replaced by atoms of the sulphide minerals now constituting the ore deposit. Bodies of lead, iron and zinc sulphides in limestone are typical of this method of formation, while deposits in sandstone are well illustrated in many California quicksilver mines. There is nothing to support the belief that the spaces now occupied by large ore deposits were at one time open caverns.

CONCERNING the location and recording of mining claims, the United States law says: "The miners of each district may make regulations not in conflict with the laws of the United States, or with the laws of the State or Territory in which the district is situated, governing the location, manner of recording, amount of work necessary to hold possession of a mining claim, subject to the following requirements: The location must be distinctly marked on the ground, so that its boundaries can be readily traced. All records of mining claims hereafter made (May 10, '72) shall contain the name or names of the locators, the date of location, and such a description of the claim or claims located by reference to some natural object or permanent monument as will identify the claim, etc." It will be noticed by the foregoing that miners may organize districts and may also determine the manner of recording. This, without doubt, contemplates the election of a local district recorder, and any record of location properly made with him in accordance with the United States statutes would be perfectly legal. The language of the Civil Code of California, Section 1159—"notice of location may be made with the county recorder," etc., does not make it compulsory. A safe plan would be to record a location with both the district recorder and the county recorder. The county records are usually kept in a safe place where they are not likely to be destroyed by fire or otherwise, while in many cases those of the district are exposed to danger of destruction. If a mining claim is worth anything it is worth recording in such a manner as to insure the validity of title.

WHERE a tunnel is located, under the tunnel right law, for the purpose of the development of a vein or lode, or for the discovery of veins, the owners of such tunnel shall have the right of possession of all veins or lodes within 3000 feet from the mouth of said tunnel on the line thereof, not previously known to exist, discovered in such tunnel, to the same extent as though discovered on the surface; and locations on the line of such tunnel of veins or lodes, not appearing on the surface, made by other parties after the commencement of such tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid. But failure to prosecute the work on the tunnel for six months shall be considered as an abandonment of the right to all undiscovered veins on the line of such tunnel. A vein discovered in such tunnel not previously located on the surface may be located by the owner of the tunnel, who may take 1500 feet along the line of the discovered vein. When such discovery is made a location notice should be posted on the surface, giving notice of such appropriation and marking it by posts or monuments. This notice should be recorded. The discoverer should raise from his tunnel or sink a shaft and determine the apex of the vein on the surface, and the surface ground included in the location, as in a location made on a surface discovery. This is in accordance with the views of the land commissioner, but the Supreme Court of Colorado held that a notice posted at the mouth of the tunnel, stating at what distance from the mouth of the tunnel the vein was discovered and the number feet on each side of the center of the tunnel claimed, was sufficient.

SHAFT TIMBERS may be cheaply and quickly framed by use of templates, which make all framing uniform. Of the several systems or methods of framing shaft timbers at the corners, the overlap joint is simple and easily made. This method is employed in vertical shafts only and is framed by cutting out one-half the thickness each of the wall plate and end plate to a width equaling the width of the timber. The upper half of the wall plate is cut out and the lower half of the end plate is removed. The wall plates are first placed in position as nearly as may be, being swung on hanging bolts. When both timbers are on the bolts, a gauge is slipped in at each end, by means of which the timbers are adjusted at the proper distance from each other, when they may be secured in that position by tacking a piece of lagging on top of the plates near each end. The end plates are then dropped in and the set wedged to place, which is determined by a plumb line in each corner, suspended from sets above which are known to be in line. The lines should take in not less than three sets in height. If four lines are not used, the sets are likely to be wedged out of line. Lining up sets is a particular job requiring care, patience and good judgment. It pays to do shaft work well, and good enough is only good enough when it can be no better. A slight departure from the true line is scarcely noticeable at first; but, as set after set is put in place with equal carelessness, it soon develops a shaft which is not a credit to anyone. In inclined shafts a dovetailed notch is cut near each end of the wall plates and a corresponding tenon cut on the end plate. The timbers are placed in the same manner as explained above. Timbers framed in this way may also be used in vertical shafts. This latter method requires less timber. Where absolute rigidity is required in shaft sets, it is good practice to put posts at each corner, and in large shafts also at the center, or opposite the dividers. When the shaft is being lagged have the post of the same size as the plates, or, at least, one dimension of the same size. If 10x12-inch plates are used, they should be put in with the 12-inch face upward. The posts should be 8 or 10 by 12, the outside faces being placed flush with the outside of the plates. This will make the posts line up with the lagging, and no lagging need be put behind the posts. The amount of timber required is less, and the saving in time in putting in is an item of even greater importance.

Cyaniding Slimy Ores and Tailings.

Written for the MINING AND SCIENTIC PRESS by MATT. W. ALDERSON.

Part III.—Decantation.

When agitation has ceased, the vat is allowed to stand and the charge settles. By glass tubes, ½-inch in diameter and from 2 to 5 feet in length, the depth of the clear fluid can be easily ascertained. In one or two hours, when material is not very slimy, decantation may be commenced. Fig. 5 gives a good illustration of how this is done. Three-inch augur holes are bored in the sides of the vat, and these are fitted with plugs which are flush with the inside of the staves, so there will be no lodging places for slimes. As there is always more or less grass and rubbish with tailings treated, and these rise to the top of the agitator, a stick is laid across on top of the fluid near the edge of the vat, where the solution is to be drawn off, and before the first plug is pulled. This prevents other than the clear fluid flowing out, and also provides a clear spot at the side, so that when the decantation is near its close one can tell how near he is to the slimes. By proper arrangement of the holes and care in decanting, one can draw the fluid down until not more than half an inch of clear solution will remain in the vat.

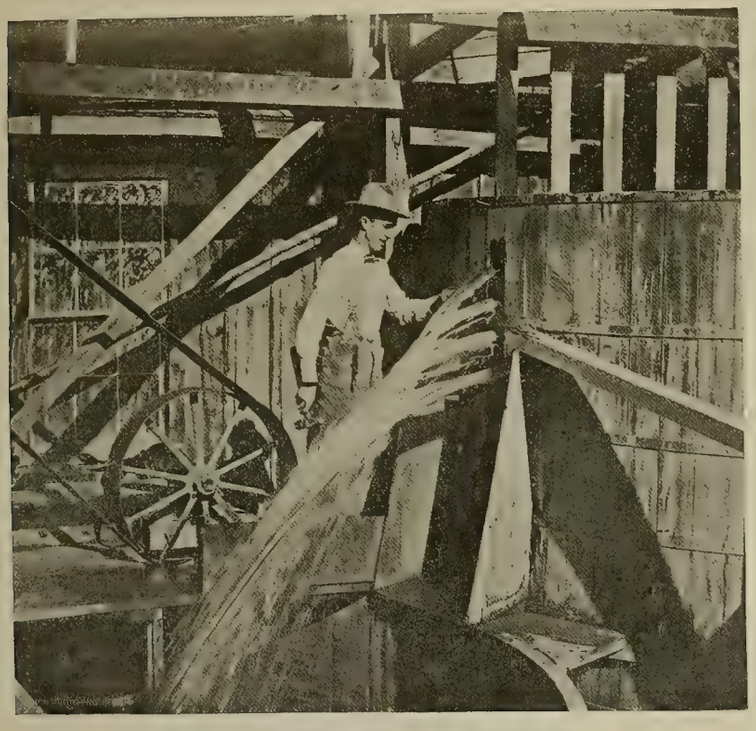


FIG. 5.—DECANTING THE GOLD SOLUTION.

It is important to map out intelligently what one expects to accomplish in a decantation scheme. In other words, the proportion of fluid decanted determines in a measure the extraction. I have known persons to make two decantations of about 40% of the fluid contents of a vat and wonder why their tailings ran high and they were not able to make a good extraction. To make the matter plain, let us suppose we are treating an ore from which we are able to secure an extraction of $10. We have used one ton of solution to one ton of ore. Each ton of solution, therefore, will carry $10 in gold. We make a decantation of 40% of the total fluid in the vat. We have thus secured $4 and left $6. We make another decantation of 40%, taking out $2.40 and leaving $3.60. This latter amount goes out with the tailings, when most of it could have been saved. Suppose, again, our quantity of fluid had been regulated so that we could make decantations of 80%. In the first decantation we would take out $8, leaving $2. In the second decantation we would draw out $1.60 and leave 40 cents to pass out with the tailings. It will be apparent that one would save more money by making but one large decantation than by making three of 40% each.

On most material it will be found of advantage to use two washes, after the first or strong solution, to leave as little cyanide and gold as possible in the charge under treatment. Decantations of the solutions may run from 50% to 70%, but it should be remembered that when they are less than 50% one is leaving a percentage against himself. In the light of the above explanation, it will be seen that it will pay to take time to get a good percentage of the fluid at the first decantation, and that, on the contrary, the waiting of a number of hours for an extra inch or two on the decantation of the final wash may not be justified by what there is in it.

The speeding of a vat comes from so arranging matters that there will be no dragging in the decantations. If, during agitation, the surface of the contents of a vat presents a uniform appearance, the material has not been properly coagulated. The charge will settle if given time, but many hours' time will be needlessly wasted. With a small plant on low-grade tailings, this may mean a loss or a small margin of profit, when, by speeding the vat, the capacity of the plant could be practically doubled, with no additional cost for labor in running the mill, thus making the enterprise profitable. The surface of the vat at the close of agitation should present a mottled appearance, with alternating areas of clear fluid and organic matter. The practiced eye will detect a glassy appearance on the surface, if all is right, and the slimes will commence to go down before the fluid is at rest. Without this appearance and prompt action, it may safely be concluded that an insufficient quantity of lime has been used. The remedy is apparent. The use of other coagulants, such as soft soap, alum, soda, etc., has not been encouraging. Lime is the most effective as well as the most economical. The proper amount should be used at the beginning, as it is hard to successfully "doctor" a vat that does not go down as it should.

The skilled workman can devote his time to other matters while a vat is settling, knowing that he can decant very rapidly when the vat is ready by pulling a number of plugs at a time, as shown in illustration (Fig. 5).

When the final decantation has been completed, the plugs are replaced, the agitator is set in motion, thoroughly stirring up the contents of the vat, and then a plug, about 3x6 inches, at the lower end of the vat is drawn, allowing the tailings to pass out through tailings launder to such place as may be provided for them. The contents of the vat are thus discharged at the rate of about a ton a minute. The average time required for treating a vat, when making these decantations, is thirty hours.

The solutions decanted from the agitator pass to a gold vat. In this is a floating intake, consisting of a piece of rubber hose with outlet on lower edge of the vat through a faucet. The other end is attached to a float which rides the top of the fluid. To this is attached a screen to keep any rubbish from entering the extractor through the tube. The solution thus passes under uniform pressure to the zinc boxes, and such fluid as is drawn off is from the top and is therefore clearest of slimes and other impurities. In the earlier work the gold solution entered the extractor from a vat in which was a filter bottom covered with several inches of sand. This would work well for a time, but the accumulation of half an inch of slimes on top of the filter would effectually prevent percolation of the fluid, and the filter was abandoned for the simple expedient above described.

(To be Continued.)

THE discovery of large deposits of bauxite, which consists principally of alumina, in New South Wales, is of great scientific interest. Previously the mineral in question had been chiefly regarded as iron ore from the point of view of its iron contents. It now appears that it contains more oxide of aluminum than oxide of iron. Whether, however, the manufacture of aluminum on a large scale is likely to be immediately proceeded with is another matter. There has never been any difficulty in obtaining ample supplies of bauxite, which is of little more value in itself than limestone or pipeclay. The trouble is in the limited demand for aluminum itself, and the great cost of its manufacture. Demand is increasing, and the expense of production has been notably reduced of late years, and may still be made considerably smaller. Immense advance, however, will have to be made in these directions before the demand for bauxite begins to be in any way commensurate with the available supply.—Melbourne Standard.

Notes on Mine Sampling.

Written for the MINING AND SCIENTIFIC by GEO. J. BANCROFT.

Sampling a mine is simply a practical application of the doctrine of averages. A number of samples are taken on a vein, the average of which in width and value should represent the average width and value of the vein. The sole object of the engineer is to take such samples in such a manner that the assays of the different samples will form the basis of a correct estimate on the value of the mine.

The day of the expert who walks through a mine with a monocle in his eye, a compass in his hand and comes out and says in an impressive manner, "Gentlemen, this mine is worth so many thousands, so many hundreds, so many dollars and so many cents," is past. His day belonged to the golden past when all mining was considered a grand gamble. Modern science has taken mining from among the speculative ventures and placed it in the front rank of conservative industries. Engineers are recognizing more and more that it is almost criminal to recommend the expenditure of large sums of money on mining property without the most careful and painstaking investigation of all available information bearing on the value of the mine. With careful and intelligent engineering, mining ceases to be a gamble and becomes an industry in which the profits are as sure as in many other branches of industry, and are far greater in proportion to the capital invested.

There are several ways of sampling a mine. Some mines offer special facilities for treating large samples. The ore may be stripped for 6 or 8 inches deep over a section of the vein and the whole lot treated in the reduction works. This is very desirable if it is known just how much of the vein is ore, and if the expenses and time necessary are not prohibitive.

By far the most common method, and withal the most satisfactory, is the taking of comparatively small samples with a hammer and moil and sending each sample to a reliable assayer.

On page 633 are two illustrations showing the writer and assistant in the act of taking samples in this manner in the Independence mine at Cripple Creek.

The values in a vein are very apt to lie in strata parallel to the walls of the vein. Hence a sample should be taken across the vein, being careful to take an amount from each stratum proportional to its width.

The ideal sample would be taken just as a cheese sampler samples cheese. Of course, a vein of hard rock cannot be sampled in practice as one can sample a cheese, but if care is taken the sample will be sufficiently accurate for all practical purposes.

The important thing in sampling is to take the ore exactly as it is mined. There is always a tendency to take more of the soft than the hard. This is, of course, to be avoided, for the soft stuff generally runs higher, but sometimes lower, than the hard. In several camps, notably Cripple Creek and Kalgoorlie, W. A., "screenings" will pay to ship when the coarse rock is worthless. So the hard places in a vein must be patiently chipped off until the required amount is secured.

In regard to the width of the ore, a good deal of reliance has to be placed on the management of the mine, but an experienced engineer will often discover things about a mine of which the management is ignorant. I recall a mine in Cripple Creek which had been stoped for a width of 15 feet. The sampling proved that all the values were in about 2 feet of the 15, and that the rest was so low grade that it was inadvisable to take it out.

Veins that have ill-defined walls should be sampled into the walls a little way, for some of the wall rock is almost inevitably broken with the ore in mining. It is well to have a shot put into each wall every now and then, if the management has neglected it. A large ore body was discovered by the reporting engineer in a mine in the San Juan, Colo., by this simple precaution. The amount of ore to be taken per foot of width varies with the vein. In Bendigo, Australia, it is necessary to take about 10 pounds per foot of width, because the gold occurs in coarse particles and a small sample would be untrustworthy. Where the values are in fine particles and evenly distributed through the ore a small sample is as good as a large one. About 2 pounds per foot is enough in this case. Such veins as those of Gilpin county, Colo., or some of the veins on the mother lode of California may be sampled in this way. Where the values are coarser, or the vein "pockety," large samples should be taken.

The intervals at which samples should be taken vary, also, with the conditions. If an extremely accurate estimate is desired, as for a cash sale, and the vein is high grade, samples should be taken every 3 feet. In other cases 5 or even 10 feet will do. Between these limits the circumstances of the particular case must mould the procedure.

Samples should be taken on every exposed face of an ore body.

It should be borne in mind that it is customary for

miners to sink a winze or put an upraise in the richest part of an ore body. If this is found to have been done, the rich ore next the winze should be figured separately.

No part of the mine should remain unexplored. In an examination of a mine in Boulder county, Colo., a certain hole on the third level was regarded as a sump. In reality it was a winze connecting with an underhand stope from which $30,000 of ore had been removed, and the estimate of ore in sight was consequently very much too high. Of course, the most extreme caution must be taken throughout the entire examination to avoid the possibility of "salting," for, even if the owners are honest, one can never tell what influences may have been at work among the employes of the mine.

Each sample should be assayed separately and the result plotted on a map of the mine. In this way the size, strike and general habit of the ore shoots may be determined. In many cases the information gained in this way is of the greatest importance, and in every case there are sure to be facts enough developed to pay for the trouble.

The surroundings in general and the neighboring mines in particular should be carefully looked into for information bearing on the mine under examination. The possibilities of lawsuits should be carefully considered. It is not pleasant to look back upon a report which recommended the purchase of a lawsuit, no matter how good the showing was.

Once in a while the structure of the district will have a most important bearing on the value of a mine, as, for instance, the "contact" of Cripple Creek, the "indicators" of Ballarat, the "bluestone" of Kalgoorlie or the "great fault" of Cornwall.

The figuring out of the value of a block of ore from the data of the samples is a simple problem, but one that is often done wrongly. If a certain number of samples are taken on a block of ore the common method is to average the values and average the widths. This is obviously wrong, for two variables related as the values and widths of a number of samples cannot be averaged independently of each other and a correct result obtained; but this fact is often overlooked.

My attention was first called to the matter by T. A. Rickard of Colorado, and together we developed a method which we christened the foot-ounce method. Many engineers use the same or a similar method, but so far as I know a description of it has never been printed. In this method the value in ounces of each sample on a given block is multiplied by its width in feet, giving a product which we call foot-ounces. The sum of all the values in foot-ounces is then taken and the sum of all the widths in feet. Both sums are divided by the number of samples, giving the average value in foot-ounces and the average width in feet. The average value in foot-ounces is divided by the average width in feet, giving the average value in ounces. An example will illustrate. Let us consider three samples taken along a drift equal distances apart, as follows: (1) Twelve feet of ore averaging 1 ounce per ton; (2) 1 foot of ore averaging 12 ounces per ton; (3) 6 feet of ore averaging 3 ounces per ton. By the ordinary method we have an average width of $\frac{19}{3} = 6\frac{1}{3}$ feet, and an average value of $\frac{19}{3} = 5\frac{1}{3}$ ounces per ton. This is obviously wrong, as the bulk of the ore is only 1-ounce ore. By the foot-ounce method

12 feet	× 1 ounce	= 12 foot-ounces.
1 foot	× 12 ounces	= 12 foot-ounces.
6 feet	× 3 ounces	= 18 foot-ounces.
19		42

$\frac{19}{3} = 6\frac{1}{3}$ feet = average width in feet.

$\frac{42}{3} = 14$ foot-ounces = average value in foot-ounces.

$\frac{14}{6\frac{1}{3}} = 2.210526+$ = average value in ounces.

By the foot-ounce method, then, we have an average width of $6\frac{1}{3}$ feet and an average value of 2.21 + ounces per ton; by the ordinary method, $6\frac{1}{3}$ feet and $5\frac{1}{3}$ ounces per ton. This is an extreme case, but it serves to illustrate the error which may be made by figuring ore bodies in the ordinary way.

That this method is correct may be seen in the following way: Let us consider the block 30 feet long and 20 feet high, and let each sample represent a sub-block 10 feet long by 20 feet high by the width of the vein at the point where the sample was taken. Let us further suppose the mine is a gold mine, that gold is worth $20 per ounce, and that the ore is of such specific gravity that 15 cubic feet weigh one ton. Then sub-block 1 contains 160 tons of 1-ounce ore, having a total value of $3200; sub-block 2 contains $13\frac{1}{3}$ tons of 12-ounce ore, having a total value $3200; sub-block 3 contains 80 tons of 3-ounce ore, having a total value of $4800. Adding the totals, we find that the whole block contains $253\frac{1}{3}$ tons, having a total value of $11,200. By the foot-ounce method, $\frac{6\frac{1}{3} \times 30 \times 20}{15} = 253\frac{1}{3}$ tons, checking the above; $253\frac{1}{3}$ tons × 2.210526 ounces × $20 = $11,200, also checking the above.

Methods of Testing and Sampling Placer Deposits.*

By EDMUND B. KIRBY.

Every engineer who has had to do with placer work realizes how difficult it is to ascertain, even approximately, the average gold contents of gravel.

The problem presented often comprises gravel beds measured by hundreds of acres, or by miles of gulch bottom. The quantities which it is possible to use for actual tests, whether measured by panfuls or by thousands of cubic yards, are but a minute fraction of the great bulk. Moreover, the distribution of gold in this mass is irregular and uncertain to an extreme. From the nature of the deposit only small portions of it, at best, can be rich enough for pay. These local enrichments are due to the concentrating action of the stream at intervals during its long history. They are therefore subject to all the irregularities which might be expected from its ceaseless shifting, and the changes in the material deposited.

Notwithstanding these difficulties a business decision is called for, and it is always necessary to reach a sound conclusion without spending more time and money than the circumstances warrant. In most cases, therefore, it is best, if possible, to carry on the work by successive steps. If the general evidence examined proves satisfactory, it affords a basis for proceeding to the more simple and inexpensive tests. Encouragement from these will warrant more costly test workings, and the latter may be followed by the heavy and decisive work which is to settle the question at issue.

The Structure of Gravel Deposits.—In most cases presented throughout the West, the gold-bearing gravels are deposits from the present system of streams, and their form and position have probably been developed during the Quaternary period. The high gravels of the California ancient river system are of earlier date and form a class by themselves. As compared with the more recent deposits they are limited in quantity, and differ radically in structure, character of the gravel, grades and methods of working.

Only the first-mentioned deposits are under consideration here. They may be conveniently classed as "high bars" (above water level) and "bottom gravel" (at and below water level). The high bars are remnants of beds which were deposited before the stream cut down its gulch or valley to the present depth. They were originally terraced, but have frequently been shifted or changed in external shape by erosion. They were the most accessible and easily worked deposits, and, generally speaking, are now very scarce.

The deep gravel filling the present gulch or valley bottoms below water level constitutes the principal bulk of the deposits now remaining in every placer district. As a rule, it is inaccessable without the aid of skilled engineering, modern appliances and the use of considerable capital. Of late years these deep deposits have attracted some attention. This is on account of their abundance, and because of the possibilities which may follow their development. The uncertainties and difficulties of such work are very great. It has been best developed by "river mining" in California, and in various districts of the Northwest. During the last few years modern heavy machinery for excavating, hoisting and conveying has been brought into use for this work. Many mistakes have been made in its application, and most attempts of this kind have so far been financial failures. Steady progress is being made in perfecting such apparatus, and there is without question a large field for its application to cases where the conditions are suitable.

It is clear that the climatic and other conditions under which a stream cut down its channel in the bedrock were different from those which prevailed while gravel beds were deposited in this channel. In the first case there was a large volume of water and probably steep grades. In the second case both waterflow and grade must be less, and this is the condition which now prevails in our western rivers and streams. The present grades are generally less than 2%, and the transporting action on large gravel, even in time of freshet, has almost ceased. The bedrock is now protected from erosion by a more or less heavy bed of gravel, over the surface of which the stream flows. In many cases the processes of erosion and deposition have alternated frequently, and this accords with what is known of climatic changes during the Quaternary period.

The gravel beds are made up of various streaks or layers, some of which may be gold bearing, while others are entirely barren. These layers have all the irregularities of stream deposited gravel. They are sometimes quite uniform in thickness and value over considerable areas, as though spread out by floods. In other cases they form crescent-like, overlapping streaks, varying greatly in gold contents, and indicating their deposition in side bars by the stream as it shifted its position. During the deposition of gold-bearing gravel, the light or scale gold is apt to be distributed very uniformly throughout the entire mass. The heavy gold, on the other hand, tends to concentrate out in special streaks or layers. It is a frequent occurrence to find rich layers on top of barren layers, and many facts indicate that, during the deposition of rich gravel, its gold contents do not work down through undisturbed gravel beneath. When pay gravel exists in a gulch, it is generally confined to a ribbon-like layer on or near the bedrock. It is not likely that this is the accumulation of gold which has sifted down from the overlying mass. On the contrary, there is every reason to believe that the bedrock channel for a long period acted like a sluice. As the transporting power of the stream gradually lessened, its gravel was alternately moved and then redeposited. This sluice action, with the repeated shifting and loosening of the first deposits, caused their gold to accumulate in the bottom layers.

This pay lead or bedrock channel is usually of limited width, and meanders along the gulch, marking in general the course and width of the stream at the time. There may be two or more of these channels, and they are not necessarily in the deepest part of the gulch. They may be found higher up, along its sides, as portions of earlier channels, made before the bedrock of the gulch was cut down to its present depth. In such a channel the distribution of gold is very irregular, but, on the whole, it seems to follow the rule so often observed, and is heaviest on the inner sides of bends. It is usually necessary to work the channel by a pit or open cut. It is a rare occurrence to find that the general mass of gravel filling the gulch will average enough for pay. The slope required for the sides of the excavation increases the proportion of this poor gravel, so that the pay lead must be rich enough to bring up the average to the pay point.

Evidence Available in Placer Examinations.—A determination of the average value of gravel is only one of the numerous questions, both business and technical, which arise in a placer examination. It is often unnecessary, because the business decision to be made may be settled by other considerations. Moreover, the books and records of an established placer enterprise will often supply the data necessary to estimate the value of the ground worked. The reliance to be placed upon such evidence is matter for special judgment in each case. Generally, actual tests must be made, and the evidence to be secured may be roughly outlined as follows:

I. General evidence derived from the history, records, facts shown by prior workings and neighboring mines, structure of the deposit, etc., etc.

II. Evidence from sampling gravel already exposed. Such exposures may be found in surface gravel, natural banks and gullies, or prior workings.

III. Evidence from special test workings made for the purpose. These may include shafts down to water level, and such work may be made light or heavy as warranted by the circumstances and the facts developed during its progress.

IV. Evidence from heavy and decisive test workings. In high bars this may merely include a more extensive system of test shafts and drifts in the dry gravel, but in the water-bearing bottom gravel such work is very difficult and expensive. This should not be a serious objection, in view of the heavy investment which will be necessary to open and work a deposit of this character. The very existence of a pay channel, to say nothing of its grade, is uncertain. To risk a large investment on mere chance, without first feeling the way by such preliminary work, is not a course that will appeal to sound business judgment.

On account of the expense of testing gravel, it is impossible to cover a large territory. In practice, all that can be done usually is to select the most promising and workable locality, and decide the question at issue by the value of this portion. The test workings should be so arranged as to define the shape and limits of the pay ground. In a large area or a thick mass, there is no better system than a number of shafts. A channel may be exposed by a crosscut drift from a shaft, and a few cross sections of this kind at different points should give a fair idea of what may be expected from it. Bottom gravel may be 500 to 1500 feet wide, and the main difficulty at first is to locate the position of the bedrock channel. It will generally be best to secure some evidence on this point before starting a shaft. There is no better way of obtaining this than by a line of drop drill holes which will give an approximate cross profile of the bedrock, and will also give some evidence as to the presence of gold and the character of the gravel.

The units of measurement used for placer gravel vary according to the shape of the workable ground. In a thick mass it is the cubic yard. In a thin sheet, with the values on the bedrock, it is customary to use a unit of area such as the claim or the acre. For a channel, a unit of length is preferred, giving the yield per 100 or 1000 feet of length. The extreme irregularities of the deposit are always to be kept in mind, and figures of measurement (like those of value) are to be used with caution. In averaging the results of tests, each should be given a value proportioned to the volume of gravel which it is supposed to represent.

(To be Continued.)

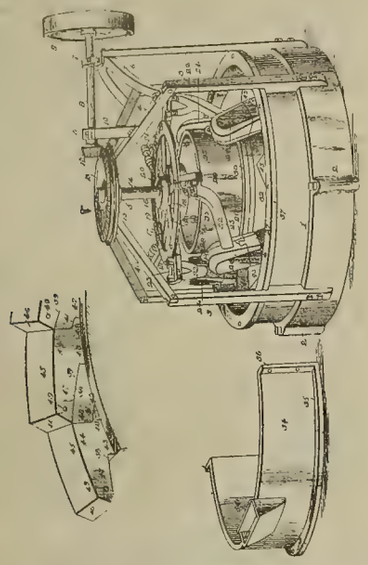
* Read before Colorado Scientific Society.

Latest Mining and Metallurgical Patents.

Patents Issued June 6, 1899.

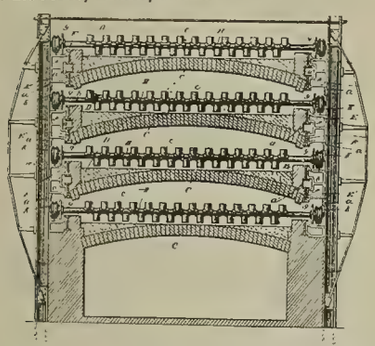
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ORE CRUSHER.—No. 626,326; J. F. Keyton, Baker City, Or.



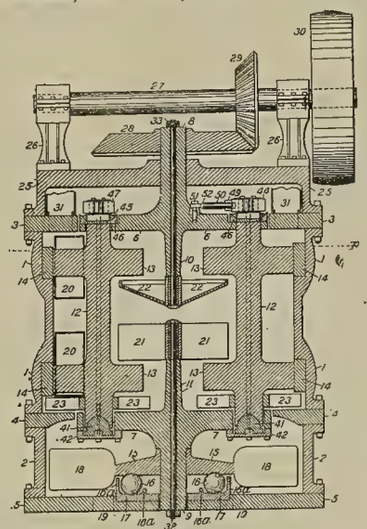
An ore crusher, the combination of a drag wheel involving a hub provided with slots, arms fitted into slots, an annular band or brace attached to arms, the arms being bent or deflected outside the brace, drag arms jointed to deflected projections, and stamps or mullers; the mortar having enlargements with recesses between them to form seats, and a groove at lower portion of one end of each recess, and dies removably fitted over the enlargement and having an under contour corresponding thereto and the recesses between same, and also provided with tenons to engage the grooves.

HEATING OR ROASTING FURNACE.—No. 626,632; W. E. Roberts, Butte, Mont.



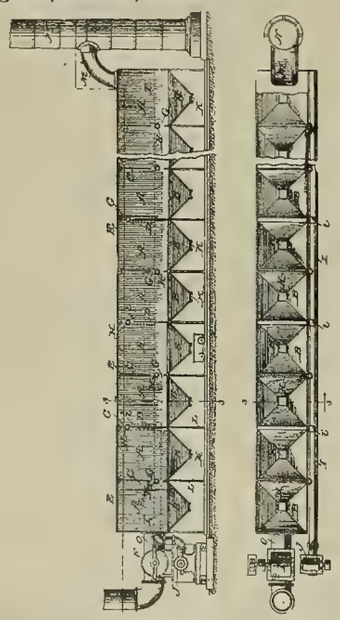
A calcining furnace comprising a series of vertical or upright posts between the ends of the furnace and at suitable localities to insure the strength of the structure, brackets carried by posts, longitudinal I-beams carried by the inner ends of brackets, and distant from posts, an arch of masonry carried by the I-beams, side walls and hearth carried by suitable supports, longitudinal continuous slots through the side walls, and extending from end to end thereof and past the vertical posts, and means for closing longitudinal slots when desired, substantially as described; a series of sets of arches, hearths and side walls of masonry carried by the longitudinal I-beams, each set of arches, hearths and side walls separated from the next adjacent set by longitudinal slots extending laterally from the heating chamber and into the open space between the side walls and the vertically arranged posts, whereby the entire masonry of the furnace may be carried by supports lateral to the side walls and heating chambers and access be had to the heating chambers from one end to the other; furnace composed of a series of ovens or heating chambers one above another, the combination with vertical supports ranged alongside the walls, of horizontal longitudinally disposed beams supporting the roof or arch of one oven, the floor of the next above and the side walls, and brackets carried by the vertical beams and engaging and supporting the horizontal beams; separate longitudinal beams one above another of differing weight and strength, the lower and heavier supporting the roof or arch of one oven and the upper and lighter the floor of the next oven above, in combination with vertical beams or columns ranged along the side walls of the furnace and brackets carried by the vertical beams engaging and supporting the horizontal beams; longitudinal tracks on brackets, continuous longitudinal openings through both side walls and extending past the columns, a rake, the ends of the shaft of which project through the longitudinal openings of the walls of the heating chamber and supports for shaft ends outside the walls of the heating chamber, but within the columns, and resting on tracks for supporting and operating the rake.

CENTRIFUGAL PULVERIZING MILL.—No. 626,426; F. G. Johnson, New York, N. Y.



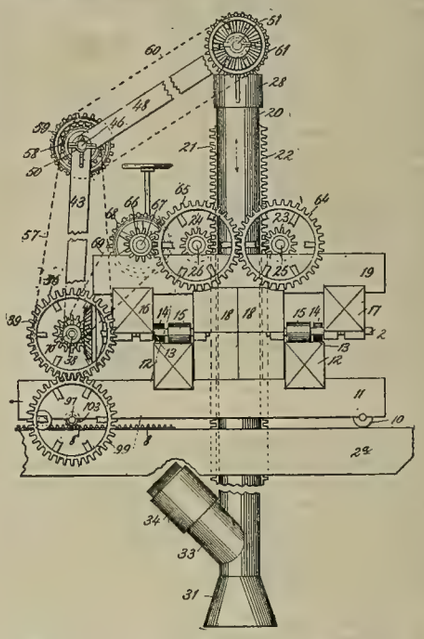
A centrifugal pulverizing mill, two or more vertical roller shafts, each of the same having two horizontal rollers, the upper and lower roller shafts holding headplates *6* and *7* rigidly held together by coupling bars, and each headplate having a central spindle shaft extending toward each other, the lower one of which having mounted thereon a series of radial fanblades, and the upper one of the spindle shafts having mounted thereon an upturned concave disk having vertical radiating partitions, in combination with an inclosing case having annular dies for the tread of the rollers; an upper inclosing case having annular dies for the tread of the said rollers and a lower case having within it an automatic blower mounted on the lower main shaft; the roller shafts having their horizontal support and propulsion in the direction of their circuit around the common center of motion by swivel connecting rods, the movable swivel ends of the rods being secured to the journal boxes of the roller shafts and the fixed ends thereof to the headplates, in combination with a surrounding case having annular dies for the tread of the roller; whereby the roller shafts are immovably held in a vertical position in the direction of their circuit around the common center of motion and yet are free to move and lean in a radial direction.

APPARATUS FOR CATCHING WASTE PRODUCTS FROM LEAD, SILVER OR OTHER SMELTERS.—No. 626,569; W. Sergeant, El Paso, Texas.



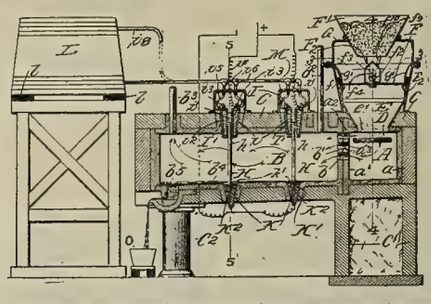
An apparatus for catching the waste product from smelters consisting of the trail or passage composed of settling chambers arranged in succession and having hopper-shaped bottom, baffle plates extending alternately up and down between settling chambers, the transverse air spray pipes extending adjacent to the free edges of the baffle plates, the exhaust fan for forcing the fumes and waste products through the trail or passage, the air main and fan for forcing the air through such main and connections between main and air spray pipes; longitudinally extended trail or passage for the fumes, transverse baffle plates alternately arranged therein and having narrow passages alongside their free edges and the transverse air spray pipes extending adjacent to the free edges of the baffle plates; standards whereby settling chambers are held in an elevated position, the alternately arranged baffle plates partially separating the chambers, the transverse air spray pipes located between the settling chambers and the main connected with pipes.

DREDGE FOR HARD OR SOFT MUD.—No. 626,491; J. T. Ford, Galveston, Tex.



A dredging machine, the combination with a support having an overhanging frame, of a main carriage movable on frame toward and away from the support, a supplemental carriage movable back and forth on the main carriage at an angle to the path of movement of the latter, a vertically movable suction pipe, transverse parallel bars on the supplemental carriage for supporting the suction pipe laterally, and a brake device supported by the bars for controlling the descent of the suction pipe; combination of a stationary support, the drive wheel (*85*) located thereon, a movable carriage for supporting the working parts, the shaft (*88*) mounted on the carriage and carrying the wheel (*96*), the idler arranged in fixed relation to the drivewheel, the movable gear (*91*), and drivechain (*92*), the shaft (*97*) supported by the carriage, and shiftable connection between shafts for reversing the movements of carriage; a vertically-adjustable suction pipe, a gear rack on the same, a pinion meshing with rack, and a brake on the shaft of the pinion to control the descent of the pipe.

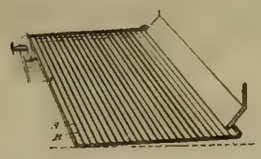
PROCESS OF REDUCING ALUMINUM FROM ITS COMPOUNDS.—No. 626,635; G. Schwahn, St. Louis, Mo.



As a process, subjecting a hot compound vapor containing aluminum to the action of a hot carbon-gas deoxidizer, in the presence of incandescent carbon, for an appreciable length of time, substantially excluding the air; as a process, passing a compound vapor containing aluminum through a chamber from which air is substantially excluded, and which contains incandescent carbon at two or more points between its ends, causing vapor to pass in the neighborhood of incandescent carbon repeatedly during its passage through chamber, subjecting vapor during its passage to the action of a hot carbon-gas deoxidizer for an appreciable length of time, and increasing the heat of vapor during its progress through chamber and while being acted upon by gas, until its temperature is not lower than that of carbon at a white heat; subjecting an aluminous vapor substantially free from silica, any alkali or any metal adapted to alloy aluminum, to the action of a carbon-gas deoxidizer and incandescent carbon substantially

free from silica, alkali or any metal adapted to alloy aluminum for an appreciable length of time, while substantially excluding the air.

CONCENTRATING BELT.—No. 626,461; G. Gates, Jackson, Cal.



An endless traveling belt having a regular general inclination so that pulp delivered at the upper end will flow toward the lower end; broad, flat tubular surfaces at the top of the belt with intervening offsets, each of surfaces declining toward the higher end of the belt and to the foot of the next offset, whereby extended surfaces are formed for the settling of sulphurets and to allow pulp to flow over the surface of the sulphurets thus deposited; an endless, longitudinally inclined belt composed of a series of wide, longitudinally disposed surfaces with shallow, vertical connecting offsets, drums around which the belt is movable, both drums so inclined from end to end that the belt surfaces have a slight downward inclination transversely from the lower toward the upper edge of the belt, and a means for supplying pulp and water along the upper edge of belt; belt having upturned flanges at its edges, drums around which the belt is movable, being inclined transversely of the belt, so as to produce a general flow of pulp from the upper side and end, while the belt surfaces decline from the lower end toward the upper side.

Some Rare Mineral Specimens.

The following recent additions have been made to the exhibit of the California State Mining Bureau in the Union Depot and Ferry House:

Strontianite (carbonate of strontium), Lassen Co., Cal., H. G. Staab; first occurrence of this mineral noted in California.

Crednerite (oxide of copper and manganese), H. C. Davey, Calistoga, Cal.; first occurrence of this mineral noted in California.

Silver ore (stalactite) assaying 140 ounces silver per ton, Esmeralda mine, near the San Marcos coal fields, Sonora, Mexico, Prof. E. T. Dumble.

Hydro-boracite (borate of lime and magnesia) containing 50% of boracic acid, Ventura Co., Cal., J. Ryan; first occurrence of this mineral noted in California.

Meteoric iron; cutting from the Roebourne meteor, found in N. W. Australia, beautifully etched by Prof. H. A. Ward.

Kermesite (oxysulphide of antimony), from near Mojavé, Kern Co., Cal., H. E. Cunningham; first occurrence of this mineral noted in California.

Quicksilver ore from near Clayton, Contra Costa Co., Cal., Dr. Wm. Rider Powell.

Petrified wood from the stump of a tree in Humboldt county, the body of which was worked up into shingles, R. F. Herrick.

Gold quartz, Gold Bug mine, Josephine Co., Oregon, J. D. Ludwig.

Gold in chlorite, New South Wales.

Chrysocolla (silicate of copper), Copper World mine, Ivanpah, San Bernardino Co., Cal., Herbert Lang.

Cinnabar (concentrates from soft ore), Integral mine, Trinity Co., Cal., A. B. McCaw, M. E.

Gold quartz, showing free gold, from a ledge 4 to 5 feet wide near Colville, Mono Co., Cal., Martin H. Shields.

Gold and silver ores from Moore Hill mine, near Cathay, Mariposa Co., Cal., Walter Mayerhofer.

Antimony ore (stibnite), Metallic mine, twenty-four miles from Mojave, Kern Co., Cal., W. A. Johnson, per A. Blanc.

Hubnerite (tungstate of manganese), Runnelville, Cochise Co., Arizona, Prof. Wm. P. Blake.

Rich quicksilver ore, Bryan & Sisk mine, Clover creek, Shasta Co., Cal., J. M. Bryan.

A large number of gold quartz specimens from Calaveras, El Dorado and Placer counties.

Gold quartz, Golden Jubilee mine, Trinity Center, Trinity Co., Cal.; 460 pounds of this rock yielded $220.64 gold and silver.

H. S. DURDEN, Curator.

A NOVEL method of saving gold from tailings, says the *South African Mining Journal*, consists in the employment of a funnel-shaped vessel, with the small end downwards, in which a quantity of water is placed, with a layer of kerosene on top of it. The tailings are put in from above, half a ton at a time, and the agitation of the fluids causes the separation of the gold, which, for some unexplained reason, takes up a position in suspension between the kerosene and the water. A. W. Howitt, late Secretary for Mines in Victoria, vouches for the correctness of the description, his son and a Mr. Godfrey being the patentees. H. C. Jenkins, A.R.S.M., and Mr. Meekinson, the metallurgist and engineer respectively of the Mines Department, have been instructed to investigate and report on this process.

Some Experiences of a Working Miner.

NUMBER XX.

Written for the MINING AND SCIENTIFIC PRESS.

The G—— G—— M—— Co. was a corporation and had an abundance of money, apparently, for speculative purposes, but there appeared to be a dearth of mining talent and a lack of common sense in the outfit. Evidently realizing the shortcomings of the concern, they employed at no small expense a certain Madame B——, whose specialty was divining the whereabouts of rich veins and deposits of gold and other ores, and on a pinch she could make a pretty good bluff at metallurgy and mechanical engineering.

After the company was organized and ready for business Madame took a hand and a large deposit of gravel on C—— creek was investigated; this was found to be very rich in gold, much to the surprise of those who lived in the neighborhood, who had never suspected that the gravel was gold bearing, but Madame went into a trance and, coming out of it alive, positively asserted that the spirit of a departed Indian chief, who had in life inhabited the section where the gravel was found, had told her there were great riches in the bank of gravel. The deposit lay 60 feet or more above the creek bottom and it was apparent the only economical way to work the deposit was by the hydraulic method. This necessitated a ditch. There was plenty of money and a ditch was built five miles in length, but in fear that there would not be sufficient water in this ditch, a second one was dug on the opposite side of the canyon. This was also about five miles long. The two ditches were finally completed and flumes arranged, several hundred feet of iron pipe laid and a full equipment for hydraulic mining put in, and at last the giants were turned on the gravel bank. Piping was kept up night and day for a week and then the water was shut off for a clean-up, to get an idea of how the thing was going. The clean-up showed several panfuls of fine, nicely washed iron rock, and a few hundred specks of gold—perhaps twenty cents in all. About this time Madame B—— had another spell and, as before, surviving it, declared that the chief had not been sufficiently plain in his description of the wealth on C—— creek. It was not in the gravel deposit at all, but in veins of silver-copper ore. A score of quartz locations were made, and open cuts, shallow shafts and tunnels were made, some of the latter nearly 100 feet in length. Not one of these developed anything. The Madame then denounced the chief as a deceiver and rousted out some other kind of a spirit who told her that on a certain hill near D—— there was a rich mine, but no one could treat the ore unless the secret were learned from the aforesaid spirit. The ground pointed out was located and considerable work done. The Madame managed in some manner to get big assays from any of the rock, but somehow the assayers who did a commercial business at D—— could not get anything out of this rich ore. The spirit came to the rescue, however, and told Madame how to build a mill to treat this peculiar ore, and the mill was actually built. It had a single steam stamp with a cylindrical screen. Below were half a dozen shallow pans, each about 8 inches in depth. There were settling vats, and roasters, pulverizers, and I cannot remember what all. It cost over $20,000 and never worked but three or four tons of ore and that contained nothing, and this failure wound up the G—— Co. which had spent over $75,000 on the advice of spiritual miners and had gone broke.

* * *

One can work very close to a lot of gold underground and miss it by an inch or two. Several years ago when the original owners were working the B—— mine it became necessary to cut a hitch in the foot wall, or rather what they called the foot wall, for the purpose of setting in a post. The hitch was cut and a very fair prospect uncovered. That is, some of the pieces of rock chipped out showed a little gold, but it was a mere nothing as compared with what had been taken out a short distance above, and it was looked upon as a sort of small offshoot from the main vein. Years after, when other men were working the mine, they were taking up this foot wall ground, and when they came to the old post it had to come out. It was removed and the rock under it was also cut out, and within a space of not over 100 square feet under and about the post nearly $100,000 was taken out in a few days. The first miners had the prospect but did not follow it.

* * *

Tenderfeet had worked the B—— B—— mine with very indifferent success, and having exhausted their means and having realized very little from the mine went in search of assistance. They found a man after a short time who agreed to put up a grubstake and work himself, being a miner, for an equal interest. When he arrived at the mine and went to the bottom of the inclined shaft, about 30 feet deep, he remarked that the hole was too small to work in and suggested putting a hole in the hanging wall for the purpose of cutting out more ground. Here comes the element of luck, for it was nothing else. One of the original owners thought the hole should be placed on the foot wall side as it would be easier drilling. The new partner made no objection and the hole was drilled into the foot, charged and fired. After a time one of them went down to see the effect of the shot. He had hardly reached the bottom when he called out to those on the surface, "Come down here; gold till you can't rest!" The men above tumbled over each other in their haste to get to the bottom of the hole, and there, sure enough, was gold and apparently plenty of it, and they scarcely rested for several days till they had taken it out, breaking out the floor of the inclined shaft nearly to the surface and getting about $15,000 for their labor. The first two had worked right over the rich streak, within 6 inches to 1 foot of it all the way down.

* * *

Mr. A—— was a well-to-do business man; not rich, but very comfortably provided with this world's collateral. He took the notion to abandon business and to engage in mining. He went to C—— and made his first venture, and it was successful. A few months' work had swelled his capital 50%. His fortunate experience also swelled his head and after six months' experience he concluded mining was the simplest, easiest and withal the most pleasant way of making money. The latter portion of his conclusion was correct, all right, but when it is classed as the simplest and easiest, he who thinks so without having learned so from his own experience had better hesitate. A——, besides being well off and successful, was also obstinate and hard-headed. Having once determined in his own mind to do a certain thing no amount of dissuasion could turn him from his purpose. He was also a scholar and a firm believer in the principles and laws of nature. Near the bar from which A—— had taken a goodly sum in placer gold was a deep hole in the river. This was commonly known as the pot hole. Now, A—— argued: "As that hole is the deepest part of the stream and gold is probably the heaviest substance in the stream, and as the stream has been rich elsewhere, the pot hole must have caught and retained a large amount of gold, for the gold in the stream above the pot hole is distributed for miles along its course, and it is simply a rational conclusion to believe that a large amount of gold has gone into that pot hole and having gotten into it it could not possibly get out." Many others had reasoned in the same manner before about other pot holes to their sorrow. Old and experienced miners told A—— he could get nothing from the pot holes, but he turned a deaf ear to all advice and told them the reason they had failed was from not knowing how to go about it. It was an inexorable law of nature that the gold should seek the lowest places, etc. He went to great expense, built pontoon bridges and had about exhausted his means when ready to reap his reward. Is is scarcely necessary to say what the result proved to be; briefly told, it was no gold. This experiment ruined A—— financially and it really cost him his life, for he was not a strong man physically and the loss of his money brought on illness to which he succumbed. It is simply another illustration of how easily a novice at mining may overestimate his knowledge and capacity to handle a novel proposition.

MINER.

Deep Mining on the Rand.

So far as the first row of deeps is concerned deep level mining on the Rand has, under careful and skillful management, proved an unqualified success, and the time is fast approaching when the second row all along the line will enter the ranks of producers and swell the output and the dividend list. The success achieved has caused renewed inquiry as to the possible depth to which mining on the Witwatersrand bankets may be practically and profitably pursued. Mr. John Hays Hammond long ago gave his opinion that 5000 feet was a reasonable depth to expect to attain both practically and on a commercial basis. Mr. Hammond estimated "that in the case of a deep level mine of 250 claims and with two shafts, each 2500 feet deep, the extra capital which would be required to pay for the sinking and equipment of such shafts would be about £800 per claim." Truscott gives the average profits per claim on the outcrop companies at £31,700, and this is now being exceeded in actual results, £45,000 per claim being nearer the actual earnings. He estimates the extra cost of hauling from 2500 feet to be about 3s 3d per ton, so that, allowing for both factors of increased expense, viz., shaft sinking and haulage, the margin of profit is affected only in a very small degree. For depths of from 2500 to 5000 feet it would seem that an estimate of costs would have to be proportionately increased, but hitherto every year the cost of mining has been reduced, and the probability is that by the time the mines containing the reef at a depth of 5000 feet reach the producing stage their working cost will be much higher than those of the deeper producing mines are to-day.

Shaft sinking is already being done much more rapidly, and new methods and discoveries are constantly being introduced which will have a most important bearing in the future of deep levels.

Diamond and Gold Mining in Minas Geraes, Brazil.

The following interesting description of the diamond and gold mines of Brazil and the methods of working them is from the report of Mr. Dawson, secretary of the United States Legation in Brazil:

Minas Geraes is the most populous State in Brazil. It has 3,000,000 or 4,000,000 inhabitants and its area is about 222,000 square miles. On account of its elevation, the climate is for the most part cool, temperate and healthy. There is no winter in the ordinary sense of the word. The surface is a great plateau with a general height of 2000 to 4000 feet above the sea. It is varied by an extensive river system and mountain chains, the latter rarely reaching an elevation of more than 6000 feet. In the southern part of the State are several lines of railway; coffee is largely exported; immigration has been considerable, and the commercial relations resemble those of the neighboring States, Sao Paulo and Rio de Janeiro. The northern part, including four-fifths of the area, is without railways and is more isolated, self-supporting and characteristically Brazilian. In this region are found the diamond mines. It contains a large population and is one of the most prosperous parts of Brazil.

In mining, Minas is pre-eminent among the States of the Republic. It has produced and still produces by far the largest proportion of the mineral output of the country.

Diamantina lies 680 miles from Rio de Janeiro, and has from 6000 to 8000 inhabitants. As its name indicates, it is the capital and center of the principal diamond district of Brazil. It was founded in the last years of the seventeenth century as a gold mining camp; in 1729 diamonds were discovered. These were at once declared State property by the King of Portugal, and for a hundred years mining of diamonds in Brazil was a Government monopoly. In 1832 the Brazilian Government legalized private mining. Before that time the Government superintendents and contractors had worked the mines with gangs of imported slaves and in a most short-sighted manner. The district shows the indelible results of such a regime. To this day, there is an enormous preponderance of negro blood, and immense deposits of diamond-bearing gravel are irrecoverably lost, because they have been covered with detritus of other workings.

There are six important diamond districts in Brazil:

(1) Diamantina.

(2) Grao Mogul, also in the State of Minas and 150 miles from Diamantina.

(3) The Chapada Diamantina in the State of Bahia, which produces quantities of amorphous and black diamonds, used for making drills.

(4) Bagagem, 200 miles south and west of Diamantina. This was worked as early as the middle of the last century and produced the celebrated Estrella do Sulof, 254 carats; but the general results were unsatisfactory as compared with those of Diamantina and Grao Mogul. The district has been but imperfectly explored.

(5) Goyaz, in the State of the same name, near the River Araguaya, a navigable tributary of the Amazon.

(6) Matto Grosso, 100 miles north of Cuyaba, the capital of the State, and 1000 miles west of Rio de Janeiro.

The first three districts lie on or near the crest of the great mountain chain of the Sierra de Espinhaco, or its continuation under different names, which forms the watershed between the Sao Francisco, flowing north more than 1000 miles before it turns toward the Atlantic, and those rivers which flow directly into the ocean between Rio de Janeiro and Bahia. It is the opinion of experts that these three diamond districts are all parts of a great diamondiferous region extending in a narrow belt along the crest of the sierra and down its slopes for more than 500 miles. It is therefore probable that further discoveries may be expected in the intervals between the districts already productive. That in the vicinity of Diamantina the country rock, from which the diamonds have been washed by erosion into the beds of streams, exists only in the central sierra and not in the side mountain chains, is proved by the fact that diamonds have been found in all, or nearly all, of the streams which flow into the left side of the Jequitinhonha, and none in those flowing into the right bank. The Jequitinhonha is the most famous of all the diamond rivers, and the most extensive and successful operations in Brazilian diamond mining have been conducted in it and its upper tributaries.

Four distinct kinds of mining are practiced in the Diamantina district. The first is the most ancient and simplest. Near the top of the sierra the small streams are very steep in their descent and have precipitous rocky sides. Their beds are filled with boulders, and in the interstices the diamond-bearing gravel is found. This gravel is called the "formacao," and is easily recognized by an experienced miner, for the reason that it contains certain minerals whose presence indicates the diamond. The diamond is a heavy mineral, its specific gravity being about 3.6, much greater than that of ordinary rock. When the original deposits in the high sierra were eroded and washed into the streams, the diamonds and other heavy minerals were separated from the bulk of the detritus by the action of the water. The heavy gravel thus left at the bottom and caught among the boulders is the formacao. There are more than thirty minerals, some of which are always found in it. Among them are tourmaline, specular ore, disthene, rutile, gold and various phosphates. The presence of these shows that the existence of the diamond among them is probable. The formacao is prospected for in the dry season, and as soon as found is dug out and piled near by the water. When the rains interrupt the digging, the miners work up the gravel. The operation is very simple. The gravel is first washed in a "bacu," an excavation a yard wide and a yard and a half long on the bank of a pond or stream. Its lip is a few inches above the surface of the water and it deepens slightly to the rear. A cubic foot or more of gravel is placed in the back end and the workman dashes water against it out of a large concave wooden plate, giving it a peculiar rotary fling. This rapidly separates the lighter and larger stones from the smaller and heavier ones. When concentration by this rough method is as complete as possible, the gravel is worked with the "batea," a wooden dish about 30 inches in diameter, with a sort of pit at the bottom. Filling the batea with the concentrate and water, the workman agitates the contents, whirling and shaking them, meanwhile pouring and scraping the lighter gravel from the top as fast as he separates it. The operation is similar to gold-panning, but requires greater skill. It is said that a man may be a first-rate gold-panner and yet useless for diamond washing. At the end of the process, the diamonds are simply picked out by hand from the remaining minerals. Their peculiar luster makes them easily recognizable even by a tyro. The Brazilian method of washing alluvial gold is substantially that described above. By its use, practically all the diamonds and placer gold which Brazil has produced have been obtained. The native Diamantina miners know no better method.

At present the small stream washings in the Diamantina district are not important or productive. Two hundred years of search has exhausted most of them. Those who work them are usually men with little or no capital. They go in small parties and work somewhat at random, trusting to the chance of finding virgin gravel and making a rich haul. The rewashing of ancient concentrates of the old workings is also extensively pursued.

The second method of mining is that practiced in the beds of the larger streams. The opening of one of these mines is an extensive and complicated undertaking, requiring the employment of thousands of dollars and hundreds of men. At the beginning of the dry season a spot is selected which is believed from tradition or ancient documents to be virgin. Just above the spot selected a rude dam is erected and also a sluice around it, through which the waters of the river are turned. The bed thus exposed is usually found to be of sand, largely the detritus of ancient workings. This sand is carried out a shovelful at a time in little wooden pans on the tops of negroes' heads. Naturally, such a process is tedious and expensive. The work could be done many times more cheaply and quickly with dumpcarts or even with wheelbarrows. From time to time attempts have been made to introduce them; but they have not been successful, owing to the conservatism of the native miners. The excavation is often carried to a depth of 30 or 40 feet before bedrock, where the formacao is to be found, is reached. The hundreds of workmen climbing the slopes of the hole in long lines, each balancing a pan of earth upon his head, look like ants following their paths in and out of a hill. The work is done in great haste, because the first considerable rains in September or October wash away the whole structure and fill up the excavation. The water that percolates into the pit is pumped out with rude pumps worked by overshot wheels, a portion of the river being diverted from the sluice for this purpose. These pumps are simply wooden tubes, in which work leather buckets opening upward. A stream of water is kept continually pouring down from the top to keep them running, otherwise they would not draw. The construction of the sluice, dams and wheels shows considerable primitive engineering skill. No nails or iron are used. The joints are mortised or bound together with vines. The builders have no idea of exact measurements, even the slope of the sluice being determined by the eye alone. Nevertheless, such is their inherent skill that their work nearly always serves its purpose. However, they are unequal to difficult and novel problems. For example, one famous spot in the Jequitinhonha called the Pocao (pothole) de Moreira, reputed to be virgin and fabulously rich, was unsuccessfully attempted several times in the early part of this century. Every time before the bottom was reached the rains came and destroyed what had been done. A few years ago Antonio de Lavandeyra, a Cuban engineer, by the use of modern methods and pumps, succeeded in reaching and uncovering the bedrock. The practical results were a good example of the discouraging uncertainty of diamond mining. Only four diamonds were found. It is now believed that one of the early contractors, in the good old days before the formacao in the Jequitinhonha had been covered up with sand, had exposed or dredged the spot and taken out all the diamonds, and then had not thought it necessary to make any record of his doings for the Government or posterity.

The whole bed of this richest of all diamond rivers, from its source to Mendanha, fifty miles below, has probably been worked. Below that point the valley is too broad and the bed too much choked with sand to permit operations of the kind I have just been describing.

The gravel found is carried out of the excavation and placed in piles until the enforced leisure of the wet season gives a convenient opportunity to wash it. If the ground is virgin, the miners are likely to get a rich reward; if the gravel has been washed before, they lose all they have spent. The river mining is usually carried on by a local expert, who forms a company, to which his speculative neighbors and friends subscribe. No foreign capital is employed in it.

(To be Continued.)

White Rock Silver Mine.

The White Rock silver mine, near Drake, New South Wales, which at one time was floated for a million sterling, has been the despair of numerous plucky prospectors. Though it has not returned a profit on the capital expended, it is of great geological interest. E. F. Pittman, the Government geologist of New South Wales, visited the mine. "The White Rock deposit," he says, "has hitherto been regarded as a felsite dyke, intersected by veins of silver-bearing galena and zinc blende. I had never had an opportunity of inspecting it until recently, when I spent several hours in examining the deposit, which appears to me of such an unusual and interesting character that I determined to pay it a second visit during the Easter holidays. In my opinion, the argentiferous material is a volcanic agglomerate or breccia, and forms the filling of a volcanic neck or chimney.

"The agglomerate, which is of a greyish-white color, consists essentially of felsite, and contains numerous rounded and sub-angular boulders, many of which show rhyolitic structure; they vary in size from that of a pea or less up to several feet in diameter. This agglomerate is intersected by numerous minute veins of galena and zinc blende, which in places impart to it the character of a stockwork, while occasionally larger banded veins up to 2 feet in width are seen striking in various directions. These consist of quartz, with galena, zinc blende, pyrites, native silver, ruby silver ore, calcite and chalybeate. The agglomerate has been much silicified by the infiltration of mineral solutions from below, and is extremely hard and tough.

"In form the mass of ore is rudely circular, or rather cylindrical, its diameter being probably about 600 feet, though it is not possible to exactly define its limits, on account of its surface being in places covered by soil. It occupies the floor or center of a circular horse-shoe-shaped valley, the walls of which rise with a regular and rather steep inclination to a height of from 200 feet to 600 feet above it, and are quite isolated from the surrounding mountains. The rock of which these walls are composed is a dark grey felsitic lava, which in one place was observed to have a columnar structure, the columns being vertical.

"The valley has only one opening, which probably represents a breach in the old volcanic cone, and through this opening the White Rock creek, which rises within the circular valley, flows towards Fairfield creek. The diameter of the crater from rim to rim is probably rather more than half a mile. The altitude of the White Rock is about 550 feet above the town of Drake, and the altitude of the highest part of the rim of the crater is about 600 feet more. There is every reason to believe, therefore, that this is the point of eruption from which all the lava and felsite breccias, which have long been known to occur in the vicinity of Drake, were derived.

"The White Rock ore deposit has been worked by an open cut having a length of 150 feet, a height of 70 feet, and a mean width of 30 feet. In addition to this a vertical shaft has been sunk to a depth of 186 feet, and drives of 100 feet and 140 feet have been put in to the north and south at the 180-foot level.

"The geological mode of occurrence of this deposit appears to me to be of peculiar interest, more particularly as there are, so far as I am aware, only two analogous metalliferous deposits known in the world. These are the Bull Domingo and Bassick mines, Colorado."—Melbourne Standard.

THE announcement recently made by the Geological Survey that the coal product of the United States in 1898 was 219,036,000 short tons against 226,287,000 for Great Britain shows that the United States is rapidly gaining upon that country as a coal producer and will soon become the leading coal-producing nation of the world. As an exporter of coal, however, the United States takes low rank in proportion to its production, and stands fourth in the list of coal-exporting countries.

Filter-Press Process of Gold Ore Slimes.*

By WILLIAM MCNEILL.

Various processes have been tried for treating that part of the tailings from stamp-mill treatment known as slimes, which are usually separated from the tailings, to be treated by cyaniding. The difficulty in treating these eliminated slimes is generally admitted to be chiefly mechanical, the gold being in a finely divided and easily soluble state. In the Transvaal the lime or coagulation process has been attended with marked success. Briefly described this process consists in the coagulation of the slimy particles by the addition of lime, settlement of the flocculent precipitate and treatment by weak cyanide solutions which are decanted after settlement. The slimes after decantation contain about 50% of their weight of cyanide solution, which is partly removed by dilution with weaker solutions. It will therefore be seen that this method requires a large amount of solution compared with the ordinary percolation cyanide process, and even with the use of successive weaker washes still leaves in the slimes 50% of their weight of weak cyanide solution, which must necessarily contain a certain percentage of gold.

The coagulation process followed by decantation, as above described, has proved itself an economic success for slimes which are not very rich, and where water is fairly plentiful. The conditions are, however, different on most of the West Australian gold fields, where water is not abundant, and where the talcose, clayey nature of the ores of the oxidized zones renders it impossible to crush them either by a wet or dry process without the production of a large percentage of rich slimes, in many cases carrying as much as one ounce gold per ton of ore.

C. A. Moreing was one of the first to consider the best and most economical method for treating slimes, more especially those resulting from the crushing of West Australian ores. The author does not contend that the coagulation process followed by decantation could not be used with more or less success upon the ores of the character met with in West Australia, but is of opinion that the elimination of the dust or slime particles, and the treatment of the same in the filter-press plant described below, offers in the case of Kalgoorlie and similar ores special advantages. In many cases the author believes that filter presses might be advantageously substituted for decantation methods. Considering the large number of industries successfully using filter presses for dealing with precipitates of a slimy nature which cannot be filtered by the ordinary percolation methods, even when the withdrawal of the liquid is assisted by a vacuum beneath the filter, it might have been anticipated that these appliances would have been more largely adopted for dealing with gold ore slimes than has hitherto been the case. Several previous attempts have been made to employ filter presses for this purpose, but have not been very successful.

The ore at the Hannan's Brownhill mine having been dry crushed and passed through a 25 or 30-mesh sieve, is delivered to a separator, which divides it into about equal quantities of slimes and sands. It is only proposed in this paper to describe the separation and the treatment of the first product, the slimes. The crushed ore, as it leaves the screens, is elevated into the separator, and passes directly into a central conical hopper without the intervention of any automatic feeding appliance. The intermittent discharge from the buckets of the elevator does not materially interfere with the action of the separator, as owing to the length of the discharge chute of the elevator, combined with the construction of the hopper (which when the supply is properly proportioned to the size of the machine, is kept with a certain amount of material at its delivery end), a regular stream enters the machine, the baffle disc rotating with the center spindle further assisting in an even distribution of material. The vertical spindle of the separator is driven by means of the cone pulley and bevel gearing, and imparts a rotary motion to the disc and fan. The material falling upon the disc is thrown off by centrifugal action in a fine spray and subjected at the same time to the action of an air current induced by the fan. This current carries off the lighter particles with it into the outer casing, where they settle down into the conical chamber and are ultimately discharged.

The coarse particles or sands fall down over the grid against the action of the air current and collect in the inner chamber, and are withdrawn as required through the spouts. The separation required can be regulated either by altering the speed at which the machine is driven, or by the adjustment of the circular damper which regulates the amount of the annular opening through which the air current circulates. With some ores a bumping arrangement has been found necessary in order to shake down the material, which tends to collect on the conical sides of the separator, even though these be constructed at a steep angle. Compared with revolving or shaking screens, this separator offers the following advantages: (1) Absence of all screens which are liable to choke and require constant renewal; (2) easy adjustment and regulation of the size of the particles carried over; (3) the same air current continuously circulating within the machine, no dust escapes out of the apparatus.

From experiments conducted by the author upon oxidized ores from the Kalgoorlie fields at the works the makers of the separator, it was found that after reducing the ore by dry crushing so as to pass a 25 or 30-mesh screen, the fine dust particles of slimes could readily be separated. In some instances the sands assayed higher than the slimes, but no great importance can be attached to this consideration, as it evidently depends upon the state of the gold, and if this were very fine the slimes might be found to be the richest. The separator cannot be regarded as a concentrator, but simply as an apparatus for withdrawing the fine dust or slime-forming particles, whose surface is large in comparison to their weight. In many respects its action is similar to that of a hydraulic spitzkasten or pointed box. It may also be pointed out that all gold withdrawn from the slimes will necessarily be in a very fine state of division, and admirably suited for recovery by cyanide if the mechanical difficulty of filtration can be overcome.

The separation of the slimes from the crushed ore having been effected, either of the following methods, or a combination of them, could be used for the after treatment by the filter press: (1) Agitation of the slimes with cyanide solution and delivery of the sludge to the press, finally washing the charge in the press, or (2) if preliminary water or other washes be desirable, to agitate with the same, deliver the resulting sludge to the press and effect the extraction of the gold with the charge in the press by passing through it the cyanide solution, finally washing the charge as before.

In the general arrangement of the filter-press plant at Hannan's Brownhill, the slimes are introduced into vats and agitated by paddle with cyanide solution as long as may be found necessary to dissolve out the gold. The contents of the vat are then run into a receiver and forced by means of compressed air at a pressure of 60 or 80 pounds per square inch into the filter presses, the filtrate or affluent from the presses being delivered through a pipe into a vat, from which it flows in a constant stream through the zinc precipitation boxes to the sumps. The cakes having been washed in position so as to remove any cyanide solution they may contain, the press is opened and the cakes allowed to fall into a truck for tramming to dump.

The pneumatic forcing receiver or montejus consists of a cylindrical steel vessel with dished ends. The pipe leading from it to the press reaches almost to the bottom of the receiver, thus insuring, as soon as the air pressure is turned on, the whole of the contents of the montejus being discharged into the press. Prior to discharging the receiver, the charge is stirred up by admitting a certain quantity of compressed air through a small pipe to the bottom of the receiver.

The filter presses are of the distance frame, flat plate and four-eyed type, each press having twenty chambers forming cakes 28 inches square by 3 inches thick. From experiments made by the author at the works of the manufacturers of the pressing plant at the Hannan's Brownhill mine, it was found that with the slimes of some of the West Australian ores there is no difficulty in forming cakes of this thickness with ore that had been dry crushed. The cakes were examined by A. C. Claudet and found to carry 20% of moisture and to weigh about 130 pounds per cubic foot, from which figures it will be seen that one press treats per charge about 1¼ tons of dry slimes. The operation of filling and washing a charge in the press is as follows: The sludge is forced into the press from the receiver through a passage by air pressure as described. This passage extends through the plates and communicates with the interior of the distance frame. The sludge continues to flow in until it completely fills the space between the plates, the liquid being forced out by pressure through the filter cloths on either side of the plates, and passes through the channels on the surfaces of the plates to the openings to the discharge pipe at the press head, and the opening would also serve for discharge of the effluent liquid during filling, but as it is connected up to the washing pump it is only used for the passage of wash water. After the cell has become compacted with material and no more liquid issues, the sludge inlet is shut and also the valve on the outside of the press. Water is then forced in and along the drainage channel on the surface of one of the plates through the filter cloth placed on this surface, and then through the cake, displacing the cyanide solution, and finally escaping through the filter cloth on the opposite side and out of the press through the opening. The tightening gear and other details call for no remarks, as the designs made may be widely varied without affecting the action of the press.

The chief advantages gained by the use of a press of the type described as compared with the usual type of press with recessed plates and central charging hole, mostly in use for sewage purposes, are that it permits of the cyanide solution contained in the cakes being effectively replaced by wash-water, and any desired thickness of cake secured by the width of the distance frame employed.

The question of the efficiency of washing and displacement of the cyanide solution contained in the cakes by the wash water is one of great importance when dealing with rich slimes, and this point alone would be sufficient to warrant the employment of filter presses in preference to the decantation methods. Experiments carried out on 3-inch cakes show that the washing is most complete, and that uneven percolation does not take place. One simple experiment made to investigate this point was to saturate the cake with a brine solution having a specific gravity of 1.100, and then to wash out this brine solution with water, and observe the rapidity of the fall in the specific gravity of the wash water as it issues from the press. The rapidity of this fall in specific gravity is a measure of the efficiency of the washing, for the drop is comparable to the displacement of the brine solution in the cake, because if channeling or uneven percolation through the cake had taken place there would have been a slow fall in the specific gravity of the wash water delivered by the press caused by the continual withdrawal of some of the brine solution. In many experiments it was found that a quantity of wash water equal to little more than the cubic contents of the cake was sufficient to bring down the brine soluble to 1.001. It is to be regretted that time did not permit of the experiments being followed by others in which the investigations were not only quantitative, but were accompanied by careful chemical analysis of the cakes and wash water. The author has, however, from more than one authority received confirmation of the efficiency of the washing in filter presses, a comparatively small quantity of liquid being generally found sufficient, except when dealing with precipitates of a very difficult nature, and from which it was required to wash away the last trace of the mother liquor, conditions which do not usually occur in the treatment of gold ore slimes. The author is not able at present to give particulars of the cost of the treatment of slimes in filter presses.

As regards the time occupied and the extraction obtained in the filter press, experiments made with 5 dwt. slimes when the mill was first started gave tailings assaying 1 dwt. after three hours' agitation, and the following average time for the completion of the cycle of filtering, washing, emptying and closing the press: Filling press from receiver, 15 minutes; washing cakes in press, 19 minutes; discharging and closing press, 16 minutes; total, 50 minutes.

The advantage of the filter press treatment is that the amount and strength of the cyanide solution can be regulated to suit the character of the ore under treatment. The amount of solution required for the usual cyanide filtration method, say one and one-half times the weight of the slimes, is sufficient to reduce the pulp to such consistency that it can be readily forced into the filter presses. In districts where water is not abundant the small amount of wash water required is also of great importance, for by the use of the press a minimum amount is required to displace the cyanide solution contained in the cakes.

By the successful and economic separation of slimes dry, without the aid of water, and the treatment of separated slimes, the advocates of dry crushing processes may certainly consider that their cause has received no mean impulse, for a process on these lines certainly enables the greater part of the float gold to be secured.

Generally, the author is of the opinion that the future will see filter presses more extensively used for the treatment of gold slimes, particularly in districts were water is scarce and where ores are of such a nature as to be difficult for ordinary filtration, on account of the excessive percentage of slimes produced when they are crushed. A filter press plant is not expensive for up keep, requires considerably less water, and will probably be found to give a greater extraction than any decantation method.

* Abstract of paper read before the Institution of Mining and Metallurgy in London.

Electrolytic Corrosion of Metals.

The extreme difficulty, if not impossibility, of preventing electrolytic corrosion in buried metal structures under certain conditions, is generally recognized, and although many of the best electrical experts in the country have now been grappling with the problem for a number of years no really satisfactory or practical solution has been offered. Nikola Tesla has suggested that were alternating instead of direct current employed for operating various street railways the difficulty now experienced through electrolysis would be done away with. This may all be, but it must be borne in mind in this connection that the application of the three-phase alternating current to street railway propulsion is of recent date and in actual use in but very few localities, and it is therefore scarcely to be expected that the street railway companies of a city such as New York would voluntarily change over to a more or less untried system, entailing as it would an immense outlay in money for new apparatus and machinery.—Electricity.

Mining Summary.

ALASKA.

(Special Correspondence).—Quartz mining is making a good showing here. A few good steady all-around miners can get steady employment here. Wages are $3.50 a day and board $7 per week.

Ketchikan, May 8th, '99.

Juneau *Miner*: Good reports come from some of the creeks in Porcupine district. The news from Porcupine, Calhoun and McKinley creeks is good. All are working, but Trail and Tahkeen are reported bad and men are leaving in disgust. There is too much snow on the ground for mining on most of the creeks. It may be the middle of June before mining operations are in full swing, and it will require this summer and next before the value of the Porcupine as a placer mining region will be known.

ARIZONA.

Prescott *Miner*: The Harlan mill on Turkey creek closed down on account of a scarcity of water. Mr. Harlan is putting in a pipe line 2400 feet to a spring, which, when completed and added to his present supply, will furnish enough to run continuously.——Mr. Taft has encountered a supply of water in his Sterling property on Big Bug. Between the water from the Sterling and that from the Lottie tunnel there is a large flow in Big Bug creek.——The Garcia G. M. Co., owner of the Garcia mine on the Hassayampa, near Wickenburg, which closed down for several months, resumed work and has a large force engaged in developing the property.——The Ardath M. & M. Co. have men at work erecting a mill and hoisting works on their Oriole mine at Santa Domingo mountain, near Wickenburg.——Mr. Cleveland, who has a lease and bond on the Cumberland mine, owned by T. Roach and others in Pine Flat, recently struck a body of ore 32 inches wide at a depth of 160 feet. This mine shows several shoots of ore. He has eight men at work developing it.——The company which purchased the Buster group in Pine Creek district has ten men at work building a road to the property. Mr. Hooper is in the East on business connected with the property, among other things to buy a mill. The mine is opened by two tunnels, in which there is a continuous ore body 900 feet in length. The company will run another tunnel, starting near the gulch, and connection with the upper workings will be made by upraises, and the ore will pass through it to the mill.——The Mohawk group, owned by ex-Supervisor T. Roach, adjoins the Buster group and is promising. A strike was made last week in a drift being run at a depth of 100 feet, where an ore body 4 feet wide was encountered. The ore averages $15 per ton.——Watts & Hanger also have a claim in the same district which they are developing.

Yuma *Sun*: G. Miles and F. O'Brien have gone to the Copper Mountain country, where they begin development work on a ledge of copper.——The Arizona C. & G. M. Co. of Phœnix, whose mines are in the eastern portion of Yuma county, near the Maricopa line, have made arrangements with Eastern capitalists for reduction works on their property.——Reports come from the Santa Maria district, in the extreme northeastern corner of Yuma county, that several copper strikes have been made.——C. E. Eichelberger has returned from a trip to the King district, where he has men at work on a prospect. The discovery of water in that vicinity has stimulated prospecting.——Water has been struck at a depth of 1000 feet within four miles of the King of Arizona mine. The company is erecting a mill and cyanide plant. The well will be sunk 100 feet deeper. There are several tons of ore on the dump and the force of miners is being increased.

CALIFORNIA.

Amador.

The Bunker Hill and Mayflower mines near Amador City have been sold at public auction. The sale was ordered by J. F. Aldrich, receiver of the Spring Garden National Bank of Philadelphia, Pa. The property is an asset of the bank, which was mortgaged for $200,000. The sale was ordered by the District Court of Philadelphia. The bidding was opened by C. R. Downs of Sutter Creek, Cal., who bid $21,000 for the property. The only other bidder was a Mr. Cheney of Philadelphia, who added $100 to the offers of Downs until the price reached $30,500, at which price Downs took the property. Downs is associated with W. F. Detert of Jackson; W. J. McGee, a local attorney, and State Senator Voorheis.

The Lincoln shaft at Sutter Creek is down 1000 feet.

The three-compartment vertical shaft at the Wildman-Mahoney is down below 500. Power drills will be put in as soon as the machinery arrives from the East.

The Kennedy M. Co. has appealed from the decision of Judge Nicol of Tuolumne county, in the case of the Argonaut M. Co. vs. Kennedy M. Co.

Supt. D. Fisher of the Hobart M. Co., operating the Spagnoli mine at Wieland, reports the shaft down 81 feet and sinking. It is the intention to erect a 10-stamp mill.

Butte.

Oroville *Register*: The Enterprise mines are busy, the owners taking out considerable gold.——The Gem gives employment to a number of men.——At the Golden Trout new machinery is being put in.——At the Slater mine good ore is being crushed. At the Crystal Peak a 200-foot upraise is being made.

Calaveras.

Several tons of quartz crystals and a large amount of agatized wood have been taken from the Green Mountain gravel mine, in Chile gulch. The crystals are of various sizes, some weighing over 100 pounds.

The Hobart Estate Co. and the Utica M. Co. are finishing their new electric plant near Murphys. The building has been built of lava from Table Mountain ranch. Its walls are 3 feet in thickness. The water power is expected to maintain a minimum of 2500 H. P., 1000 of which will be needed at the Utica mines and mills, which are again running.

The Angels mine has been cleaned up and placed in working order, the hoist and other machinery renovated under the direction of its owner, J. V. Coleman of San Francisco. As soon as a 20-stamp mill has been erected, work will be resumed on this property.

The new addition to the Gwin mill is provided with concrete foundations for the mortar blocks which are 14 feet in length. An air hoist has been put in on the 1400 level. The hoist is secured to a car and can be moved from place to place as required.

Mokelumne Hill *Chronicle:* It is reported that preparations are being made to resume operations at the Esperanza mine near Mokelumne Hill. The mill is to be increased to eighty stamps, a new hoist is to be erected and the shaft is to be sunk an additional 500 feet.

Angels *Echo*: The Bruner mine, two miles south of Angels, employs twenty-five men.——The Harris mine, one mile south of Angels, is to be operated on a more extensive scale than heretofore.——A 20-stamp mill is to be erected on the Angels mine.——Grading for the 120-stamp mill at Robinson's Ferry goes steadily on. This mill when completed will be the largest in the State.

El Dorado.

Placerville *Democrat*: One hundred men are employed at the Griffith.——A number of pockets are reported to have been taken out in the Kelsey district the past month.——Owners of the Ida Livingston, Kelsey district, have resumed operations, with J. Kelley Supt. A new shaft is down 50 feet.——T. Smith and P. Stingle have leased the Delmatia mine and are cleaning out tunnel and winze.——Roberts & McGraw have struck good prospects in their quartz mine in the Kelsey district, and are having a crushing made at the Ranney & Smith mill.——The Gopher-Boulder has installed new machinery, preparatory to resuming crushing.——The citizens of Georgetown have established a local mining district, with the boundaries as they were previous to the act of March 27, 1897.——J. S. Blackiston has bonded his Crystal mine at White Rock to A. S. Moore of San Francisco for sixty days. The mine is to be prospected for quartz crystals and gold.

Kern.

Six mills are in operation in the Randsburg district.

A run of ninety-five tons of ore from the Winnie mine, Randsburg, made at the Barstow mill, yielded $887, being the second run from that mine milled at Barstow. The first, of forty tons, made two weeks ago, gave $538.

The owners of the asbestos mine near Bakersfield are reported to have an offer from New York for the entire output.

The Wedge mine, Randsburg, has had a run of thirty tons of ore at the Red Dog mill which yielded $2500, averaging $80 per ton.

Mono.

Bridgeport *Chronicle-Union*: C. H. Glines and J. Hays, owners in the Arnot and Par Value mine on Green creek, are at the property getting the mine and surroundings ready for working this summer.

Nevada.

It is reported that a new shoot of ore has been struck at the Pittsburg mine on Gold Flat, near Nevada City. The mill will be put in repair and started up.

The North Star Mines Co. of New Jersey is a successor to the North Star M. Co. The North Star Mines Co. is capitalized for $5,000,000, or 500,000 shares, par value $10. J. D. Hague is president; W. L. Bull, vice-president; W. D. Pagan, Secretary. The directors include the foregoing, with A. G. Agnew and Benjamin Strong, all of New York. C. G. White of Boston will be added to the board. President J. D. Hague says: "The old North Star M. Co. has been operating for years in the Grass Valley mining district and acquired the North Star mine, which had up to that time produced $3,000,000 gold. The company reopened the mine, it having been idle, and it has since produced $2,500,000. The company has been acquiring additional property adjacent to the North Star, which in times past had been productive, in this way acquiring two or three large mines and a number of adjacent mining claims which have been consolidated and conveyed to the North Star Mines Co., the new company which will develop at great depth the combined property comprising the North Star mines, the New York Hill and the Massachusetts Hill or Stockbridge mine. These three mines have produced in the aggregate $12,000,000 to $15,000,000 and are now to be opened at greater depth. The Massachusetts Hill mine has produced within the last two years $800,000, nearly all of which came out of ground purchased for $30,000 to $40,000. The new company is in productive condition, taking out $30,000 to $40,000 per month, and has paid two dividends of $50,000 each since November."

Tidings-Telegraph: Moroney, Webb & Baldwin, who are interested in the Slide mine, at French Corral, have ordered a mill for their claim. The new mill will have a capacity of fifty tons a day. A Bartlett concentrator will be put in.

Placer.

T. Haney is working six men at Bloody ravine.

B. Kavanaugh is taking out pay from his mine near Bald mountain.

S. Savage has put up hoisting works at the Savage mine and is prospecting.

The shaft at the Whisky Hill copper mine is down 135 feet. Cuts have been run, opening up 1200 feet of the ledge. The rock yields 9% copper, $3 in silver and $5 gold per ton.

J. McAninch, G. Cowan, E. B. Quigley and J. Shiels have bonded the Glen Consolidated mine in Duncan canyon to a Colorado company.

Riverside.

In the Virginia Dale district a scarcity of water has obliged several of the mills to suspend operations. The water supply is derived from wells sunk in a dry lake basin north of the mines. The O. K. and Arbois are operated steadily, but several mines are shut down.

Los Angeles *Herald*: It is reported from San Diego that an effort will be made to work the lepidolite mines near Pala. An agreement has been filed in the recorder's office at San Diego whereby N. G. Douglas and other owners of the mines agreed to supply W. J. Schieffiln, a New York druggist, with as much lepidolite as he might want, up to 1200 tons a year, at $40 a ton. The agreement stipulates that none of the mineral shall be sold to anyone else for five years. This mineral is a lithia mica and contains handsome crystals of pink tourmaline (rubellite) in radiated groups.

San Bernardino.

Yuma *Sun*: G. Livingston and H. Randolph have gone to gold mines twenty miles from the river above Ehrenburg in California on which they will do development work. They have a ledge of free gold.

The Rose mine on the San Bernardino range, fifty-five miles easterly from Victor, is running, but there is a scarcity of water.

San Diego.

Lepidolite, with tourmaline, occurs near Mesa Grande in large granitic veins, not far from the Indian rancheria.

It is reported that a discovery of gold-bearing quartz has been made on the Warner ranch northwest of Julian.

Yuma *Sun*: There are eighteen men using dry washers and rockers in the Potholes district, twelve miles above Yuma, with good result. W. Boyle and partner, Mr. Riley, exhibited $22.10 in coarse gold which they took out of seven yards of dirt. The richest gravel is on the banks of the river under 2 feet of dirt which they strip, as it does not carry enough value to pay working in a rocker. It is impossible to reach bedrock, owing to the volume of water. This district has been producing gold for thirty years, but has never been systematically operated, the rocker and dry washer being the only methods used.

Shasta.

(Special Correspondence).—Near Igo J. P. Wright, who has been developing a silver property for a number of years, has found a 20-inch ledge, from which he made a shipment of several tons to the Selby Smelting Works. The returns were 500 ounces silver per ton.

H. Christensen is developing his claims near Igo, taking out a fair grade of smelting ore.

Price & Wartechek, on Muletown, are making their first shipment. They began work on their property two months ago. They haul their ore ten miles to the smelter.

There is a probability that the Afterthought copper mines will resume work. The property has been idle a number of years. They are twenty miles east of Redding.

F. Hurst has four men developing the Dobrowsky claims near Shasta. He made two twenty-ton shipments four miles by wagon to the smelter, and received $14.72 per ton on one and over $20 on the other lot.

The Mt. Shasta mine is pushing development work to 500 feet depth and employing eighty men. In consequence of development only five tons of ore per day are hauled to the smelter.

M. T. Howell & Co. are making a second twenty-ton haul to the smelter at Keswick.

Near Copley a group of thirty copper claims belonging to Ellis, Murray & Co. are being developed under bond.

Shasta, June 12th, '99.

Four hundred men employed by the Mountain Copper Co. at their mines at Iron mountain struck on the 13th inst., the result of a demand for increased wages. Last week the company raised the wages of 500 men at their smelters at Keswick 10% to 15%. Sunday a committee of miners at Iron Mountain demanded an increase. The quarrymen receive $1.60 a day, muckers $2.10 and miners $2.60. The committee asked an increase of 40 cents a day for each. The company was allowed until June 15th to announce its decision. On the morning of the 13th several of the men known to have led the demand for greater wages were discharged. The 400 at noon quit work and marched to the office and demanded their time. Enough ore is in the roasters to keep the smelters busy for a month.

Redding *Free Press*: It is reported that an agreement to purchase the Lowdon-Friday has been made by the Uncle Sam G. M. Co.—virtually a consolidation of the two properties in the Backbone district. The option is given until January 1, 1900. The consideration is withheld. The property of Lowden & Friday, known as the Cleveland Consolidated group, consisting of eight claims, adjoins the Uncle Sam. From the mines to a proposed smelter is a mile. From the smelter site to the railroad is three-quarters of a mile.

Redding *Searchlight*: H. C. Woodrow of Salt Lake, who has a bond on the Trinity group of gold mines at the head of Dog creek, six miles from Delta, reports that he will put three shifts to work on a mine of the group. He will sink a shaft 200 feet and drift under the ore body. There is now a 10-stamp mill and an electric plant on the property. A steam hoist will be put in.——C. D. Galvin and F. Grotefend are developing the King Copper property, three miles from Copley. Twenty-two men are employed in seven tunnels. It is thought the ore body will soon be reached.

Sierra.

The Plumbago mine, on the north side of the Middle Yuba river a few miles from Forest City, has been worked in a superficial way for years, and at times produced rich ore. C. Hegarty, Sr., of Moore's Flat, Nevada county, sold it to New York capitalists, and M. W. Mather was sent to take charge. Mr. Mather abandoned the shafts which had been sunk near the top of the ridge, and on the hillside ran three tunnels into the hill. Two of these are half a mile in length, and a fourth is contemplated which will have 1700 feet vertical depth from the top of the ridge. The tunnels were run on the ledge, which varies in size from a few inches to 5 feet in thickness. A 10-stamp mill is running night and day on ore. Bunches and pockets of rich ore are occasionally found.

Siskiyou.

Yreka *Journal*: The hoisting and pumping machinery for the new company to work the Nebrbass and Rostel grounds, adjoining the Blue Gravel mine at Greenhorn, will soon be working. Mr. Stevenson, who is to superintend the operations, has arrived in Yreka, and F. D. Fraser, who bonded the property, also returned.——Johnson & Kelly, who are mining old ground in the Greenhorn Blue Gravel mine on commission, are said to be getting pay from the present working. They do the timbering, hoisting gravel and sluicing at their own expense and pay 10%.——C. Fairchild has started his mill on Humbug, near Sucker creek, and finds good pay in the quartz. He has a 14-inch ledge and is close to the Thresh & Coulson ledge.——Mining is soon to be commenced in Yreka creek, in the vicinity of Hawkinsville, by the company which bonded the creek from Shasta river to the McNulty place near Yreka.——T. Austin & Co., working deep diggings north of the high school grounds, continue to find the average pay gravel.——Work at the Cherry Hill quartz mine on Cherry creek is carried on with success. It is the intention to run a 1500-foot tunnel towards the ledge 1000 feet below the surface, a survey having been made for that purpose.——J. C. Burgess is prospecting the ground at Cottonwood creek, near Henley and Hornbrook, for the company having a bond on same.

Yreka *News*: L. Erickson has out ore for crushing.——The Gold Ball and Aromas mines are working to their full capacity.——The Salmon River Co. is running with a large force.——Mr. Peterson of Eddys gulch cleaned up twenty-six ounces from a short run in his placer claim.——Peters Bros. have a ledge on White's gulch.——The Jumbo mine is reported to be bonded to Colorado parties.——The Gold Run is working twenty-two men.——The Knownothing has large bodies of ore and employs fifteen men.

Trinity.

The Morning Star mine, on Coffee creek, owned by Frue & Norton, is to put in power drills. There are two shafts—one 70 feet, the other 57 feet—and 310 feet of tunnel.

F. L. Dimock of Trinity Center has opened a copper ledge three miles above Trinity Center. There are two claims—Happy Day and June Day. A small cropping a few feet underground developed into a copper ledge 3 feet in width.

Redding *Searchlight*: T. J. Loftus recently discovered a ledge between porphyry and serpentine walls 100 yards west of the trail from the Nash mine store to the Keating mine. He has located a claim.——W. R. Conant is doing development work on his claim on Deacon creek.——H. Z. Osborn, formerly editor and proprietor of the Los Angeles *Express*, and M. H. MacIlvane, manager of the Nash mine store, have bought the one-half interest of J. Murphy in the Forest Queen mine and are running a tunnel which is expected to cut the ledge at 65 feet.——D. Donovan has located a claim on the Calahan trail near the Nash mine, one mile from the mouth of Hickory creek.——W. Maitland, Supt. Nash mine, has bought a copper prospect from C. J. Farmer. The claim is on Ram's Horn gulch, and, in addition to copper, shows gold and silver.——Ten men are employed at the Nash mine. The company is getting in such a shape as to work to advantage next year.

Tulare.

Porterville *Enterprise*: D. B. James, Supt. Minnie-Ellen mine, on Deer creek, reports finding ore in a vein 7 feet wide in one of the drifts. In the main vein they are in 30 feet of ore and still crosscutting. They have ore 90 feet wide in some veins. There are 3000 tons of ore on the dump.

Tuolumne.

The Tuolumne Mother Lode & Development Co. of Fresno has bonded the Columbus mine, which is a part of its property in this county, to San Francisco capitalists for $20,000. The Mother Lode Co. also owns the Big Oak group. This sale would give them $5000 for sinking on these mines, and the balance of $15,000 will go to stockholders as dividends.

Jamestown *Magnet*: Four claims on Whisky hill below Jamestown, known as Trio properties, have been incorporated under the laws of Wyoming, to be known as the Harvard G. M. Co., with a capital of 200,000 shares at $5 each. The claims included are the Trio, Mooney, McCann and Clark. The Erin-go-Bragh and Cloudman at Stent remain in the hands of the Trio trustees. It is reported a mill will be built.

Carters *New Era*: The Missing Link, adjoining the Buchanan, south of Carters, is being prospected by open cuts. A 6-foot vein has been found.——At the Buchanan a two-compartment shaft is being sunk which is down 650 feet. The company, it is reported, will put in an electric plant on the Tuolumne river. The mine has a 20-stamp mill and chlorination works.——The hoist, pump, buildings, etc., of the Junction mine, near Soulsbyville, have been transferred to the Laurel mines, near Arrastraville, owned by the Laurel G. M. Co. Eight men are employed at the mine.——The Chaparral, one of the pioneer claims of the east belt, is opened by two tunnels to a depth of 200 feet on a vein 2 to 7 feet

in width. The mine is being operated by Judge Lindsey of Columbia.

COLORADO.

The Argo smelter, at Denver, has complied with the eight-hour law and is running. The Guggenheim smelter at Pueblo is running. The closed works are under guard. At Central City men in the stamp mills are expected to strike. The mines already closed are the Commodore, Amethyst, Bachelor, Bachelor No. 2 and Last Chance, at Creede district; the Calliope and Hagerty, at Ouray; the Caribbeau and Montezuma, near Ophir; the Iron Mask ond Black Iron, at Red Cliff; Smuggler, at Aspen. The Porter Fuel Co., at Durango, employing 150 men, has also closed. At Leadville 900 men have been discharged. Little except development work is going on. Four mines of the Colorado Fuel & Iron Co.—three near Canyon City and one in Pitkin county—have been closed down.

BOULDER COUNTY.

A strike of silver ore has been made in the Belcher mine on Caribou hill in the 200-foot level; almost solid silver ore was found. Three shifts are sinking the main shaft and when this lift is completed the shaft will be down 300 feet. Shipments are being made.

CLEAR CREEK COUNTY.

Georgetown *Courier*: By accident Mr. Anderson has located a new body of mineral in the 850 level of the Aliunde mine.——A mill-run of ore from the Onie Bell returned four ounces gold and fifty ounces silver to the ton. ——Another tin discovery is reported in Clear Creek county.——A raise is under way on the Comet mine, Silver mountain, to connect with the old shaft. When the connection is made daily shipments are expected.——The Atlantic Milling Co. has entered into a contract with the Enterprise Tunnel Co. at Empire to do their concentrating. The output of the mine is now twenty tons per day, which will be increased.——H. Kneisel and others are developing a group of lodes on Democrat mountain. They have driven a tunnel 700 feet and within another 100 feet expect to reach a junction of lodes.

GILPIN COUNTY.

A recent strike in the Whiting mine, on the 320 level, is in ore assaying $200 per ton. Shipments from this property average thirty tons per day.

Eighty-three cars of ore were shipped from Blackhawk the first week in June.

The Maine is to resume operations under Mgr. Brereton. The present 250-foot shaft is to be sunk 100 feet deeper.

A new 25-stamp mill is to be built in Fourmile gulch, near the Rocky mountain concentrator, to be under the same management as the latter. It will be 33⅓x50¾ feet on the ground, of the slow-drop type.

Central City *Register-Call*: In May there were treated at the Rocky Mountain Concentrator in Black Hawk, 1250 tons of ore which produced 395 tons of concentrates. Mgr. J. Hannigan says A. L. Collins intends to put up a 25-stamp mill on the site of the offices at the rear of the concentrator. The mill will have twenty-five slow drop stamps weighing 700 pounds each and dropping thirty-five times to the minute.

GUNNISON COUNTY.

(Special Correspondence).—R. W. Spensley, formerly of Leadville. has gone to resume work on the Union Park placer property, which is near the Watson or Taylor Park placer. He is putting in a bedrock flume, which will have a length of 4000 feet and is 3¼x3¼ feet. The company have already in 1600 feet of flume besides the one now building. Thirty men will be employed this season.

The Mgr. of the Watson placer is also on the ground and will start work. They will soon begin using the giants. It gives employment to fifty men.

Work has been resumed on the Maple Leaf property, on Cochetopa creek. The shaft will be sunk 100 feet farther and drifts and crosscuts will be run. The shaft is now 50 feet deep. Some rich ore has been shipped from it in the past.

At the Tuller & Riley property considerable development work had been done during the latter part of the winter, which has produced seventy-five tons of ore that will pay to ship. The vein is 8 to 20 inches wide and is in a dyke which cuts the schist formation nearly at right angles. The vein has been exposed by open cuts and shafts for 2000 feet, and in all these places free gold can be seen in the quartz. There is also tellurium in the rock. An offer of $40,000 has been made for this property by outsiders, but the owners demand a higher price; a deal is expected at a compromise price. The property is well situated for milling purposes, as it is thirty rods from Beaver creek, where power can be generated for all purposes.

It is rumored that the ore from the Diamond K did not run as well as expected, and work may not be resumed.

It is understood the Daniel Dorondo is under option to Denver people.

Ross & Breden report a rich strike on the Iron Cap hill. The rock is jasperized quartz and gold can be seen with the naked eve.

Work is steadily progressing at the Venable but all information is being suppressed at present for some cause.

The Underhill M. Co. have put a force of men on their three claims, west of the village of Spencer.

J. Dunbar is doing assessment work on a group of eight claims near the Iron Cap property.

The deal has fallen through on the Iron Cap mine.

The Vulcan mine has again started and they are filling the mine with miners as fast as they can secure good men. None of the strikers are being put on the force. The mine will again take rank among the foremost in the county.

The first car of ore from the Midland under its present management has been sent to the smelters. If it proves satisfactory many more will follow.

Mr. Johnson, the principal owner of the Branch mine, has put on a whim and is sinking. The shaft is 60 feet deep. This property is a copper prospect. The vein is 3 feet wide at 50 feet and will run 25% copper and some gold. The ore is principally red oxide. There are a number of other prospects near the Vulcan that show good values in copper.

It is reported the Standard and Sterling properties, on Cochetopa creek, are to be started. These mines produce milling ore which may be suitable to cyanide treatment. The vein is 3 to 7 feet wide and runs $10 per ton.

J. P. Smith has secured an option on the Keystone group through G. W. Bartholemew. He expects to open the property and ship ore. The property has large bodies of galena ore, which also carries silver, copper and gold. The vein is 15 feet wide; 2 feet of it will pay to ship without sorting, and the balance is a good concentrating ore. The property is developed by two tunnels, each 700 feet long. A number of other veins are found within the limits of the claims, but have had little development. The property is favorably located, both as to railroad and water power, being half a mile to each. The price to be paid is somewhat less than $50,000.

J. A. Goodwin is in Boston trying to float a property from this county with a good prospect for success.

Gunnison, June 10th, '99.

HINSDALE COUNTY.

The Lellie, seven miles from Lake City, which has averaged a shipment of 3½ cars of ore per week for eighteen months, is to be equipped with new machinery, comprising hoist and compressor.

LAKE COUNTY.

(Special Correspondence).—It is estimated the section which holds the down-town mines at Leadville makes 2000 gallons of water per minute. To keep it unwatered five pumping plants are employed constantly, having a combined capacity much in excess of the present demand upon them.

The Weldon, one of the down-town groups, is operating its two principal shafts and will soon be producing, as formerly, 150 tons of lead-carbonate ore per day. Mgr. T. S. Schlessinger states that the force of thirty men will be increased.

The Neubian M. Co., also under the management of Mr. Schlessinger, is preparing to sink a shaft on a forty-acre tract which they control in the down-town district.

Leadville, June 7th, '99. WASCOTT.

The Comstock Mining and Leasing Co. has secured five well located claims near the Antioch, with a territory of fifty acres. These claims include the Amelia, Prince Albert, Comstock Nos. 1 and 2 and Thunderbolt. The new company will put down a shaft 800 feet. The officers of the company are A. W. Lawrence of Boston, Pres.; G. Flint of Boston, Sec'y and Treas.; R. B. Estey of Leadville, Gen. Mgr. One of the new shafts sinking on the Alhambra placer of the Revenue Co. will be sent down 600 feet. A second shaft has been started on another part of the ground and a third shaft will be started. The Revenue people have 140 acres of ground in their combination, which lies between California and Iowa gulches, and is about a mile east of south of the city. The officers of the Revenue Co. are R. C. Surbridge of Boston, Pres.; G. M. Steer of Boston, Sec'y and Treas.; R. B. Estey of Leadville, Mgr.

The President mine on Breece hill has commenced shipping fifteen tons of gold ore daily, adding another to the list of producers of the gold belt.

The Louisville mine, owned by D. H. Moffat, is now a producer of zinc ores as well as oxide and sulphide ores carrying gold, silver and lead. Zinc is being broken for the zinc mill in California gulch.

MINERAL COUNTY.

(Special Correspondence).—The owners of the Amethyst resumed management of that property on June 1st, at the expiration of Carver & Miller's lease.

The Commodore maintains its shipment of 400 tons per day.

The Happy Thought mine has been pumped out down to the seventh level, giving access to ore blocked out on that level. Part of this ore is concentrated at the Happy Thought mill and the balance shipped to the smelters.

Creede, June 12th, '99.

MONTROSE COUNTY.

The La Sal mountains, near the boundary line of Colorado and Utah, promise to be the scene of active prospecting and development during the coming season.

The sandstone surrounding the La Sal range extends entirely around the mountains, and everywhere is more or less impregnated with copper. The circle commences at La Sal creek, on the Colorado side of the range, where the Paradox mine is located. The ore is found again in the Big Indian mine, on the south slope, then in the Salt Wash district, on the west end, then in the Welsh and Huntsman, on the north, and from there the line is traced back to the Paradox, the distance being about 200 miles.

The Salt Wash district has been examined by T. L. Darby, who says that it is not likely to prove valuable, but other mines have opened into bodies of ore and are being developed. The Huntsman group of three full claims has been sold for $30,000 and the owners are putting the property in shape. The company will ship forty tons of ore to Salt Lake City.

R. Dillon has located a tunnel. The tunnel will reach a vertical depth of 1500 feet from the apex of the mountain.

A number of low-grade gold prospects have been found in the vicinity of Miners' basin and a company has been organized to build reduction works. Chicago people have bought the Mazeppa mines in Beaver basin and are considering the building of cyanide works.

OURAY COUNTY.

Sunday the Wedge M. Co., at Ouray, posted a notice informing the employes that the miners would go down the shaft on the company's time and come up on their own time, and take one hour for dinner. This action was not in accordance with the eight-hour law, according to the miners' views. The mine was closed down and the men paid off.

One hundred cars of ore were shipped from Ouray in May.

The force of men on the Revenue mine is larger than it was last year.

The Atlas, on Bear creek, is proving a success and working with increased force.

PARK COUNTY.

It is reported at Colorado Springs that the Green Mountain M. Co. has sold its thirty-two claims and 2500 acres of placers, patented, to the Calumet & Hecla M. Co. The property is located in Alma district and is undeveloped The Lee shaft is in a 5-foot vein of copper and iron pyrites. The mines are equipped with machinery, and two mills are in operation.

SAN JUAN COUNTY.

(Special Correspondence).—On the 9th inst. B. W. Sweet of Denver secured a contract to erect a 50-ton concentration mill at Gladstone, near Silverton, for the Red Mountain & Bonita G. M. Co., of which Dr. C. A. W. Zimmerman is Gen. Mgr. and whose home office is at Quincy, Ill. The mill will comprise stamps, rolls and concentrators. The Gates Iron Works are to furnish the machinery.

Denver, June 9th, '99. WASCOTT.

The Silver Queen is being developed by its owners, most of whom are residents of Kearney, Neb. It is to be further equipped with machinery. The development is mostly tunnel work at different levels on the vein. The ore is smelting and of a grade to stand shipment. It is claimed ores of the value of $30,000 have been shipped.

SAN MIGUEL COUNTY.

Denver *Republican*: Shipments for May from the Ophir district show an increase. The last week was the heaviest of the month, the total being thirteen cars—four cars of concentrates from the Caribbeau, four cars of ore from the San Bernardo, one from the American Frenchman, one from the Montezuma, two from the Butterfly and one from the Alta.

SUMMIT COUNTY.

The Hamilton mine and mill, in Summit gulch, are expected to start up in a few days. Concentrates, accumulated during latter part of winter, are being shipped.

TELLER COUNTY.

(Special Correspondence).—The Work properties on Raven and Gold hills are worked by sixteen sets of lessees. The gross receipts from sale of ore for the year ending June 1, was $46,102.

The output of the Orpha May on Bull hill was 750 tons of ore for the month of May, averaging four ounces gold to the ton.

A recent shipment of ten tons of high-grade ore from the Last Dollar on Bull hill brought $1900 to the ton. This came from a newly opened body of ore containing a streak of quartz carrying fine gold and is below the sixth level.

The Isabella Co. has declared a dividend of 2 cents per share, amounting to $45,000, payable June 26th.

The National M. & L. Co. are preparing to develop a group of properties on the north slope of Tenderfoot hill. It is claimed this company paid $5000 for the group of twenty-one acres.

The Matoa G. M. Co., whose Matoa mine is on Gold hill, have purchased an adjoining property known as the Johnson lease, claimed to have produced $500,000. The purchasers will sink 200 feet to the 800 level.

Cripple Creek, June 11th, '99.

Denver *Republican*: A large quantity of mineral is being broken by two sets of lessees operating on the Pinnacle Co.'s ground, who recently made good strikes.——On the Lansing the lessees are getting the lease in better shape as regards equipment. In the breast of the drift run at the second level the ore body measured 5 feet.——The strike made on the Mitchell of the same company is holding out. The lessees are preparing a carload shipment to be sent out this week. There are ten tons in the bins. The find is supposed to be a new vein, the strike being toward the Lansing workings.

IDAHO.

J. Lefler, a prospector, reports a discovery in the Crooked river country, midway between Buffalo Hump and Salmon river.

Warner Bros. have 8 feet of lead, of which 5 feet is solid quartz and 3 feet granulated quartz which assays $45 and this has been stripped for 900 feet. The claim is named the Drum Lummon.

Smith & Blake have also made locations, their principal one being the Monday, parallel to the Drum Lummon on the west.

While water has been plentiful the Granite M. Co., has been ground sluicing its ledge east of the old works and uncovered it where it was 18 feet wide. In the old workings the ore is a high-grade gold ore, but base, the amount of free gold saved on the plates being small and concentrates run high enough to ship to the smelter. Where the vein was recently uncovered it is galena, the surface assaying 30% lead, $13.27 gold and two and one-half ounces silver, making ore worth $40 per ton.

The second payment of $25,000 on the bond of the Big Buffalo mine at Buffalo Hump is reported paid. Since the first payment a shaft has been sunk 60 feet. The Big Buffalo was purchased on a bond by Clark & Sweeney of Spokane, and it is understood to have been floated in New York.

There is excitement in the Boise basin country over the discovery of a rich gold ledge three miles west of Idaho City.

Placer gold is reported discovered on the St. Joe, near the mouth of Slate creek. The gold was found on a side gulch high above the creek, but at last reports bedrock had not been reached.

The Helena and Frisco mines at Wallace have started up with twenty to twenty-five men each, under military protection.

Spokesman-Review: The Monte Cristo mine at Buffalo is working seven men, running three shifts of eight hours each. They are down 30 feet in the shaft, in ore, with neither wall in sight. The quartz from the shaft shows free gold.——The Saint Paul, adjoining the Monte Cristo, has had crosscutting on the surface and shows the same character of ore as the Monte Cristo. For 4500 feet the ledge shows a width of 6 to 10 feet on the surface. ——On the Big Buffalo workmen are crosscutting. It is said that the crosscut is in over 40 feet and the other wall not reached. ——F. Brown, constructor of the trail into camp, says the workmen are within thirteen miles of camp, and he thinks ten days more will see the work completed.

Boise *Statesman*: The DeLamar M. Co. is reported to have purchased the Big Buffalo mine for $500,000 on June 7, the first payment of $25,000 to be made July 15. This mine is the original discovery of the Buffalo Hump camp.

Salt Lake *Tribune*: At Salmon City, F. Ibach arrastraed ten tons of ore from the Kittie Burton on Indian creek, which turned out a bar weighing thirty ounces in gold, with ten ounces remaining in the crevices of the arrastra, which continues to run on the same class of ores. There are 18 inches on the foot wall that will average $75 per ton.——The representatives of New York parties who recently bought the Ulyssus group of Suydam & Ibach are letting contracts for a 5-stamp mill, etc., the machinery for which is at Red Rock station.

NEVADA.

Repairs to the hoisting engine at the C. & C. shaft in Virginia City have all been completed and work resumed in the Consolidated California & Virginia mine through the shaft. The first elevator will be raised, the defect located and remedied and the elevator again put at work. Meantime the second elevator keeps the water down, running eight hours out of twenty-four.

The New Pass M. Co. has shipped its first gold bullion from ore running $16 per ton.

The Dexter M. Co. of Tuscarora has sent over $5000 in bullion to Salt Lake.

De Lamar *Lode*: Searchlight lies between Manvel, San Bernardino county, Cal., and the Colorado river, being ten miles west of the latter and twenty-five miles northeast of Manvel, the terminus of the California Eastern railway. There is a good wagon road to the camp. There are 150 persons in Searchlight district, and twenty of the properties are working. Among those developing mines are F. W. Dunn, E. J. Coleman, F. C. Perew, B. Macready of Los Angeles, and Daugherty, Rose & Colton.——The New Years Gift and Searchlight are owned by the Searchlight M. Co. On the New Years Gift two shafts have been sunk 100 feet apart and connected at the bottom by drift. There is also a drift 30 feet east of the shaft and an upraise 50 feet. The shafts were sunk on the vein, and in sinking considerable ore was taken out and one carload shipped. On the Searchlight two shafts have been sunk, one 100 feet and the other 120 feet. They are parallel claims; the shafts were sunk 120 feet apart and on the vein. A drift will connect the shafts. The drifts were run in the wall and the ore left in place. All the ore extracted in sinking is on the dump with the exception of a few carloads shipped for test. The width of the vein is 4 feet and will average $23 in gold per ton. There are twelve men employed. Sinking will be continued as soon as air connections are made.——The Good Hope claim is owned by F. Colton. It has a shaft 100 feet deep on the vein, and in sinking several carloads taken out were shipped which averaged $125 in gold.——F. Perew has a number of claims upon which 300 feet have been sunk.——E. J. Coleman is down 50 feet on three of his claims and has a good showing.——B. Macready is opening the Golden Treasure and Copper King.——On the Copper King a shaft is down 100 feet and a 50-foot shaft on the Golden Treasure. These claims are parallel. They are drifting on the vein to connect the two shafts. The vein is 18 feet wide. In running a crosscut 50 feet two veins were encountered, one 4 feet and one 18 inches wide, each averaging $30 in gold per ton. A whim has been put up and ten men are employed. So far ore is piled on the dump until the best method of treatment is determined.——On the Goodenough and Rajah claims, owned by Boller and Lovey, two shafts have been sunk to a depth of 70 feet and both show ore.—— The Hopkins group of six claims is in charge of F. W. Dunn. The owners of this group are also part owners of the Copper King and New Years Gift. On the Pope there is a perpendicular shaft 100 feet deep which cuts four veins, the smallest of which is 14 inches, the largest 4 feet; from the bottom of this shaft a crosscut has been run to tap seven parallel veins which crop on the surface. On the Columbia a 50-foot shaft has been sunk and 30-foot drifts run on the vein. This vein, as well as other veins, runs northeast and southwest. The Columbia veins dip to the southeast, the Pope and Boston to the northwest. On the Columbia a double-compartment shaft is down 75 feet, timbered. Sinking will be continued. On the Boston a shaft on the vein has been sunk 220 feet, and at the 100-foot station drifts both ways have been run 300 feet, and at the 150-foot station drifts each way 125 feet. At 205 feet water was encountered and at this point a drift has been started to make connection with the double-compartment shaft, a distance of 150 feet. The crosscut is now in 80 feet and in this distance three veins have been passed through.

NEW MEXICO.

Santa Fe *New Mexican*: W. R. Doran and W. W. Fitzpatrick have opened a 4-foot vein

of fine looking copper ore in Lincoln county. ——Work at the Malaga coal mines has been suspended and the force removed to the Salado mines.——The claim holders of the Jicarilla mining district will put a stop to the illegal cutting of timber.——The Colorado Fuel & Iron Co. employs forty mules and sixty horses hauling ore from Hanover to Santa Rita.——H. C. Meyers made a gold discovery at Gold hill, near Lordsburg. Assays of the paystreak run six to fifteen ounces in gold. ——After two years of work the Catherine management has struck the rich Snake vein in Sierra county.——W. H. H. Llewellyn has given orders to resume work on the tunnel in Animas peak.——All the men on the Timber Peak mine and mill, with the exception of three, were laid off and work will not be resumed until the return of Mgr. R. H. Sanders from Philadelphia, where he is attending a meeting of the stockholders.——A gasoline engine and hoist have been put up at the Excelsior mine, Organ.——The Mormon mine near Organ has been bonded to Enock & Jewel of Kansas City.——J. C. Greenway of Pittsburg, Pa., has taken a bond and lease on a group of copper claims in the San Andreas mountains. He will put a force of men at work under T. Jones.——A 10-inch lead of galena has been struck on the left fork of Red river.——A. R. Manby of Taos has located a number of gold and copper claims in the Rio Arriba copper country.——The Abbott Bros., working the iron placers on Placer creek, are taking out gold in paying quantities.——Development work has commenced on the Grand View on the Columbine. The property carries lead and gold.——The Whale mine, recently sold to Montana parties, is shipping gold and copper ore and prospectors are making new locations and starting development. ——The Mystic, on the west side of Baldy, in Colfax county, has been bonded to Indiana parties for $40,000.— Prospectors near Sweet Water have discovered a lead of quartz cropping near an inclined bed of copper-bearing shale.——J. G. Schuman of Santa Fe has bought one-half of the interest in the Texas Girl, near Bland, from T. B. Ward. He has also bought the Padre lode from M. Hill.—— Much of the ore taken from the Montoya mine, Santa Rita, runs 75% copper.——Burns & Spafford have leased the Romero Extension mine at Santa Rita, Grant county, and have sunk a 100-foot shaft. They employ fifteen men.——Bible, Halleck, Jay & Co. have sunk a new shaft which taps the old Spanish workings on the Carrasco mine at Santa Rita. They found a nugget of copper weighing 1500 pounds.——Bragaw & Potter are working the Modoc-McCarth group at Hanover, recently sold by A. W. Tenant of Santa Fe. On the Modoc a drift was started in the ore body. The returns at the smelter give 7% to 12% copper.

OREGON.

(Special Correspondence).—A number of mining men have been making an examination of the property of J. H. Searles, near Cornucopia. The property has a 20-stamp mill and comprises a group of fifty claims. The ore is concentrated and shipped to Tacoma. Concentrates are reported to run $225 per ton. The veins are from 2 to 10 feet wide.

The placer mines of J. Arthur are again being worked. The force will be increased as soon as the snow in a 30-inch sluice permits.

Cornucopia, June 4th, '99.

Sumpter *News*: Dr. J. J. Fisher and D. Copping of Sumpter have sold their Pine creek placer ground to H. E. Courtney and J. I. Sturgil of Baker City.——The Sloan & Haskell placers at Susanville are showing up well. As high as $85 to the pan has been taken out from bedrock, we are informed by Mr. Sloan.——J. M. Jones has sold his half interest in the Golden Treasure, the west extension of the Amazon, to S. Chapman of the Ibex for $4000. There are four parallel veins in the property, with a considerable development and necessary buildings. Assays will average $15, running as high as $40.——J. D. Young and P. G. Estes of Sumpter have sold their Gold Hill mine, an extension of the Mammoth, to J. A. Panting, Mgr. Burnt River M. Co. The consideration is $15,000, of which $5000 was paid down.——The Annalulu mine, situated on the same vein as the Mammoth and Amazon near Sumpter, was bonded by the owners—L. J. Hazlewood and Dr. G. W. Tape—to S. Chapman of the Ibex. The bond is for $15,000, payable in two years, with a cash payment of $1500. Dr. Tape purchased a one-fourth interest in the Annalulu last winter for $200.

Grant's Pass *Mining Journal*: The Channel hydraulic placer property and adjoining claims, comprising the Old Channel 60 acres, Booth 160 acres, Oregon 160 acres, Rialto 160 acres, Powelson 20 acres, Golden Link 60 acres and Rich gulch 40 acres, situated on Six Mile creek (a tributary of the Illinois river), thirty-two miles from Grant's Pass, has been sold to C. B. Beardsley, W. H. Thompson and others of Chicago. The owners were J. O. Booth, F. D. Burns and associates. It is an auriferous gravel deposit, occupying a high plateau 400 feet above the river, on which there is a frontage of more than two miles. The mine has been worked for years in a small way. The property will be equipped with modern hydraulic mining machinery, and Surveyors Wright and Perkins have made surveys for a ditch that will be 3½ miles long and give them a pressure of 300 to 350 feet with about 2000 inches of water.

SOUTH DAKOTA.

On the Dakota Maid M. Co.'s property of fifty-four acres large bodies of ore are opened up. The Dakota Maid has a 1000-foot tunnel and a 160-foot shaft with stopes at the bottom, besides numerous tunnels, pits and shallow workings on different parts of the location. When the west drift is extended 20 feet on the level of the 1000-foot tunnel it will tap the fissure at a vertical depth of 376 feet.

The Holy Smoke camp is two miles from Keystone. The Holy Smoke was located by J. A. Clark. The Golden Return M. Co., composed of H. F. Chipman, J. H. Duffie, H. Binswanger and E. G. Stevenson of Detroit and J. A. Clark, own the Holy Smoke and Vulcan, which originally included ten claims, to which have been added, by purchase, four adjoining claims. There are on the property five ledges, two of which have been opened. A shaft has been sunk on the Holy Smoke 150 feet and an ore body 40 feet wide encountered, assays from which return $3.10 to $24.80. It is free milling and concentrating ore. In the Vulcan shaft, 100 feet, ore was found a few feet from the surface and the shaft has continued in ore all the way down. The ore is copper and gold similar to the Holy Smoke and assays from $1.60 to $9 in free gold and $14 to $90 in concentrates. It is the intention of the company to equip the Vulcan shaft with a steam hoist, pumping plant and air compressors.

Deadwood *Independent*: Wolzmuth & Co., owners of the cyanide plant at Spearfish, and who have a lease on the Alameda property, near Portland, are shipping regularly to their plant in Spearfish.

UTAH.

The Jersey Blue group of mines at Bingham has been sold to Eastern people, it is reported, for $250,000. The purchasers include C. E. Graham and J. Kennedy of New Haven, Conn.; C. Burr of Middleton, Conn.; J. B. Collins of Chicago and I. S. Pine of Colorado. The vendors include Dr. J. K. W. Bracken, J. C. Dugan, C. H. Lashbrook, E. Rauch, J. Poudler and W. C. Hazelgrove of Bingham; F. L. Force of Charlotte, Mich., F. Pence of San Francisco; and O. Will of Salt Lake. The Jersey Blue group consists of the Jersey Blue claim, the I. X. L., Little Cottonwood, Big Giant, Elmore, Manila, Albatros, Harrison, Howard and Chandler, containing nearly 200 acres.

Salt Lake *Tribune*: At Castle Dale, from the work done, it is evident that the main body of mineral is confined to a blanket deposit, varying in width from a few inches to many feet, and extending from Green river to Hanksville on the east and from Castle Dale to the Fremont river on the west. In the center of this area is what is known as the San Rafael swell or reef. This reef is the result of volcanic disturbance, the formation being sandstone and lime. Porphyry has been injected into the overlying strata. The erosion of the crown of the uplift has left a jagged fringe of rock encircling the center of the disturbance. It is between the main body of the reef and what has been the overlying formation that the principal deposit of mineral-bearing rock is found, chiefly copper, carrying small quantities of gold and silver. The copper occurs in a layer of lime varying in thickness from a few feet to 24 feet, and encircling the reef a distance of 200 miles. The blanket, where it is exposed, dips from the reef at an angle of 45°, diminishing until it reaches its normal position of horizontal, where it attains an estimated depth of 3500 feet below the furface. Besides this blanket there are in the main reef fissures of more or less extent and width carrying values in copper and silver of a better grade than are found in the blanket.

WASHINGTON.

The Dear Trail No. 2 M. Co. paid a monthly dividend of $2500 June 15, making a total of $32,500 paid by the company from ore shipped in course of development, never exceeding four cars per month, and rarely more than two. The mine is in Cedar Canyon camp and produces high-grade silver ore.

J. Howard has located a group of copper bearing veins in the south half of the Colville reservation on Capital hill; he has a vein 10 feet wide carrying copper ore.

Galena and copper ore have been found in the Mable at Republic. The finding of galena ore is something new in Republic camp.

The mines of Republic camp are reported to have done development work during May which aggregates one mile of shaft and tunnel.

Spokesman-Review: The Morning Glory at Republic is to be developed to greater depth. A winze will be sunk from the tunnel on the ore shoot which was first opened in the shaft and later in the tunnel.——The North Star G. M. Co. has closed a deal for the purchase of a fractional claim which lies east of the North Star claim in Republic camp, which gives a tunnel site on the level of Granite creek, from which a tunnel can be run in 300 feet to tap the vein.

WYOMING.

T. F. Carroll of Fremont, Neb., is doing development work on the Shipper mine on Miner creek, four miles south of Grand Encampment.

FOREIGN.

AUSTRALIA.

Melbourne *Standard*: The Yankee Creek district, ten miles east of Bendigo, has for some time been prospected by private parties, and some promising shows have been opened. Slingo and party have had profitable results, a crushing going as high as four ounces to the load. The pioneer prospector, Mr. Greaves, sank a shaft 200 feet to water level and crushed stone which went 9¼ dwt. per load. Twelve months ago another shaft was sunk, 270 yards south of the original workings and a reef was cut 6 feet from the surface. The stone was 16 inches thick and was followed down on the eastern underlie 75 feet, varying in thickness from a few inches to 5 feet, averaging 3 feet. From this reef twenty-one loads have been crushed for seventy-five ounces, 19 dwt. Slingo and party have been successful. They are driving on 3 feet of stone, in which fine gold can be seen at a depth of 70 feet. A small battery in the district is needed as the stone crushed has to be carted to Bendigo or Ellesmere. —— The Inverell Diamond Field, Ltd., have plenty of water for all purposes. One hundred men are employed in the mine. The washing turns out rich both in diamonds and tin.——Elliott's Soldier's Hill property is running. His diamond and tin saving machine is working satisfactorily.——The Old Malacca, idle for some time, is starting again.——Kenzie & McCartney have bottomed their new shaft on wash, and the prospects of diamonds, gold, and tin are better than any they have had previously.——On the Borah Creek silver field, J. Howell has put in two tunnels and sunk two shafts on a rich silver mine. The ore is is a clean galena, going 70% lead, and at the present price of silver each ton of ore is said to be worth £22. This lode is 2 feet to 5 feet thick.

BRITISH COLUMBIA.

The Canadian Pacific extension from Rossland to Penticton, via Greenwood camp, is being pushed rapidly.

The parties interested in the Old Ironsides and Knob Hill groups at Greenwood have commenced the construction of their smelting plant. On these properties are large ledges of low-grade copper sulphides and iron, carrying gold values. The vein matter contains considerable lime. This camp is seven miles north of the Washington line.

Since the snow has about disappeared in Burnt Basin district there has been a renewal of activity in that section. The ores at first found were of the free milling sort, but more recent exploration has developed large deposits of sulphide ores. The Mother Lode is being developed. One vein of free milling ore on this property has been stripped for 200 feet and another of high-grade ore, 5 feet in width, has been uncovered. Another, showing 13% copper, has been stripped 1000 feet. The management will tap these ledges by running a 300-foot tunnel.

The Pleasure of Hope, owned by the St. George M. & D. Co., T. G. Elgie of Rossland Mgr., is being worked and the shaft is said to be in solid ore.

J. Hamill of Armstrong, B. C., and D. Graham visited the Basin to have some claims surveyed. They, with others, own the Barrow, Copper Farm and other properties. One of them was recently bonded for $20,000.

The Jackstraw, 1500 feet from the Mother Lode, owned by Hunter & Sharp of Rossland, has been worked and a ledge of free milling quartz uncovered. Free gold is visible to the naked eye in samples.

Williarson & Johnson have given a thirty-day option on the Big Chief group to a Montreal syndicate. These adjoin the Mystery group and have the same general formation.

Cowan & Hickman have commenced work on the Lucky Four, a group of claims situated on Boulder creek, seven miles from Trout lake.

J. W. Westfall, Supt. for the Old Gold & Primrose M. Co., will commence work on two of the company's properties with an increased force.

Morrison, McCord & Johnson have given an option for thirty days on the John L. group to J. Dixon of Vancouver. The value placed on the property is $20,000.

The Silver Belt group on Brown's creek, west of the south fork of Lardo river, on the Silver Cup ledge, will be worked this summer. The owners, H. H. Johnson and M. H. Dobie of Rossland and G. K. Morton, St. Thomas, Ont., will be associated with Eastern capitalists.

A strike has been made on the Merchant Townsend group, also known as the Downs group, above the Sunset property on Trout creek, near Index.

On the Capella group, Goat mountain, near New Denver, work is still in progress and high-grade ore is being taken out. A shipment of ninety sacks is being packed to the wharf.

Work is being pushed on the Hartney, Merrimac, Marion, Convention and Home Run, on Silver mountain, on all of which ore is showing.

Kaslo *Kootenaian*: A find was made last week by H. Mathews three miles from Duncan City on Howser lake. The formation is lime, believed to be a continuation of the lime formation on which the Bannockburn, Wagner, Gertrude and other claims are located. This is the first important discovery on the peninsula. Mathews states that the ore is $30 galena.

SOUTH AFRICA.

South African *Mining Journal*: The Schuller diamond mines are developing their No. 2 mine, ninety claims in extent. There are 20,000 loads of yellow ground on the floors, which will be ready for washing at the beginning of the month. There are 600 loads of blue on the floors weathering. The manager is sinking an incline to prove the northern boundary of the pipe. The opinion is held that these pipes, which occur in the Magaliesberg sandstone, will go down straight, and not like the pipes of other parts which crop out through shale and are funnel-shaped, tapering off to forty claims at 1000 feet depth. ——At the Wilgespruit, 660 feet to the north of the new reef, are found the Hospital Hill shales, much contorted, but unmistakable; the intervening space is occupied by beds of quartzite, with small bands of shale. On the footwall of the reef there is a thick bed of quartzite, and a thin band of shale separates this from the reef proper. This shale contains only a small quantity of gold. The reef itself is 3 feet in thickness and consists of altered quartzite. There are evidences of stratification, and the opinion is that the reef is one of the sedimentary beds of the Witwatersrand series. On the hanging wall of the reef there are 6 feet of quartzite and then shale; some distance south is another quartzite leader which pans gold on the outcrop. South of this are quartzites and shales, the latter predominating. Assays show at 22 feet, 3 feet of reef, 24 ozs. 17 dwts.; at 30 feet, 33 ozs. 6 dwts.; at 35 feet, 28 ozs. 4 dwts. The crossout is in some distance, and has not reached the reef; it may be broken and have to be found underneath. A fault having been met with in the crosscut indicates the latter probability. At the surface where the principal shaft is located the outcrop 8 feet gave 15 dwts.; 190 feet west another shaft is being sunk in shales north of the reef, and 300 feet farther west is another. On Weltevreden the outcrop has been located at two places, and in both instances the reef shows well. To the east, on Waterval, the reef has been located in the same relative position to the Hospital Hill shales and pannings obtained. The old reef worked ten years ago on Sayman's portion of Weltevreden lies half a mile to the south of the new line, and the prospectors claim that their strike is a new one, no systematic work ever having been done on it before.

Personal.

A. A. BLOW, M. E., was in Denver, Colo., on the 9th inst.

J. P. EVANS, of the Colorado Iron Works, is on a trip through the East.

W. B. WILSON, Supt. Elkton mine, at Cripple Creek, Colo., has returned from Scotland.

E. E. CHASE, M. E., Denver, Colo., was recently in Butte, Mont., on professional business.

C. D. LANE, Woodson Garrard and party, of Angels, Cal., left for Alaska in the yacht Townsend.

J. M. HANAUER, Mgr. Hanauer Smelter at Salt Lake City, Utah, was in Denver, Colo., on the 8th inst.

R. H. CHANNING JR. has taken charge of the Highland Boy at Bingham, Utah, in the capacity of Mgr.

A. E. LINDROOTH, Denver, Colo., representative of the Link-Belt Machinery Co., Chicago, Ill., recently made a trip to Arizona.

HORACE F. BROWN, who recently furnished the plans for the mill for the Economic Gold Extraction Co. at Victor, Colo., has gone to Chicago, Ill.

R. J. WALTER, Mgr. B. & M. mine at Ward, Boulder Co., Colo., recently made mine examinations in the Black Hills and Bradshaw mountains, Ariz.

F. G. FARISH has resigned his position with the Grand Central M. Co., Ltd., of Minas Prietas, Sonora, Mexico, to take charge of the Humboldt mine at Ouray, Colo.

N. MANSFIELD, who for nine years has been Supt. Smuggler-Union mine, at Telluride, Colo., has resigned his position, being succeeded by C. W. Miller, formerly of Aspen, Colo.

Recent Mining Incorporations.

Manhattan G. M. Co., San Francisco; capital stock, $250,000—subscribed; C. E. Hegard, C. A. Kroch, C. V. Hegard, H. Boldt, G. E. Dangle.

Royal Oil Co. of Coalinga, Fresno, Cal.; capital stock, $500,000; subscribed, $25,000; C. A. Canfield, J. A. Chanslor, W. Easton, G. D. Easton, L. Phipps.

Black Hill Oil Co., Fresno; capital stock, $250,000; subscribed $100,000; L. S. Chittenden, A. L. Hobbs, H. J. Pfluger, H. Nathan, W. B. Holland, A. B. Smith, F. J. H. Manning.

Stanislaus Dredging Co., San Francisco; capital stock, $25,000; subscribed $12,700; N. M. Stover, C. H. Shorey, Sonora; C. H. Cornell, F. P. Bull, San Francisco; S. Goodenough, Oakland.

The Turner Oil Co., Los Angeles; capital stock $30,000, subscribed $8000; M. W. Turner, H. C. Turner, F. C. Turner, G. W. Brookins, J. T. Kirkwood.

Hanford & Oleander Oil and Mineral Co., Hanford; capital stock $320,000, subscribed $160,000; R. J. Wilson, W. J. Wilson, C. A. Lauder, H. C. Lauder, B. L. Barney.

Dolly Varden M. Co., San Francisco; capital stock $1,000,000, subscribed $5000; P. W. Johnson, E. A. Barber, W. A. Sabin, A. L. Black, H. S. Wilson.

Commercial Paragraphs.

THE Colorado Iron Works reports a strong demand and large sale of Bartlett concentrators.

THE Dillon Iron Works of Denver are making several of the Woodbury Imperial concentrators for Colorado trade.

THE Jeanesville, Pa., Iron Works Co. have received an order from British Columbia for three of their compound mining pumps.

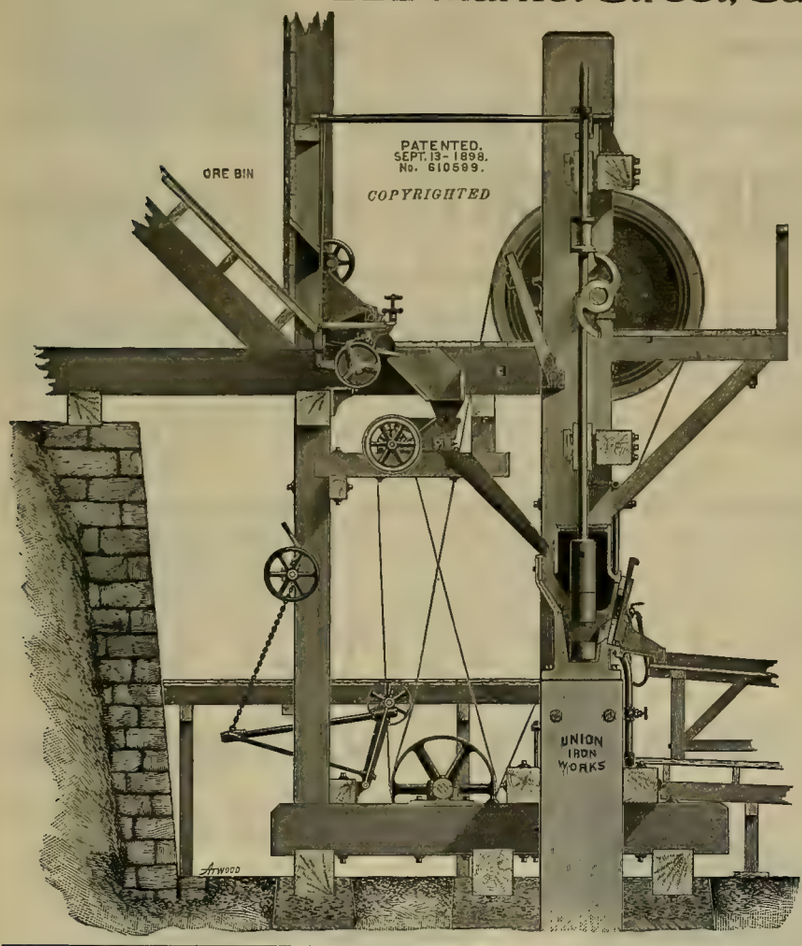
SKINNER & SETHMAN, Denver, Colo., agents for the Gates Iron Works, recently sent a Tremain stamp mill to a mine in Chihuahua, Mexico.

J. GEO. LEYNER, manufacturer of mining machinery, Denver, Colo., will soon move into his new shops at Thirty-sixth and Wazee streets, and into city offices in the Albany Hotel building.

THE Denver Engineering Works reports a heavy demand for Cammett concentrators, manufactured by them at the rate of thirty per month. Tables of this make were recently shipped to Breckinridge for the Mountain Pride mine and the Ault-Wilborg Co. They are building three 150 H. P. double drum electric hoists for the Le Roi mine at Rossland, B. C., and report fourteen sets of rolls in process of construction; also the building of a double 12x18 steam hoist, twenty-four special ore cars, six electric mine blowers and three electric incline hoists for points in State of Durango, Mexico. They have built a Loder pyritic smelter to be erected at Kokomo, Colo., and are building one of the same type, having a 200-ton furnace, for parties near Atlanta, Georgia. This kind of furnace, it is claimed, effects a great saving in fuel. They recently filled orders for three cars of water jackets for Colorado smelters.

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.



THIS ILLUSTRATION

Shows our patent Improved Stamp Mill, with Secondary Crusher, which increases the capacity of the ordinary stamp battery from 25 to 30 per cent.

We respectfully invite the attention of those contemplating the erection of new mills to this practical improvement.

For particulars address

UNION IRON WORKS,

222 MARKET ST., SAN FRANCISCO, CAL.

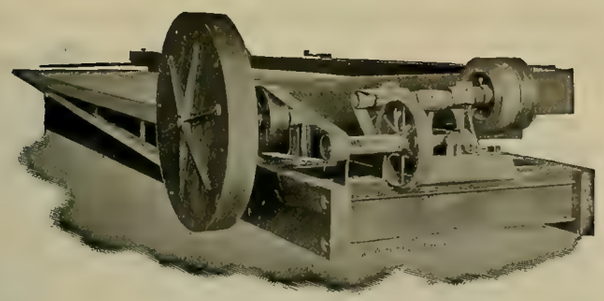
WHITE, ROGERS & CO.,

Consulting Engineers and Millwrights,

OFFICE, 306 PINE STREET, - - SAN FRANCISCO, CAL.

Sole Pacific Coast Agents and Builders of the Celebrated

WILFLEY CONCENTRATOR.



The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

PRICE, $450, F. O. B., San Francisco.

One of these machines will take the place of two or three belt concentrators of any style and do very much better work.

Some Practical Reasons Why the Wilfley Concentrator Should Be Used in Gold Mills:

1. It will successfully handle three or four times more material than any belt Concentrator made, without exception.
2. It will save more sulphurets in proportion while so doing, and catch any float gold, amalgam or quicksilver which may escape from mortars or plates.
3. It will make cleaner and much more valuable concentrates, thus saving useless expense for transporting valueless material, as also extra cost for treatment.
4. It requires little or no attention when once adjusted and no expert is required to either adjust or run the machine.
5. It will save much expense in power and room, and the first cost of a mill requiring concentrators.
6. It has no expensive belts to crack and wear out, nor complicated machinery to keep in repair.
7. It is the only sensible plan of concentration, as any kind of material can be worked, which is not true of any style of belt machine.

—— SEND FOR CIRCULARS. ——

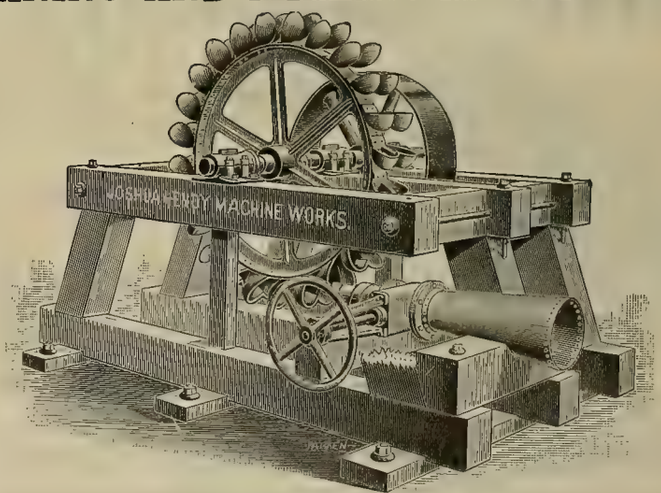
These Machines are Kept in Stock Ready for Immediate Shipment.

Joshua Hendy Machine Works,

San Francisco, Cal.

Office and Salesroom.....38 to 44 Fremont Street.
Works.....Cors. Bay, Kearny and Francisco Streets.

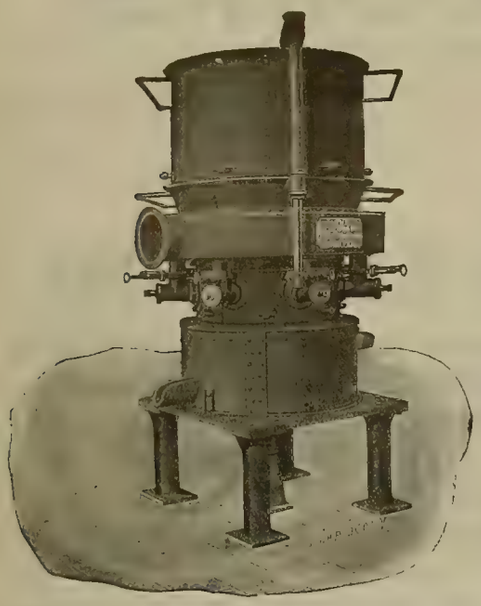
MINING AND MILLING MACHINERY.



WATER WHEELS.

Stamp Mills!

"Hercules" Ore Crushers;
"Challenge" Ore Feeders;
"Triumph" Ore Concentrators;
"Hendy-Norbom" Ore Concentrators;
Boilers, Engines and Pumps;
"Triple Discharge" Two Stamp Mills;
Hydraulic Mining Machinery;
Hoisting, Pumping and Irrigating Plants;
Tangential Impact Water Wheels.



A MODERN COPPER SMELTER (ROUND FORM).

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO.

MANUFACTURERS OF

Smelting Furnaces and Equipments

For the Treatment of

GOLD, SILVER, LEAD, COPPER and PYRITIC ORES.

THIS CLASS OF WORK IS A SPECIALTY WITH US.

We also manufacture all kinds of Ore Milling Equipments for Amalgamation, Concentration, Cyanide and Chlorination Processes.

(SEE PAGE 648.)

THE MINE AND SMELTER SUPPLY CO.,

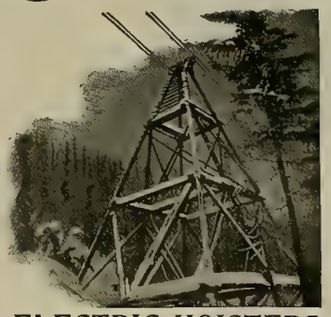
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Etc.

THE MINE AND SMELTER SUPPLY CO.,.....Denver, Colorado.
THE MINE AND SMELTER SUPPLY CO.,.....Salt Lake City, Utah.
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

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THE MOST RECENTLY DEVELOPED AND SCIENTIFICALLY DESIGNED CONCENTRATOR ON THE MARKET.

Capacity—15 to 30 Tons Per Day.

PRICE, with all extra attachments, $450, DENVER, COLO.

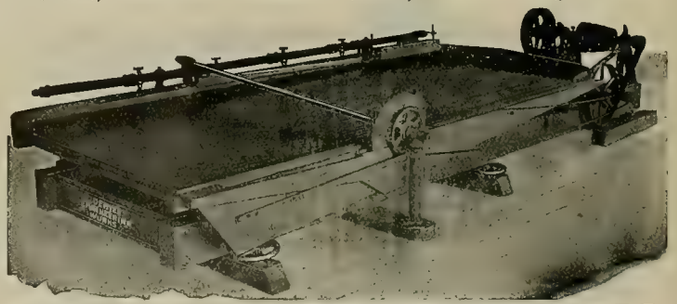
YOU ARE A MILLMAN,

or you would not be looking at this ad.

YOU ARE AN INTELLIGENT ONE,

because having naturally seen the picture first, your instinct said, "That's a good looking machine," and you are reading this to find out about it, which proves our judgment of your intelligence is correct.

Our circular will tell you more. Write for it—it's free.



DENVER ENGINEERING WORKS, Sole Manufacturer, DENVER, COLORADO, U. S. A.

CHAS. C. MOORE & CO.,

ENGINEERS AND DEALERS IN

BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES, HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES, GREEN'S ECONOMIZERS, WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS, HOPPES LIVE STEAM PURIFIERS, EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS, SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS, GOUBERT FEED WATER HEATERS, ATRSTTON STEAM SEPARATORS, SNOW STEAM PUMPS, QUIMBY SCREW PUMPS.

Watch this Space for Description of the Above Machinery.

Send for Catalogues and Full Information.

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THE M. & E. AUTOMATIC ORE CAR. (Patented Jan. 2, 1894.)

Dumps easily in any direction. Boxes of sheet steel, wheels cast iron. All other parts are forged and hammered wrought iron or steel. No unnecessary weight, but every part heavy enough for the work required of it. Get estimates and prices. : : : : : : : : : : :

"Snow" Mine and Sinking Pumps,
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Shafting, Belting, Pulleys, Hangers, Boxes, Etc., Etc.

ORE BUCKETS, WHIMS, HOISTING ENGINES, AIR COMPRESSORS,

Boilers, Engines, Pumps, Mine Rail.

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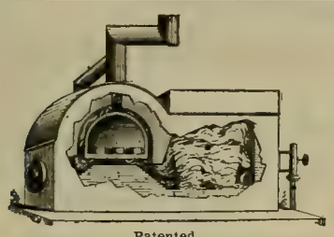
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Illustration shows L. & C. Combination Assayers' Furnace melting and cupelling at same time with one burner.

ECONOMICAL.
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A Full Line of

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Constantly in Stock.

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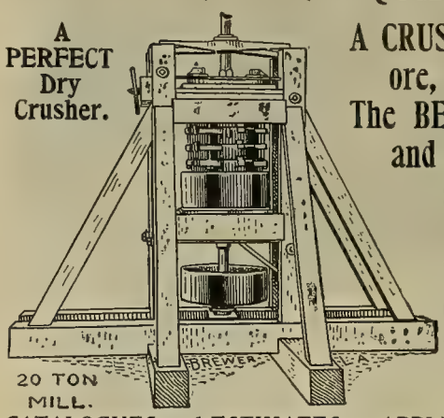
A PERFECT Dry Crusher.



A CRUSHER for all kinds of ore, wet or dry.
The BEST MILL for cyanide and amalgamating plants, silver mills, etc.
Less power and less wear PER TON OF ORE CRUSHED than any mill known.

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Lumber, Shingles, Shakes, R. R. Ties.

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Mining Timber and Plank for Arizona and Mexico Shipment.

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Stamp Mills a Specialty.

ATLAS ENGINES AND BOILERS.

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Agents for Henry R Worthington Steam Pumping Machinery.

General Foundry Work
And All Kinds of Heavy Forgings.

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We manufacture Water Pipe for

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IRRIGATION SUPPLIES OF ALL KINDS.

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General Sheet Iron Work.

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Mining Machinery.

Stamp Mills, Smelting Furnaces,
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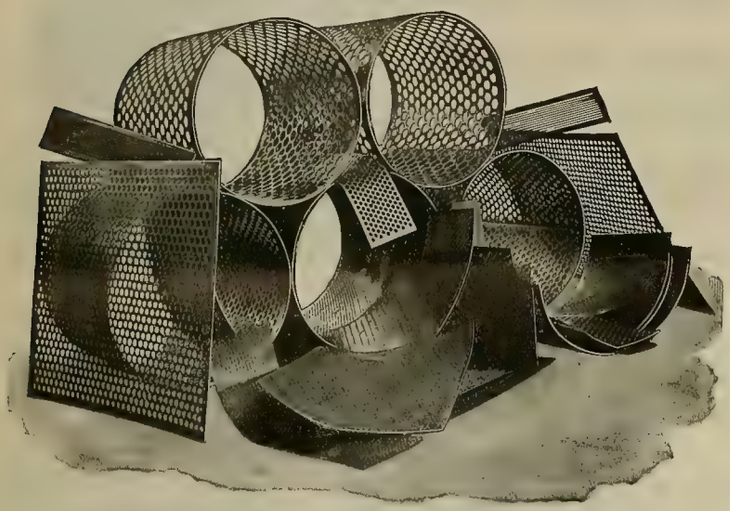

Exclusive Makers of RIEDLER PUMPS AND AIR COMPRESSORS.

PERFORATED SCREENS A SPECIALTY. Samples sent on request.

When in need of any Mining or Metallurgical Machinery BE SURE AND GET OUR FIGURES. "WE LIKE TO MAKE ESTIMATES," and will give your inquiries careful attention.

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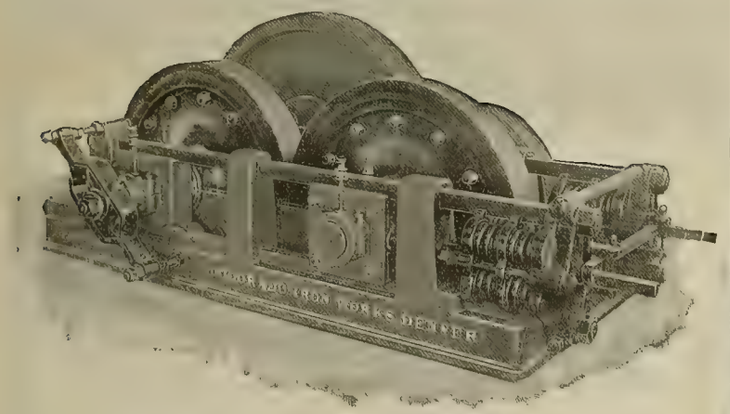
Manufacturers of HIGH CLASS

Ore Milling Equipments.



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Narrow Face, Large Diameter, High Speed

CRUSHING ROLLS.

THE J. H. MONTGOMERY MACHINERY COMPANY.

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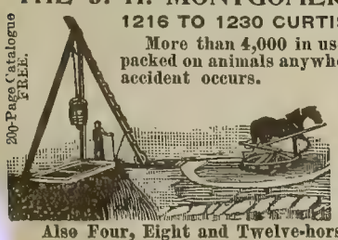
20-Page Catalogue FREE.

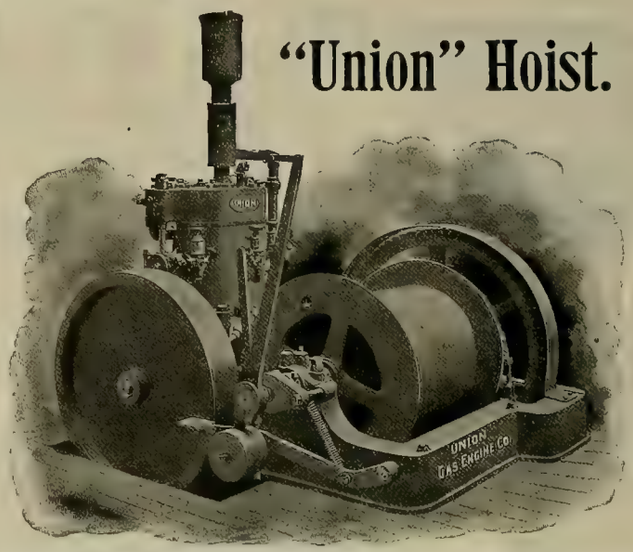


More than 4,000 in use. Made of wrought iron and steel. Can be packed on animals anywhere. The deadlock holds the load when an accident occurs.

Price of One-Horse Whim, complete, with shieves..... $90.
Two-Horse Whims, complete, with shieves..... $150.
Pumping Attachment with Pipe for either..... $40.
Blower Attachment with Pipe for either..... $30

Also Four, Eight and Twelve-horsepower Whims.

"Union" Hoist.



The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
TEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

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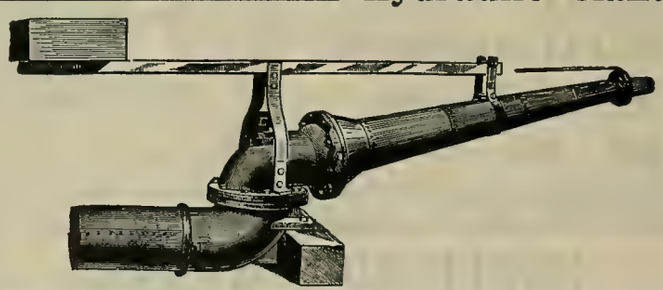
Double-Jointed Ball-Bearing Hydraulic Giants.



The above presents an improved **Double-Jointed Ball-Bearing Hydraulic Giant** which we build. The improvement consists of the introduction of a **Ball Bearing** by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.
Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco Cal.

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The only Tank that will stand the Desert and Hot Climate.

Write for Catalogue and Estimate on any kind of Tank Work.

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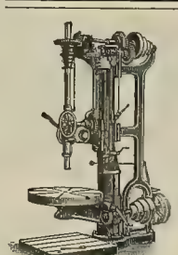

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Iron : Working : Tools.

Engine Lathes, Pulley Turning Lathes, Iron Planers, Slotters, Upright Drilling Machines, Horizontal Drilling and Boring Machines, Etc.

HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JUNE 6, 1899.

626,474.—HAND BRACE DRILL.—W. H. Ames, Watsonville, Cal.
626,452.—WAVE POWER PUMP—J. E. & W. Armstrong, Santa Cruz, Cal.
626,360.—DIGGER—D. M. Baldwin, Griffin, Cal.
626,453.—GANG PLOW SEEDER—J. E. Beach, Routier, Cal.
626,317.—STOPPING HORSES—A. B. J. Brown, San Jose, Cal.
626,269.—GATE—E. G. Cameron, Corvallis, Or.
626,487.—FILTER—Cook & Coboon, Sacramento, Cal.
626,596.—HOSE NOZZLE—B. C. Crane, Montesano, Wash.
626,461.—CONCENTRATING BELT—G. Gates, Jackson, Cal.
626,423.—EDUCATIONAL APPLIANCE—J. H. Hargeps, S. F.
626,465.—HEATING FURNACE—A. Johnson, S. F.
626,431.—GANG EDGER—S. B. Kenfield, S. F.
626,326.—ORE CRUSHER—J. F. Keyton, Baker City, Or.
626,434.—HAY RAKE—A. F. Martin, Chester, Cal.
626,626.—LEMON SQUEEZER — E. A. Middlekauff, S. F.
626,627.—BICYCLE LAMP—E. A. Middlekauff, S. F.
626,289.—PIE PLATE LIFTER—W. P. Murphy, Willowglen, Cal.
626,293.—SAW GUIDE—C. Palmleaf, Woolley, Wash.
626,338.—LOCK—B. Phelps, Seattle, Wash.
626,339.—LOCK—B. Phelps, Seattle, Wash.
626,340.—LOCK—B. Phelps, Seattle, Wash.
626,341.—LOCK—B. Phelps, Seattle, Wash.
626,342.—LOCK—B. Phelps, Seattle, Wash.
626,343.—LOCK—B. Phelps, Seattle, Wash.
626,344.—LOCK—B. Phelps, Seattle, Wash.
626,468.—ICE CREAM MOLD—F. E. Schmits, Oakland, Cal.
626,346.—FLUSHING DEVICE—D. O. Seaman, Seattle, Wash.
626,446.—TIRE BOLT WRENCH—T. E. Stockford, Leesville, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

HAY RAKE ATTACHMENT.—A. F. Martin, Chester, Cal. No. 626,434. Dated June 6, 1899. This invention is designed as an improvement upon spring tooth hay rakes and consists of one or more wire guards extending across the arc of the outer teeth of the rake which act to prevent the hay at the ends from falling or being dragged out. These wires have a certain portion of their length made elastic, and there are connections on the exterior teeth of the rake which form attachments for the ends of the wires, these connections being so disposed that the wires extend in an approximately vertical position from the upper part of the tooth to points adjacent to the ends. The spring of the teeth is thus not interfered with, but the wires prevent the hay from falling out at the ends.

TIRE BOLT WRENCH.—Thomas E. Stockford, Leesville, Cal.; one-half assigned to Chas. E. Stockford of Sulphur Creek. No. 626,446. Dated June 6, 1899. This invention is for the purpose of securing and removing the nuts upon tire and similar bolts. The nuts are screwed on very tightly after being driven through the tire and felly, and it is difficult to remove them when it is necessary to take off the tire. This wrench has a hollow head adapted to fit over the inner end of the bolt, an arm swiveled to the head carrying a screw at the outer end and turnable to adjust the screw in the line of direction with the bolt. The screw is adapted to press against the head of the bolt and lock it in place. A nut wrench is turnable within the hollow head and has a socket fitting the nut, the shaft of the socket being in line therewith, and a means for turning the shaft so as to transmit its motion to the nut wrench. These means consist of ratchet wheels fixed upon the shaft, pivoted pawls, the points of which engage with opposite sides of the ratchet, and a spring which engages the pawls with the ratchet. A transversely movable screw is so disposed as to alternately engage one of the pawls and lift the other out of engagement with the ratchet so that the apparatus will work equally well to turn the nuts on or off of the bolts.

SEEDER ATTACHMENT FOR GANG PLOWS.—James E. Beach, Routier, Cal. No. 626,453. Dated June 6, 1899. The object of this invention is to provide an attachment for gang plows which serves to deposit the seed after the plow has passed. It consists of a braced bar fixed to the plow frame and extending rearwardly therefrom. The seed box is supported upon the rear end of this bar and has connections by which it may be tilted thereon. The feed for the seed is driven by contact wheels which may be made to engage or disengage as may be desired, by the tilting of the seed box so as to bring these wheels into or out of contact.

WAVE POWER PUMPING APPARATUS.—J. E. and W. Armstrong, Santa Cruz, Cal. No. 626,452. Dated June 6, 1899. By means of this apparatus the force of the rising and falling water or swell acts to operate a pump or pumps. The arrangement consists of independent vertical wells, one of which has a direct connection with the sea, and within it is a guided float adapted to rise and fall by the action of the waves. A pump is fixed in the other well and connections are made between the float in the outer well and the pump plunger of the inner one. A supply pipe or passage connects the two chambers at a oint above the bottom, and is provided with an inwardly opening valve which supplies water to the inner chamber and prevents its escaping again. At the bottom of the chamber is another passage having an outwardly opening valve, and controlling gates so that the water which is contained in the inner well may at any time be used to flush out and clean it by opening the lower passages. The action of the waves upon the float in the outer chamber will cause it to rise and fall and the connection between it and the pump in the inner chamber will constantly actuate the latter and cause it to throw a steady stream of water which is conducted to any desired point by suitable pipes. The water thus stored may be used for power or other purposes.

HAND BRACE DRILL ATTACHMENT.—W. H. Ames, Watsonville, Cal. No. 626,474. Dated June 6, 1899. This invention relates to an attachment for the ordinary wood-boring, bit-holding stock or brace by which it is made capable of use in connection with a metal-boring bit. The boring brace has a drill clamp at the lower end, a screw-threaded sleeve enclosing the upper part of the clamp, and an interiorly screw-threaded extension fitting and movable upon the sleeve to increase or decrease its length. A flexible connection is made between the part to be drilled, and the attachment upon this extension by which the length of the flexible connection is adjusted. A ball-bearing casing fits in the upper part of the sleeve, one part bearing upon the upper end of the drill clamp and the other being supported within the sleeve and turnable therewith. A lever is fulcrumed to the brace in such a manner that it can be moved into line with arms which radiate from the upper end of the sleeve so that by contact of these arms with the lever the sleeve may be turned in unison with the movements of the brace and the yoke thus advanced.

FILTER.—E. R. Cook and S. L. Cohoon, Sacramento, Cal.; one-third assigned to Thomas Scott, same place. No. 626,487. Dated June 6, 1899. The object of this invention is to provide an automatically self-cleaning filter, and means by which it is thus cleaned whenever water is drawn through the apparatus. It comprises an inner hollow filtering cylinder with a discharge opening, an outer casing with supply passages to admit the water to be filtered between itself and the filter, brushes adapted to contact with the surface of the filter having swiveled arms by which they adjust themselves as they move about it, and a driving mechanism actuated whenever the faucet is opened to cause these brushes to rotate and thus brush off the outer face of the filter to prevent any gathering of sediment or deposit thereon. The mechanism for driving the brushes may be a bucketed wheel loosely turnable and so connected as to carry the brushes with it. Jet tubes discharge water into the buckets of the wheel whenever the faucet is opened and thus cause it to operate.

ICE CREAM MOLD AND MEASURE.—F. E. Schmits, Oakland, Cal. No. 626,468. Dated June 6, 1899. This invention relates to a device for measuring and molding ice cream, water ice and similar condiments, and a means by which the material thus molded is afterwards loosened and discharged from the mold. The mold and measure may be of any suitable or desired shape, and preferably as scrapers pivoted and turnable within it. A polygonal stem to which the scrapers are fixed extends axially outward through the end of the mold, a pinion journaled in line therewith has a socket with which the steam engages and other pinions engaging it are actuated by a movable handle so that when turned the scrapers move around the inside of the mold and attach the contents which can thus be discharged. One of the handles for holding the device is stationary, while the other which is fixed so as to turn the train of gearing, is movable and may be operated by one hand. A suitable clutch mechanism causes it to engage and rotate the scraper arms when the handles are pressed together, and they are allowed to remain stationary when the handles are separated by a spring which acts for that purpose. The device can thus be operated with one hand, leaving the other free for other purposes.

HEATING FURNACES.—A. Johnson, San Francisco, Cal.; assignor to the Oil Fuel Saving Co. of same place. No. 626,465. Dated June 6, 1899. This invention is especially designed to be used in conjunction with furnaces where heat is required, either for making steam, or for roasting or smelting ores, or any other uses where heat and perfect combustion are required. it consists of a main combustion chamber, a communicating primary combustion chamber below the front portion thereof, a discharge pipe, oil and air supply pipes, connections between these and a transverse pipe so that the air admitted through the air pipes will be delivered into the discharge pipe, mixing and delivering with the oil which is delivered therefrom.

CONCENTRATOR BELT.—George Gates, Jackson, Cal. No. 626,461. Dated June 6, 1899. The object of this invention is to provide an endless traveling belt with a surface upon which a separation and concentration of heavy, valuable substances can be accomplished and such separation made more closely than with the concentrators now in use. It consists of an endless, longitudinally inclined belt having a series of wide, longitudinally inclined surfaces with shallow, vertically connecting offsets; drums upon which the belt is movable, these drums being so disposed that the belt surfaces have a slight backward inclination toward the foot of the preceding offset or step so that extended surfaces are formed for the settling of the sulphurets upon the tables while the lighter pulp will flow over the surface of the sulphurets and discharge onto the next table, each table thus retaining a bed of sulphurets which are eventually carried up by the travel of the belt and delivered in the usual way over the upper end.

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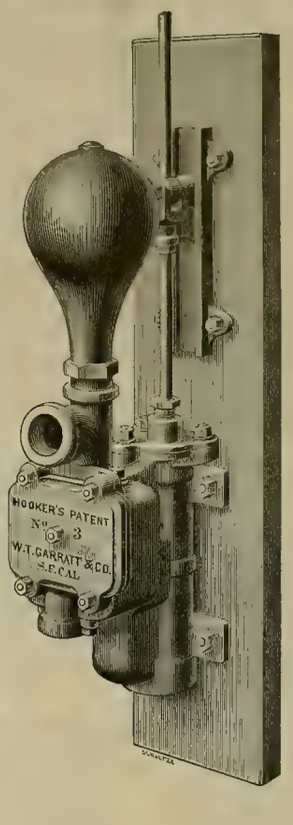

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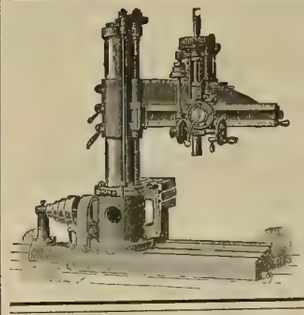

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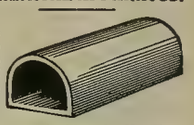

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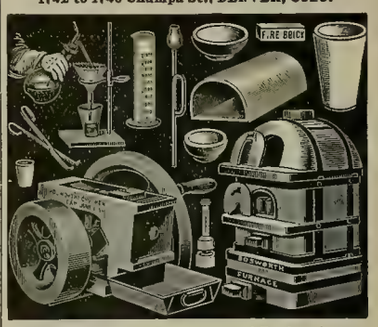

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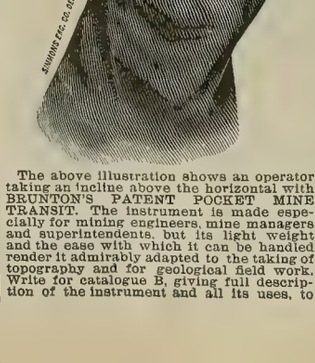

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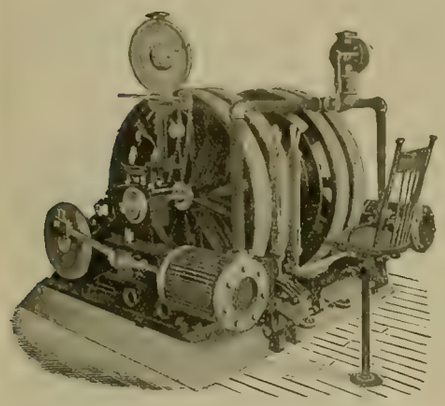

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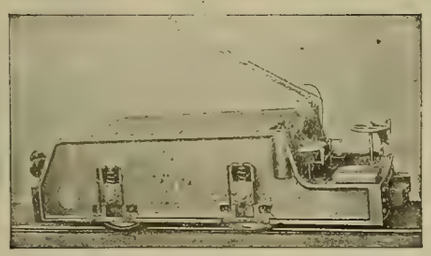

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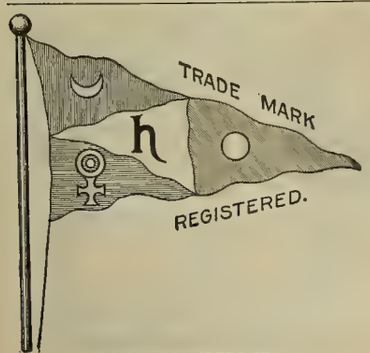

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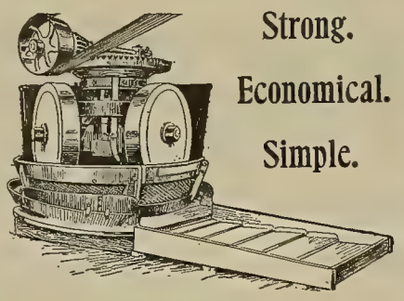

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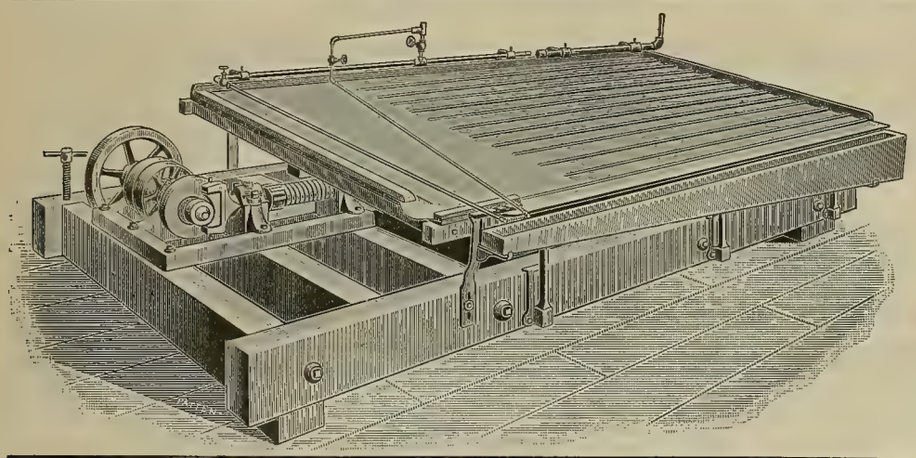

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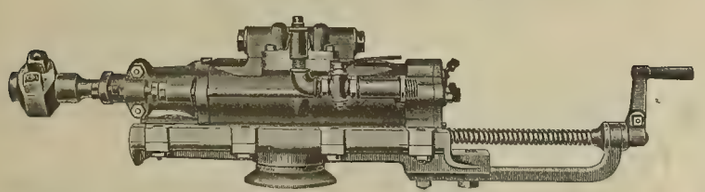

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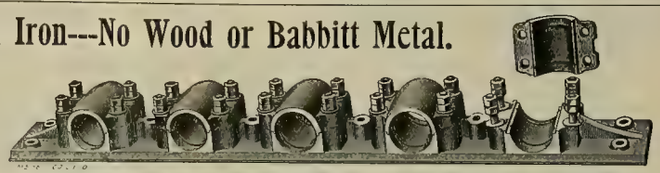

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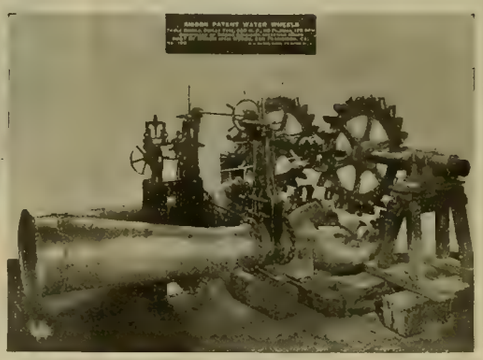

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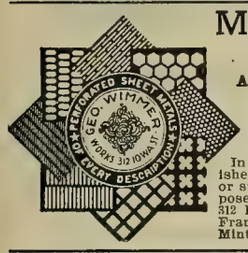

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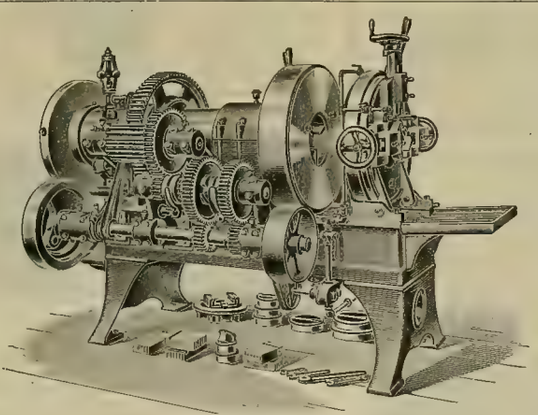

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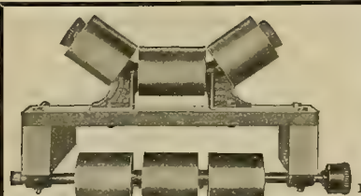

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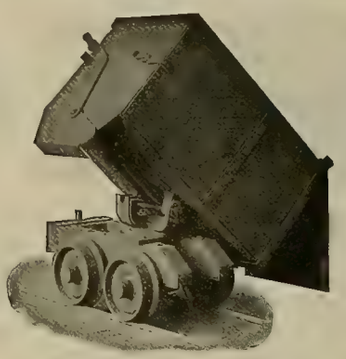
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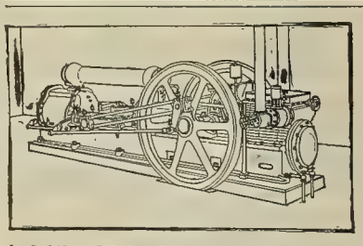
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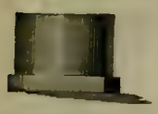

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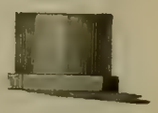

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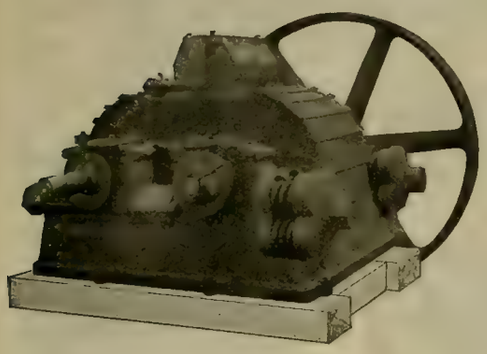

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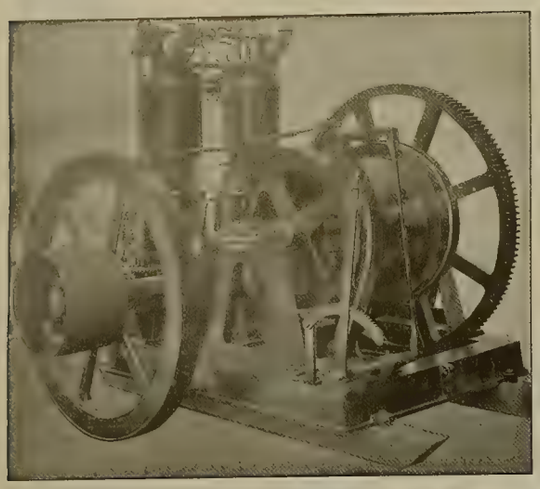

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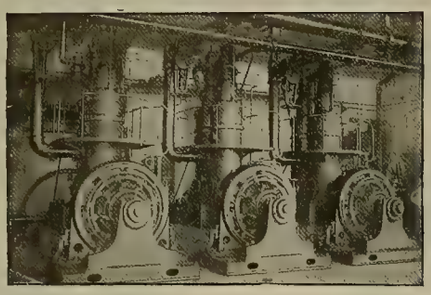

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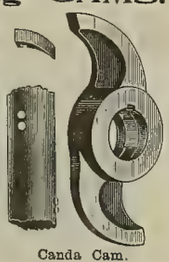

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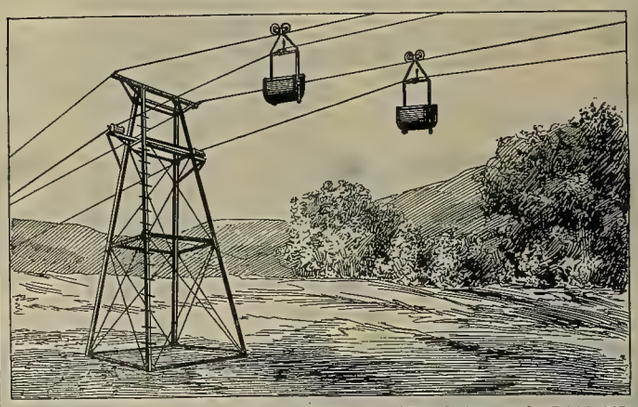

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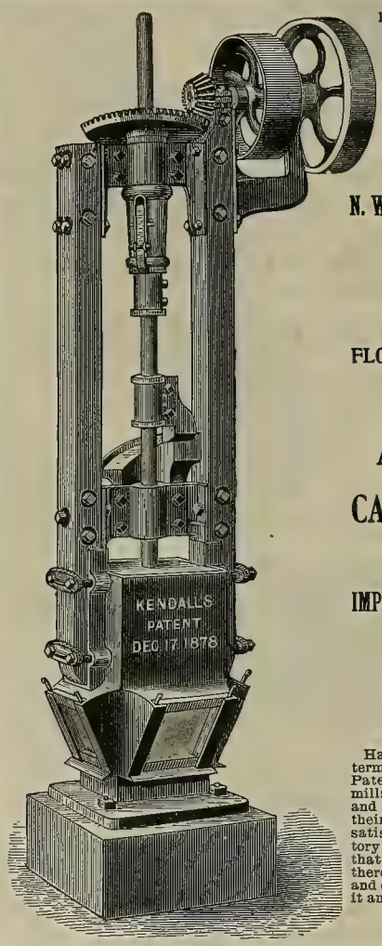

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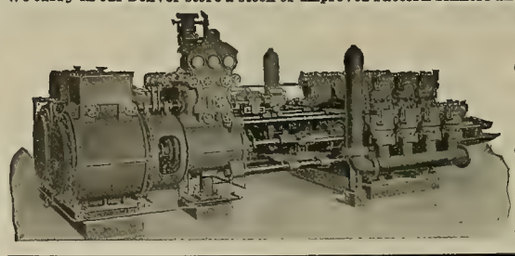

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WHICH FOR STRENGTH AND TRACTION POWER HAS NO EQUAL.

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It Is Unaffected by Water, Heat or Steam.
EVERY BELT GUARANTEED.
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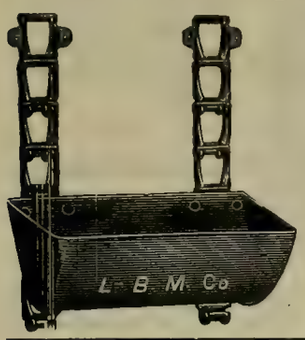
Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.



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$1.00 per gallon in barrels, $1.10 per gallon in cans.

Like our P. & B. Roofings and P. & B. Building Papers, this is of first quality.

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Suitable for all kinds of **Excavating Work**, making a specialty of

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Adopted, Used and in Force in Accordance with Law.

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Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

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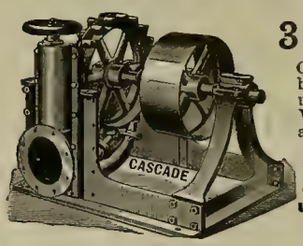
TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from



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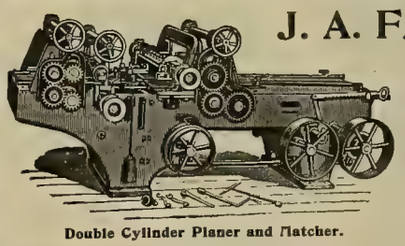

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Box Factories, Planing Mills,
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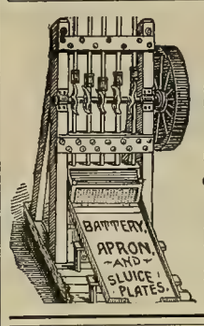

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Every Description of Mining Plates Made.

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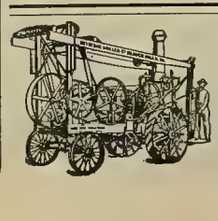

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Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes.

Write for Catalogue and full information.

KEYSTONE DRILLER CO., Beaver Falls, Pa.

Market Reports.

SAN FRANCISCO, June 15, 1899.

SILVER.—London, 27 11-16d; New York, 60¼; San Francisco, 61½; Mexican Dollars, 49¾@50¼; New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.—New York reports firmer, $4.45 bid, $4.50 asked; brokers' price, $4.25.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6½c; bar, 6.50c.

COPPER.—New York reports Lake dull at $18.25 bid, $18.50 asked; brokers' price, $18.50; mill copper plates, 23½c.

IRON.—American, soft, $32.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Dull, $25.60 bid, $25.70 asked; pig, 31c per lb.; Bar, 35c. New York weak, $23.35 bid, $25.50 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $43; export, $39.00 @39.50; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¾c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7½c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 47c; cs., 52c; raw, bbl., 45c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18½c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 52c; cs., 57c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	9¾	9¾
12-thread (⅜ dia	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¾	10¾
Bale Rope (3 and 4 strand)	9¾	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 15, 1899.

9:30 A. M. SESSION.

200 Belcher	48c	600 Ophir	$1 05
300 Caledonia	76c	200 Overman	20c
75 Confidence	$1 00	200 Potosi	37c
100 Gould & Curry	26c	200 Sierra Nevada	68c
100 Hale & Norc's	34c		

2:30 P. M. SESSION.

200 Ophir	$1 00	200 Belcher	39c
200 Best & Belcher	46c	200 Sierra Nevada	70c
300 Con. Cal. & Va.	$1 60	100 Justice	18c
100 Potosi	38c	100 Union Con	40c
250 Hale & Norcross	34c	600 Julia	02c
50 Yellow Jacket	41c		

Recently Declared Mining Dividends.

Isabella M. Co., Cripple Creek, Colo., $45,000; payable June 26.

Deer Trail No. 2, Washington, $2500; June 15. Total, $35,000.

Bullion-Beck, Utah, $10,000; June 15.

Centennial-Eureka, Utah, $15,000; June 15.

Utah Mining Districts.

Bingham, Tintic, Park City, Mercur, Marysvale, Gold Mountain, Deep Creek, La Sal, described and illustrated in a sixty-four-page pamphlet, together with a prospector's map of Utah, and claim (grouped) maps of Bingham, Tintic and Mercur, ready for delivery June 20th Send six cents in postage for this, the most complete and reliable write-up of the mineral resources of Utah ever published. F. A. WADLEIGH, General Passenger and Ticket Agent. Salt Lake City, Utah.

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FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Mining and Mechanical Engineer of twenty years' experience desires engagement, for family reasons, in locality below an altitude of 6500 feet. Mining and concentration a specialty. Address "Concentrator," care Mining and Scientific Press.

AN ACCOUNTANT

Of seven years' experience with mining company desires a position in any country. Good references. Address C. G., this office.

OPEN FOR ENGAGEMENT.

A Mining Engineer, Geologist and Metallurgist; associate of the Royal School of Mines, London; first-class Government certificated mine manager, England, (39) is open to an engagement with responsible gold or copper-producing company as General Manager or Superintendent. Has had 21 years' practical experience in all branches of mining work and held the position of Manager at some of the largest and most important mines both in Europe and this country. Highest testimonials and references. Address "QUARTZ," care of Mining and Scientific Press, San Francisco.

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TO BUY ASSAY BUTTON BALANCE OR GOOD ASSAY OFFICE.

Must be cheap. C. B., 429 San Pablo Ave., Oakland, Cal.

WANTED—Stamp Mill Tailings.

Will buy or work on shares. State quantity, value, character and terms. Address C. R. P., care Mining and Scientific Press.

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One 150 H. P. Corliss engine, in first-class condition; size of cylinder, 18x48. Also, one Buckley condenser. For particulars, apply O. N. B. & C., P. O. Box 2096, San Francisco.

CRIPPLE CREEK.
FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

Stockholders' Meeting.

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines.—In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated mines, a meeting of the stockholders of this company will be held at 11 o'clock in the forenoon on WEDNESDAY, the 12th day of July, 1899, at its principal office, 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Hundred Thousand ($200,000.00) Dollars in 200,000 shares at the par value of One Dollar each.

Dated: San Francisco, May 25th, 1899.

JOSEPH H. MOOSER, Secretary.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

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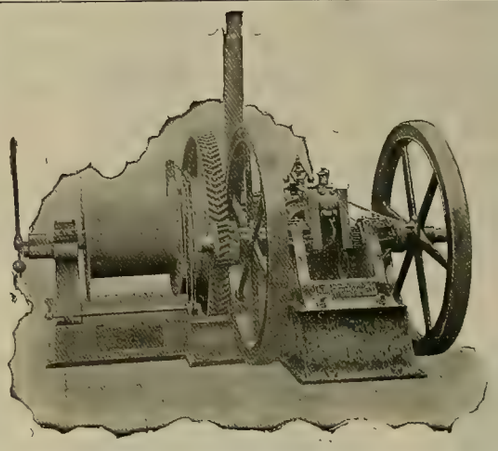

FRESNO, June 25, 1898.

Hercules Gas Engine Works, San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,

305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,

MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,

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Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.

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W. PELLEW HARVEY, F. C. S.
The Vancouver Assay Office and Ore Testing Works.

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Working Tests by Amalgamation and Cyanidation. Ores Purchased. Assays and Analyses.

Representative for:

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FOWLER'S AIR SPACE and Asbestos Sectional Covering.

As a Non-Conductor, Unequaled.

Special Rates for Steam Boilers and Drums.

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MINING PROPERTIES.

Capital wanted to continue development on partially developed, promising mine. Will give an interest or bond, with option for purchase. Near good ore market. Also a group of six claims, developed, ready for mill. Likewise a partially developed prospect containing eight ledges, smelting character, near ore market.

J. N. ROSA, BOX 5,.....SHASTA, CAL.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.

GRAHAM, GARRETT & CO.,

211-212 Peyton Block, SPOKANE, WASH.

MINE PROMOTERS AND BROKERS.

Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

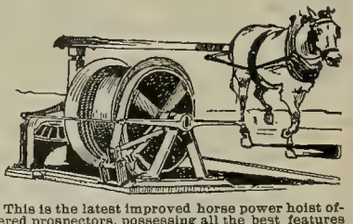
TUBBS CORDAGE CO.

(A CORPORATION.)

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. Extra sizes and lengths made to order on short notice

611 and 613 Front St., San Francisco, Cal.

EL PASO
Automatic Horse Whim.



This is the latest improved horse power hoist offered prospectors, possessing all the best features of other styles with improvements added. The end thrust is entirely done away with, thus increasing the efficiency and saving considerable wear. The **Automatic Safety Brake** is so arranged that accident is impossible, being in position until held out by operator to lower bucket. ::::: It is made entirely of iron and steel. Weight, about 1400 pounds

THE HASSELL IRON WORKS CO.,

COLORADO SPRINGS, COLO.

Powell's Signal Oiler.

LEVER UP, Oil Dropping; LEVER DOWN, Oil Shut Off.

Doesn't interfere with the adjustment.
Most perfect Oiler in the world.
Haven't you need for such an Oiler?

In stock by all Jobbing Supply Houses.

Manufactured only by
THE WM. POWELL CO.,
Cincinnati, O.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, · 426 CALIFORNIA STREET,
SAN FRANCISCO.

Assessment Notices.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of June, 1899, an assessment (No. 19) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels' Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 29th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—No. 1209 Claus Spreckels' Building, San Francisco, Cal.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of May, 1899, an assessment (No. 12) of two cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3d day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary.

Office—Room 9, 320 Sansome street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of June, 1899, an assessment (No. 7) of five (5) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of May, 1899, an assessment (No. 2) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

BOULDER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1899, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 27th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of June, 1899, an assessment (No. 21) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 8th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Mines and Machinery for Sale at Public Auction.

The Harqua Hala (Arizona) Gold Mining Company will on Monday, August 14th, 1899, at 12 o'clock noon of that day, at the Court House door at Yuma, Arizona, offer for sale to the highest bidder all its mines, mill site, pumping plant, 40-stamp mill, cyanide plant, engines, boilers, machinery (fixed and movable), and stock of merchandise situated at Harqua Hala, Yuma Co., Arizona. Inventories and information may be obtained from C. Dallman, agent at Harqua Hala, or Lindley & Eickhoff, attorneys, 530 California St., San Francisco. Terms of sale: Cash, U. S. gold coin, payable twenty per cent on acceptance of bids, balance on delivery of possession. Title to mines U. S. patents. By order of the Board of Directors.

DEWEY, STRONG & CO'S PATENT AGENCY.

Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & CO.'S Patent Agency will have the benefit of a description in the *Mining and Scientific Press*. We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

DEWEY, STRONG & CO.,
PATENT AGENTS,
330 Market Street, San Francisco, Cal.

DELINQUENT SALE NOTICE.

HEAD CENTRE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. B. Parsons, Trustee	108	100	$20 00
H. B. Parsons, Trustee	112	100	20 00
H. B. Parsons, Trustee	116	100	20 00
H. B. Parsons, Trustee	145	100	20 00
H. B. Parsons, Trustee	152	100	20 00
J. W. Pew, Trustee	348	500	100 00
S. B. Wakefield	361	3	60
J. W. Pew, Trustee	384	100	20 00
J. W. Pew, Trustee	389	100	20 00
J. W. Pew, Trustee	390	50	10 00
J. W. Pew, Trustee	463	100	20 00
J. W. Pew, Trustee	504	5	1 00
J. W. Pew, Trustee	536	50	10 00
G. B. Root, Trustee	564	20	4 00
G. B. Bayley, Trustee	674	50	10 00
J. W. Pew, Trustee	710	100	20 00
J. W. Pew, Trustee	711	100	20 00
J. W. Pew, Trustee	712	100	20 00
E. B. Deane, Trustee	717	100	20 00
S. Iglauer, Trustee	820	100	20 00
H. H. Shinn, Trustee	873	700	140 00
F. A. Benjamin	875	5	1 00
W. Steele, Trustee	890	500	100 00
J. W. Pew, Trustee	896	50	10 00
J. W. Pew, Trustee	905	100	20 00
H. W. Hasselgren	908	100	20 00
H. W. Hasselgren	909	100	20 00
Peter Lane	910	630	126 00
M. Rehfisch, Trustee	917	1,250	250 00
M. Rehfisch, Trustee	918	1,250	250 00
M. Rehfisch, Trustee	922	300	60 00
M. Rehfisch, Trustee	923	200	40 00
M. Rehfisch, Trustee	924	400	80 00
J. W. Pew	946	1,333	266 60
John Sinclair	951	500	100 00
A. W. Foster	957	8,000	160 00
A. W. Foster	958	4,000	80 00
Rehfisch & Co., Trustees	960	100	20 00
Jas. Rolph, Trustee	968	500	100 00
S. B. Wakefield & Co., Trust's	969	1,500	300 00
S. B. Wakefield & Co., Trust's	971	3,833	766 60
J. W. Pew, Trustee	975	400	80 00
J. W. Pew, Trustee	989	40	8 00
A. W. Foster	1010	3,000	600 00

And in accordance with law, and an order of the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

POSTPONEMENT.

The day of sale of the delinquent stock of the above named company is hereby postponed to MONDAY, June 12th, 1899, at the same time and place. By order of the Board of Directors.

J. W. PEW, Secretary.

POSTPONEMENT.

The day of sale of the delinquent stock of the above named company is hereby postponed to MONDAY, June 26th, 1899, at the same time and place. By order of the Board of Directors.

J. W. PEW, Secretary.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential*.

DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 19) levied on the 13th day of May, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No Cert.	No. Shares.	Amt.
G. A. Hinckelbein	2	10	50
G. A. Hinckelbein, Trustee	9	1000	50 00
G. A. Hinckelbein, Trustee	10	1000	50 00
G. A. Hinckelbein, Trustee	11	1000	50 00
G. A. Hinckelbein, Trustee	12	1000	50 00
G. A. Hinckelbein, Trustee	13	80	4 00
G. A. Hinckelbein, Trustee	20	500	25 00
G. A. Hinckelbein, Trustee	21	500	25 00
G. A. Hinckelbein, Trustee	22	500	25 00
G. A. Hinckelbein, Trustee	23	500	25 00
G. A. Hinckelbein, Trustee	24	200	10 00
G. A. Hinckelbein, Trustee	25	200	10 00
G. A. Hinckelbein, Trustee	26	200	10 00
G. A. Hinckelbein, Trustee	27	200	10 00
G. A. Hinckelbein, Trustee	28	200	10 00
G. A. Hinckelbein, Trustee	29	200	10 00
G. A. Hinckelbein, Trustee	30	200	10 00
G. A. Hinckelbein, Trustee	31	200	10 00
G. A. Hinckelbein, Trustee	32	200	10 00
G. A. Hinckelbein, Trustee	33	200	10 00
G. A. Hinckelbein, Trustee	44	100	5 00
G. A. Hinckelbein, Trustee	45	100	5 00
G. A. Hinckelbein, Trustee	46	100	5 00
G. A. Hinckelbein, Trustee	47	100	5 00
G. A. Hinckelbein, Trustee	48	100	5 00
G. A. Hinckelbein, Trustee	49	100	5 00
G. A. Hinckelbein, Trustee	50	100	5 00
G. A. Hinckelbein, Trustee	51	100	5 00
G. A. Hinckelbein, Trustee	52	100	5 00
P. A. Wagner	53	10	50
P. A. Wagner, Trustee	90	980	49 00
P. A. Wagner, Trustee	91	1000	50 00
P. A. Wagner, Trustee	92	1000	50 00
P. A. Wagner, Trustee	93	1000	50 00
F. X. La Bonte	75	10	50
Louis Audet	89	10	50

And in accordance with law, and an order from the Board of Directors, made on the 13th day of May, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 3rd day of July, 1899, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHARLES BOVONE, Secretary

Office—217 Sacramento street, San Francisco, California.

RUPTURE AND PILES.

For May and June, 1899, only, **Drs. Mansfield & Porterfield, at 838 Market St., San Francisco,** are issuing certificates entitling the holder to free examination for **Rupture** or **Piles**, with treatment till cured, for $30. Send for one.

Skeleton Mining Report.

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FIFTY CENTS POSTPAID.

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Cost to Run, 1c per hour per H. P.

All Latest Improvements.
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WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

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CHEMISTS ASSAYERS ENGINEERS.

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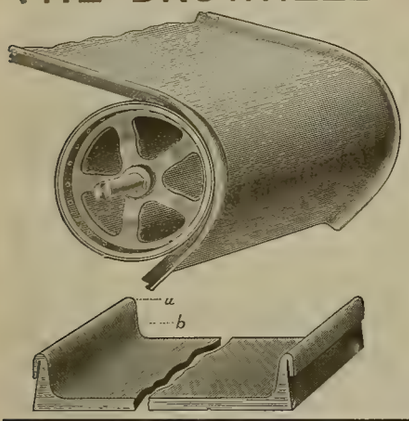
WORKING TESTS by Amalgamation, Concentration, Chlorination and Cyanide.

ORES CRUSHED AND SAMPLED. ✦ MILL RUNS.
Prices on Application.

THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.



It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

SUPT. OFFICE WILDMAN GOLD MINING COMPANY,
SUTTER CREEK, AMADOR CO., CAL., Feb 22, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: Replying to your favor of the 18th inst., will say that in the two mills operated by this company we have nineteen of your Patent Lip flange concentrator belts in use; some of them have been in constant use for the past two years and have given entire satisfaction. I know of no better flange for a side shake machine.

Yours truly, JOHN ROSS JR., Superintdenent.

MEXICAN MILL. EMPIRE, NEV., March 28, 1897.

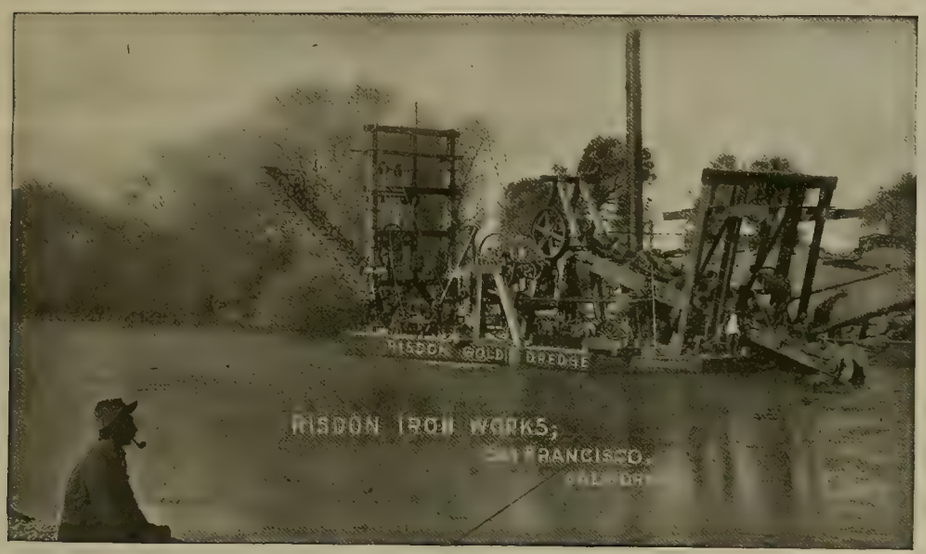
MR. J. S. BROWNELL, San Francisco, Cal.—DEAR SIR: For some years we have used three different styles of belts on our Frue vanner at the Mexican mill, and for smooth working and endurance the Brownell Patent Lip flange belt has proved its superiority over all others, and I unhesitatingly recommend it to all who are using Frue machines.

Yours truly, EUGENE MAY, Foreman.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.

(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.



RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leibers.

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Gold Dredging Machinery

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OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard. We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

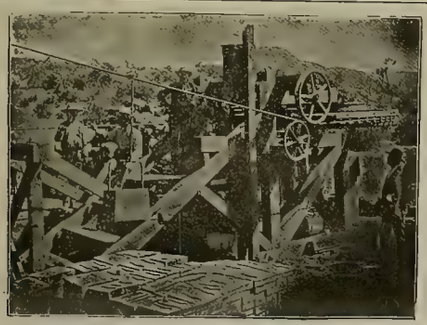
Send for Dredging Catalogues Nos. 15 and 16.

WE ALSO BUILD

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.



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For transporting Ore, Fuel, Merchandise, etc., in bulk or in packages. SIMPLE, ECONOMICAL, INEXPENSIVE, PRACTICAL.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY. Send for Ropeway Pamphlet No. 20.

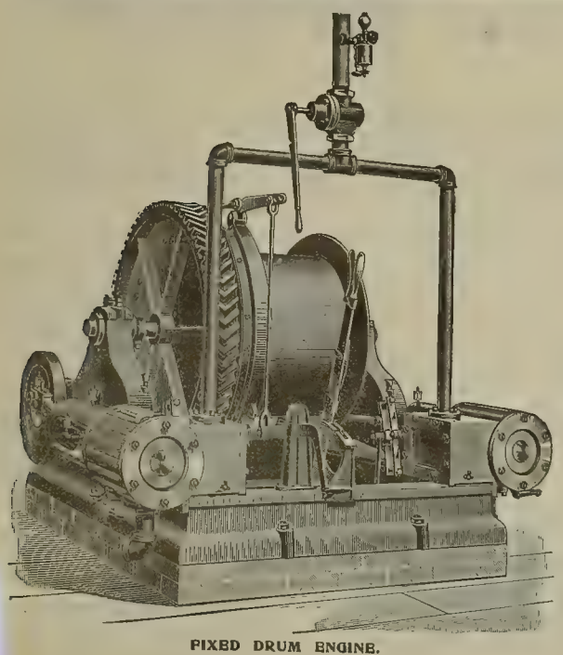
THE CALHOUN EXCAVATOR.

A COMBINED POWER-SHOVEL AND CABLEWAY.
.....Ask for Circular.....

Cableways, Double Rope Tramways, Wire Rope Transmissions, Incline Planes, Logging Machinery, Suspension Bridges.

DESIGNED, FURNISHED, ERECTED. Write for Estimates.

CALIFORNIA WIRE WORKS, - 330 Market St., San Francisco, Cal.



FIXED DRUM ENGINE.

PARKE & LACY CO.,

21 and 23 FREMONT STREET, SAN FRANCISCO, CAL.

Hoisting and Pumping Machinery

...FOR...

MINE PROSPECTING AND DEVELOPMENT.

SOLE AGENT FOR THE

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The Value of Comparisons.

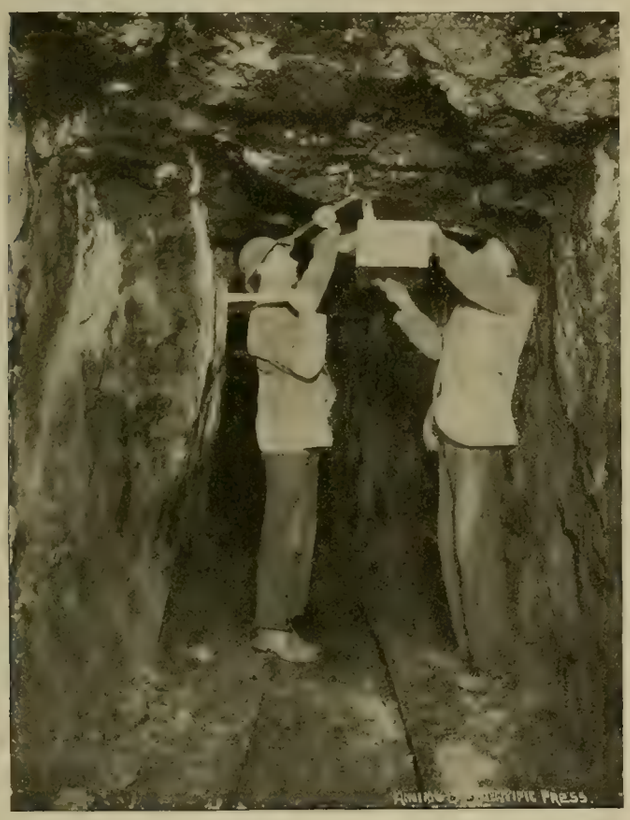
Considering the importance of the mining industry to California, too little attention is given to securing accurate information relative to the cost of operating mines under varying conditions. The simple statement that this or that mine is operating at a cost of $1 or less per ton has no particular significance unless the statement be accompanied by a description of the mine—its geology, character of rocks and of the ore, quantity of water handled, etc. It is only by comparison that these statements are made valuable. If a mine of a distinct type, isolated from all others, and unlike all others, can be operated at a cost so low as to attract attention from mining men everywhere, it has no particular value further than it concerns that mine; but if a mine is only one of a number similar in character and similarly situated, any radical difference in cost of operation would attract equal attention and a remedy would doubtless be sought, for what can be accomplished at one place under certain circumstances should be accomlished at another place where the conditions are the same. A mine may be more cheaply operated with steam, where fuel is very cheap, than one with water power, where the cost of water is very high. The question of wages is also an important one. With a plant of given capacity and a mine of equal size and character, it would cost more to operate a mine in Butte City, Montana, where wages are $3.50 per day than in Tennessee, where wages are about $1.25. It may be that there is greater efficiency in the higher priced labor, but it is not likely that the difference is in the ratio of the respective wages. The same difference exists in the treatment of ores. No comparisons of value can be made when all the conditions having a bearing on the matter are not known. It is to enable mining men to make valuable deductions by comparison that such detailed and accurate information should be sought and made public.

New Old Mines.

Among the most prominent and the best paying mines in California are several which, after the abandonment of years, have been reopened and are now operated successfully. Among these are the Kennedy mine at Jackson, Amador county, and the Gwin and the Utica mines in Calaveras county, also the Rawhide and App mines in Tuolumne county. Besides these, there are a number of others which will probably soon be added to the paying list, including the Central Eureka and Oneida in Amador county, the Melones Con., Sheep Ranch and Angels mines, in Calaveras county, and several smaller mines in Tuolumne and Mariposa counties. Among the most important factors in the development and success of these new old mines are improved methods, superior management, better machinery, lower wages, cheaper supplies and mill processes which save a higher percentage of values at less expense than in former years. The possibilities of these old mines which were once operated with profit and then closed down is fully demonstrated in these recently opened mines, and there are numerous similar opportunities awaiting the investment of capital.

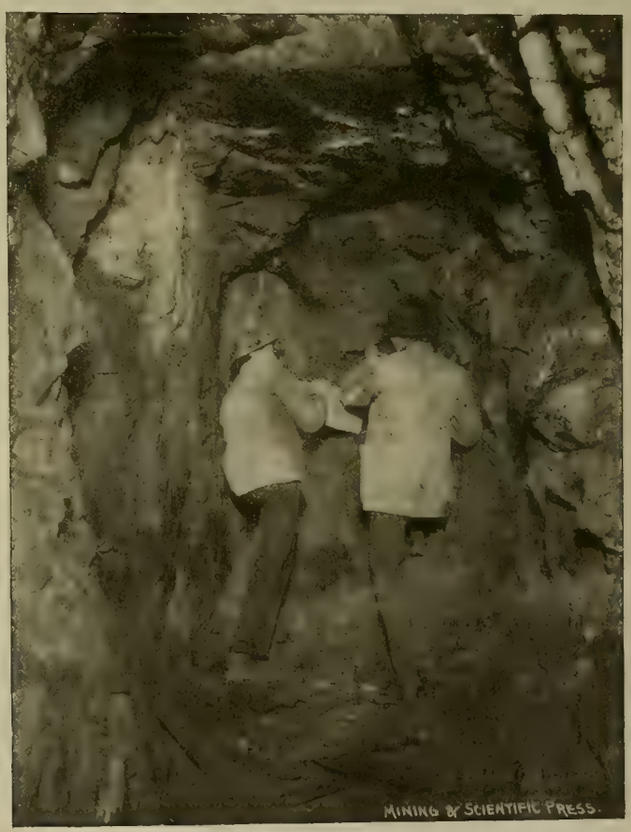
Mine Sampling.

No duty which falls to the lot of the mining engineer calls for an exercise of greater caution than the sampling of a mine. It is a well-known principle that a sample which is not a sample is worthless for either owner or prospective buyer. Often the obtaining of samples is accomplished under great difficulties. The illustrations appearing on this page are those of men in the act of sampling the Independence mine at Cripple Creek, Colo. Under some circumstances the use of the moil is undoubtedly the best for taking samples, as the rock detached by this means can usually be secured in the desired amount, and can be prevented from flying off under the force of the blow, as is often the case in the use of a pick or hammer. The value of the services of a man who can correctly sample a mine cannot very well be estimated on a basis of time.



TAKING SAMPLE IN BACK OF DRIFT, INDEPENDENCE MINE, CRIPPLE CREEK, COLO.

(See page 636.)



TAKING SAMPLE IN FACE OF DRIFT, INDEPENDENCE MINE, CRIPPLE CREEK, COLO.

THE Sauerwald Development & Promotion Syndicate, Ltd., is the title of a new English concern which has gone into the business of gold winning—from sea water. No one will deny that the business is legitimate if they can make a success of it. Metallurgy has made great strides lately, but it has not yet reached a point where the water from the ocean can be made to yield up its gold in profitable quantity. These enterprising promoters doubtless claim to have a sure thing, as did certain New England people not long since. The credulity of some people surpasses belief, for people are said to be actually subscribing for the stock of this salt sea bubble.

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STEEL and iron are still rising in price. The unusually large demand for steel and iron and the lateness of the arrival of vessels from the Lake Superior regions at the Lake Erie ports with iron ore combine to keep up the price.

THE new Washington State mining law requires a 10-foot shaft on all quartz mining claims before the act of location is completed. An equivalent amount of work is required on placer locations. The law went into effect on the 7th inst.

PROSPECTORS continue to leave for the new gold fields in Lower California. Some of the most recent reports tend to the belief that gold cannot be obtained more readily there than elsewhere without a proportionate amount of labor.

ON June 1st, when the eight-hour law went into force in British Columbia, 400 men in the Slocan district quit work, for the reason that the mine managers would only pay for eight hours work at the same rate per hour as had been paid for ten hours.

COMMISSIONER OF PATENTS DUELL reports the receipts of the Patent Office for last month to be $116,386.87. For the corresponding month last year the receipts were $88,558.41. The number of applications for patents, including designs, for May, 1899, was 3856, as against 2870 for May, 1898.

A NEW MINING COMPANY has recently been incorporated in Arizona which claims to have 8,000,000 tons of copper, gold and silver ores in sight, in Pima county. This may be considered a very fair start for a new enterprise. No statement as to the value of this ore and cost of mining and treatment is at hand.

THE average cost of the production of gold is lower at the present time than at any time in history, and, as a result, a decided impetus is given the gold mining industry. Attempts to work low-grade ores, where failure resulted a few years ago, are now meeting with success as a result of the changed conditions.

NO CLASS of men in new mining regions do more to retard the development of mines than those who stake all the ground they can possibly cover regardless of the law or the rights of others. Those who would locate and work on claims if they could have the opportunity are unable to buy out these wholesale locators and do not wish to take issue with them at law for obvious reasons, though their case would in most instances be won in the courts. Local rules should limit the number of claims which one person could locate.

Effect of the Eight-Hour Law.

The result of legislative interference, in the passage of the eight-hour law, with a condition of affairs which, if not wholly satisfactory, was at least peaceful, and under which the mining industry and all concerned in it were prospering, is in evidence in Colorado and British Columbia.

Ever since the passage of the eight-hour law by the Colorado Legislature trouble has been anticipated when the time arrived for the law to go into effect, June 15. It is learned that 3000 men employed in various smelting concerns at Denver, Pueblo and Leadville have quit work owing to the differences arising between the workmen and smelter managers as to hours of labor and wages. Several days since notices were posted in and about the smelters stating that thereafter men would be employed by the hour, no man being required to work longer than eight hours during twenty-four, but giving the privilege of working extra time, this being wholly optional. Later a raise of about 10% in wages was announced. That these arrangements did not meet the approval of the workmen is evident. It is asserted that unless the matter is speedily adjusted upward of 40,000 men will be thrown out of employment, as the mines, unable to find a market for their ores, must also close down. The railroads running into the mining districts would also be heavy losers.

In the Slocan region of British Columbia the miners have quit work, refusing to work eight hours for less than the pay formerly received for ten hours' work. That eight hours work is enough in twenty-four in many mines where there are floods of water and poor ventilation, there can be no doubt; but this condition does not obtain in all mines, and the claim that the miners will accomplish as much or more work in eight hours as in ten will scarcely be credited, even if it were so.

In some instances mining companies have also offered to pay by the hour with the overtime privilege, which would be satisfactory, perhaps, in many cases, but would be a violation of the law which makes it unlawful to employ men in a mine longer than eight hours in any twenty-four.

These affairs have reached an unfortunate stage, but it is to be hoped that a just regard for the right on both sides of this question may ultimately prevail. Such things necessarily adjust themselves, as they always have.

"DEEP-LEVEL mining in the Transvaal, as far as the first row of deep mines is concerned," says the *South African Mining Journal*, "has thus far, under careful, experienced management, proved an unqualified success, and the time is not far distant when the second line of deep shafts will enter the ranks of producers." The difference between very deep mining and that which is moderately deep is in some cases so radically different that success may not attend the efforts of those who do not fully grasp the situation in its broadest sense and who are able to meet the changed conditions with the necessary financial outlay. Deep mining—that is, mining deeper than 3000 feet—involves, usually, very heavy surface plants, the lifting of larger quantities of water to greater heights, and, possibly, increased temperature; but, from a mechanical standpoint, it may be said that mining will be carried on to a depth as great as it is possible to sink shafts and hoist heavy loads with a single cable. When a cable is very long—3000 feet or more—the "springing" of the rope is the cause of some difficulty, but the inconvenience caused by this is usually overcome by the use of chairs at the stations. To how deep a point mining can be carried on successfully is not known, but it is believed to a much greater depth than the deepest mines of the present day—about 5000 feet. Economic conditions usually determine the depth to which a mine is worked; but, if the value of ore deposits warrant it, it is safe to say the depth to which mines will be worked will be very materially increased.

WHAT is alleged to be a "petrified man" is being lugged about the rural and mining districts of California by men who claim to have discovered the "man" in Death Valley while prospecting. When last heard from they were headed for Oregon. This sort of "fake" has been worked on the people so often and so frequently exposed, it is amusing to see that the old trick still works, and people actually pay to see such a creation. On second thought, perhaps people who are so easily taken in might spend their money more foolishly. Such a thing as a petrified human body does not exist, and never has. Bones sometimes become petrified, but the fleshy tissues are not subject to replacement in the same manner that bones, wood and some other organic substances are, for the simple reason that the tissues are destroyed by decomposition before the atomic replacement of inorganic for organic matter can be accomplished.

THERE is usually a vast difference in current reports from a mine that is being boomed by every conceivable device for what can be made in a stock operation and one which is worked for what there is actually in it. A great deal of free advertising has recently been given a noted mine location in the Northwest. Statements of fabulous values are commonly made, in connection with enormous breadth of ore bodies. The papers are full of it. During the last four months a large force of men has been reported engaged in development work and have succeeded in sinking a small shaft 60 feet in soft rock. In comparison with this is a gold mine in the Southwest which for months past has shipped several hundred thousand dollars monthly and yet its name in print is a rarity. These two make a decided contrast.

SOME of the United States Consular reports, particularly those which deal with mining and the mineral resources of foreign countries, are of unusual interest. Consul Fowler, writing from Chefoo, China, Feb. 16th, '99, says that, at his request, E. D. Sims of Tai-au-fu has sent an interesting report on the coal and other mines of that department. In his report Mr. Sims writes: "I send you a very good specimen of galena, very rich in sulphide of lead, and I am told it would make very good German silver." The correspondent also writes of a "vein of pure silver assaying from $600 to $1000 per ton." It is unfortunate that consular reports, which should consist of reliable information from the most responsible source, contain such foolish statements as the above.

AT the mines of the Mountain Copper Co., near Keswick, Shasta Co., Cal., 450 miners have quit work owing to a refusal of the management to meet a demand for an increase of 40 cents per day for all classes of labor. Various complaints are made by the men. They assert that the mine is worked in a reckless manner; that the ore is stoped from large masses without sufficient precaution being taken in the way of supporting the ground, to insure the safety of the men, and that, as a result, the ground is settling. This condition of affairs, if it exists, is in itself sufficient cause for refusal to work. It is also claimed that the accommodations are insufficient and squalid and that the food provided by the company is of inferior quality.

A FEW WEEKS AGO every one interested in affairs commercial and political in the Transvaal looked forward to the meeting of President Kruger and the British Commissioner, Sir Alfred Milner, with much hope for an improvement in existing conditions. These gentlemen met, but contrary to the hope entertained by many, failed to arrive at a satisfactory solution of the problems presented. It now looks as though the difficulties are multiplying instead of otherwise. The Uitlanders demand equal political rights with the Boers, and also numerous "reforms" in matters relating to mines. Thus far the Boers have declined to meet these demands.

A FURTHER ADVANCE in the price of silver is predicted by some who are looked upon as authority. The reasons given for this happy anticipation is largely increased use in the arts and manufactures due to low prices of silver, and the greatly extended use of the metal as a circulating medium in Oriental countries now about being opened up, particularly in China.

THE latest in the world of practical science is the effort of Prof. Dewar of London to cast steel in a vacuum, by which means it is thought gas bubbles and blow holes, so detrimental to steel, will be avoided.

Concentrates.

A LEAD and zinc mine is being opened at Bristol, New Hampshire.

LOCATION certificates when placed on record do not require stamps.

A PLACER LOCATION may be made in contiguous tracts of ten acres each.

COPPER and silver ores occur in quartz porphyry in the Lava Beds district of San Bernardino county, Cal.

THE Ontario vein at Park City, Utah, is a vein in quartzite, from which $13,559,500 have been paid in dividends.

IN drifts the bottoms of which are soft and wet, sills should be placed to afford firm support to the posts of the drift sets.

LAND in California more valuable for limestone or marble than for agricultural purposes may be located under the mining laws.

LANDS lying between high and low tides belong to the State, and placer claims located thereon cannot be sold by the United States.

THE slow backward movement of abrupt rock faces due to weathering has been called the recession of cliffs, a very appropriate name.

THE slates of the Mariposa beds of the California gold belt are proven to be of Cretaceous by the appearance of casts of the fossil aucella.

SEDIMENTARY STRATA to a depth of 11,000 feet have been removed by erosion in some portions of the Grand Canyon region in southern Utah.

MICA of merchantable character is found in several localities near Custer City in South Dakota. The mineral occurs in coarse granitic veins.

A SURVEY of a mining claim made before the date of recording the location of the claim cannot be regarded as the official survey contemplated by law.

IT is not necessary that the "discovery shaft" should contain mineral or ore. If mineral in place is found on any portion of the claim, it is all that the law requires.

MINERS can survey their own claims with considerable accuracy by using a common open-sight compass provided with sights and by taking care in making measurements.

WHEN estimating the $500 worth of work necessary to secure patent, any work done by former owners who had abandoned their claim cannot be considered as part of the expenditure.

WHEN making application for a patent to placer ground care should be taken to determine the exact classification of the land, and the clearest evidence possible should be presented.

QUICKSILVER is obtained on the Pacific coast from four minerals—cinnabar, metacinnabarite, native quicksilver and tiemannite (mercuric selenide). This latter occurs in Piute county, Utah.

THE development of a mine is exploration. The stoping and working of a mine after it is developed is exploitation. A good maxim in mining is keep exploration well in advance of exploitation.

A NORMAL FAULT is one in which the hanging wall has sunk relatively to the foot wall, and a reverse or thrust fault is one in which the hanging wall side has moved upward relatively to the foot wall.

A MINING CLAIM is not subject to relocation by other parties until an abandonment by the original locators is established. Non-compliance with the laws, federal and local, constitutes an abandonment.

IT has been asserted that all pyrite contains gold in some amount, but careful tests have been made by some of the most expert chemists of the United States Geological Survey and pyrite frequently found which showed no trace of gold.

IN the early stage of development of a quartz mine it is often impossible to tell whether or not the ground is more valuable for mineral or agricultural purposes. A vein small and low-grade upon the surface may develop into a very valuable mine in depth. Several such instances are of record in California.

THE zone of oxidation in the copper mines of Butte, Montana, ends very abruptly, usually, the oxides and carbonates giving place within a few inches to ores of the normal sulphide type. In the Homestake mines of South Dakota, sulphide ores are found on every level below the 100, but oxidized ore is found as low as the 400 level.

AN anticlinal fold is one in which the strata dip in both directions from the crest of a fold. A synclinal fold is one in which the strata dip toward each other from opposite directions. A quaquaversal fold is one in which the strata dip away in all directions from the crest of an uplift. A monoclinal fold is one dipping in one direction only.

A SIMPLE fissure vein is one having well defined walls, a nearly straight or slightly curving strike and dip. Pieces of the country rock are often included, as though they had fallen into an open crevice. Such a vein as this not infrequently has a banded structure. This is the type of vein frequently figured in textbooks but not often seen in nature.

WHEN using hanging bolts in shafts, use only large sized iron washers. There is no economy in small washers. A 4 or 5-inch washer is far better than one 2½ inches in diameter, for should any downward pressure exert itself the small washers will sink into the plates and there is sure to be a subsidence in the shaft sets. Large washers will obviate this to a great extent.

CHLORIDE OF SILVER is soluble in a solution of hyposulphite of soda, from which the silver may be precipitated in the form of black sulphide of silver by the introduction of sodium or calcium sulphide. These reactions are the basis for the lixiviation process of working silver ores. When ores are not naturally in the state of chloride, they are chloridized in a furnace and the roasted ore leached.

OVER 5,000,000,000 gallons of petroleum are now produced annually in the world. Of this amount 2,500,000,000 are produced in the United States, 2,250,000,000 in Russia, and the remainder is distributed among a dozen countries, Austria 87,000,000, Sumatra 72,000,000, Java 30,000,000, Canada 29,000,000, Roumania 24,000,000, India 15,000,000, Japan 8,000,000, Germany 7,000,000, Peru 3,000,000, and Italy about 1,000,000 gallons.

IN the Manzanita mine on Sulphur creek, in Colusa county, Cal., cinnabar occurs associated with gold. With these minerals are pyrite, and marcasite, chalcopyrite, stibnite, calcite and quartz. The gold is often visible in groups of feathery crystals sometimes in contact with cinnabar and sometimes deposited on the calcite, which is usually more abundant in the ore than quartz. A large amount of native sulphur occurs in the mine.

THE spectroscope is employed to determine the elements in any body when heated to an incandescent state. Distant stars—not planets, but burning suns like that of the solar system, show the lines in the spectrum characteristic of many elements familiar to chemistry. The moon's rays produce none of these characteristic lines on the spectrum, hence it is impossible to say what elements exist in the moon, but the elements of some fixed stars are, according to the spectroscope, singularly like the earth.

EARTHQUAKES are supposed to be due to the readjustment of the earth's surface or crust enveloping the heated interior, which is believed to be slowly cooling. The unequal contraction due to this causes the seismic disturbances. A period of repeated earthquakes is often, if not always, followed by a more or less violent eruption of some volcano. Whether there is a direct connection between the earthquakes and the volcanic outburst, or whether it is only a coincidence, can only be surmised.

WHERE shafts are sunk through ground which is not solid enough to afford good support to the timbers by wedging, reachers should be put in every 30 to 50 feet. These are let into the walls, the ends resting on hitches cut deep enough to hold, and the timber firmly wedged. The plates of the shafts rest on these reachers at intervals and they support the weight of the several sets above as far as the next reacher, or at least such weight as there may be. This keeps the shaft sets firmly in place, and there is little danger of collapse.

THE swelling of rock in mines is due to various causes, among them being a molecular enlargement of the constituents of the rock mass upon being exposed to the atmosphere. In some cases very soft rock is forced into the workings by pressure from the surrounding rocks. The pressure exerted by swelling ground is almost irresistible, and cannot be held by timbers without relieving the ground. It is cheaper in the end to sink the shaft of a mine in the hard rock of the foot or hanging wall rather than in the soft crevice of a vein, the walls of which are swelling ground.

WHEN shafts are sunk in rocks firm enough to stand without timbering the shaft may be divided into two or more compartments by means of heavy timbers placed vertically above each other at stated distances, these timbers reaching from wall to wall of the shaft. To these may be secured the guides in vertical or steeply inclined shafts. In some inclined shafts even these dividing timbers are dispensed with, only plates being put in on the footwall side to carry the runway for skips or buckets, ladders, etc., and only such dividers as are necessary to support air, steam and water pipes.

NOT infrequently one reads of and hears of dykes of quartzite. Quartzite is a metamorphic sand rock formed by an infiltration of some cementing material, such as iron, carbonate of lime, or silica, usually the latter, and in many if not all cases where silica is the cementing material, a secondary enlargement of the individual grains of sand making up the rock mass has occurred, each grain taking on a normal crystalline form. The envelopes of silica which surround the grains coming in contact with each other fill all the interstitial spaces and form a firm, solid rock, so it will be seen that quartzite is in no sense a dyke rock. These beds of quartzite are sometimes also called reefs, which is a more appropriate term.

ON what grade must a flume be built for it to discharge a given quantity of water in a given time? Divide the number of cubic feet of discharge wanted by the area of the section of the flume in square feet. This will give the necessary velocity. Multiply this result by itself and multiply the product by the wet perimeter, in feet, of the flume and multiply the product by decimal .0001114. Divide the product by the area of the section of the flume, expressed in square feet. Call this A. Multiply the velocity in feet per second by the wet perimeter, in feet, and multiply the product by decimal .00002426. Divide the product by the area of the section of the flume, in square feet. Call this B. Add A and B. The result will be the grade expressed in decimals of a foot.

A VERY small amount of iron has been manufactured on the Pacific coast, at Clipper Gap, Placer county. In 1891 furnaces were erected at Roseville near the mouth of San Diego bay for the manufacture of iron direct from ore by the Eames process, but further than the construction of furnaces of the reverberatory type the proposition did not go. By this process the ore was to have been ground to pulp, mixed with retarded coke (coke which has been dipped in clay water and dried) and spread on the hearth of the furnace. Petroleum under blast was to to have been utilized for fuel. The process seemed reasonable, and was in actual use in Pennsylvania, where it is known as the Carbon Iron Company's process, where natural gas was the fuel used, about 30,000 cubic feet of gas being consumed in making a ton of iron.

THE determination of rocks is made in two ways—by chemical analysis and by means of the examination of thin slices of the rock under a microscope. The latter method possesses many advantages, as it shows not only each mineral composing the rock mass, but it also shows the structure and the relations which the rock constituents bear to each other. Internal strains and movements of the grains or crystals composing the rock can be detected as well as alterations from one mineral to another, as the alteration of augite to green hornblende (uralite) and the further alteration of the uralite to chlorite and alteration of the latter to epidote. Each of these minerals may sometimes be observed in a single rock section grouped about a central crystal of augite, showing clearly the transition of one mineral to another, giving information which would be wholly lost by chemical analysis. The use of the polarization microscope, more than anything else, has thrown light upon the alteration of massive eruptive rocks to schistose and slaty condition.

IT is generally conceded by the highest authority that the existence of open spaces are necessary for the formation of ore deposits of any kind. These open spaces may be extremely minute, interstitial openings in fractured, crushed rock mass, or they may be of considerable size in a coarse breccia. The ore may have been deposited in these open spaces between the pieces of the fractured rock mass or in the small cavities between the grains of porous rock, as sandstone. Some ore deposits undoubtedly have been formed by replacement—that is, as the mineral-bearing solutions passed through the rock, atoms of the rock mass were dissolved and carried away in solution, being replaced by atoms of the sulphide minerals now constituting the ore deposit. Bodies of lead, iron and zinc sulphides in limestone are typical of this method of formation, while deposits in sandstone are well illustrated in many California quicksilver mines. There is nothing to support the belief that the spaces now occupied by large ore deposits were at one time open caverns.

CONCERNING the location and recording of mining claims, the United States law says: "The miners of each district may make regulations not in conflict with the laws of the United States, or with the laws of the State or Territory in which the district is situated, governing the location, manner of recording, amount of work necessary to hold possession of a mining claim, subject to the following requirements: The location must be distinctly marked on the ground, so that its boundaries can be readily traced. All records of mining claims hereafter made (May 10, '72) shall contain the name or names of the locators, the date of location, and such a description of the claim or claims located by reference to some natural object or permanent monument as will identify the claim, etc." It will be noticed by the foregoing that miners may organize districts and may also determine the manner of recording. This, without doubt, contemplates the election of a local district recorder, and any record of location properly made with him in accordance with the United States statutes would be perfectly legal. The language of the Civil Code of California, Section 1159—"notice of location may be made with the county recorder," etc., does not make it compulsory. A safe plan would be to record a location with both the district recorder and the county recorder. The county records are usually kept in a safe place where they are not likely to be destroyed by fire or otherwise, while in many cases those of the district are exposed to danger of destruction. If a mining claim is worth anything it is worth recording in such a manner as to insure the validity of title.

WHERE a tunnel is located, under the tunnel right law, for the purpose of the development of a vein or lode, or for the discovery of veins, the owners of such tunnel shall have the right of possession of all veins or lodes within 3000 feet from the mouth of said tunnel on the line thereof, not previously known to exist, discovered in such tunnel, to the same extent as though discovered on the surface; and locations on the line of such tunnel of veins or lodes, not appearing on the surface, made by other parties after the commencement of such tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid. But failure to prosecute the work on the tunnel for six months shall be considered as an abandonment of the right to all undiscovered veins on the line of such tunnel. A vein discovered in such tunnel not previously located on the surface may be located by the owner of the tunnel, who may take 1500 feet along the line of the discovered vein. When such discovery is made a location notice should be posted on the surface, giving notice of such appropriation and marking it by posts or monuments. This notice should be recorded. The discoverer should raise from his tunnel or sink a shaft and determine the apex of the vein on the surface, and the surface ground included in the location, as in a location made on a surface discovery. This is in accordance with the views of the land commissioner, but the Supreme Court of Colorado held that a notice posted at the mouth of the tunnel, stating at what distance from the mouth of the tunnel the vein was discovered and the number feet on each side of the center of the tunnel claimed, was sufficient.

SHAFT TIMBERS may be cheaply and quickly framed by use of templates, which make all framing uniform. Of the several systems or methods of framing shaft timbers at the corners, the overlap joint is simple and easily made. This method is employed in vertical shafts only and is framed by cutting out one-half the thickness each of the wall plate and end plate to a width equaling the width of the timber. The upper half of the wall plate is cut out and the lower half of the end plate is removed. The wall plates are first placed in position as nearly as may be, being swung on hanging bolts. When both timbers are on the bolts, a gauge is slipped in at each end, by means of which the timbers are adjusted at the proper distance from each other, when they may be secured in that position by tacking a piece of lagging on top of the plates near each end. The end plates are then dropped in and the set wedged to place, which is determined by a plumb line in each corner, suspended from sets above which are known to be in line. The lines should take in not less than three sets in height. If four lines are not used, the sets are likely to be wedged out of line. Lining up sets is a particular job requiring care, patience and good judgment. It pays to do shaft work well, and good enough is only good enough when it can be no better. A slight departure from the true line is scarcely noticeable at first; but, as set after set is put in place with equal carelessness, it soon develops a shaft which is not a credit to anyone. In inclined shafts a dovetailed notch is cut near each end of the wall plates and a corresponding tenon cut on the end plate. The timbers are placed in the same manner as explained above. Timbers framed in this way may also be used in vertical shafts. This latter method requires less timber. Where absolute rigidity is required in shaft sets, it is good practice to put posts at each corner, and in large shafts also at the center, or opposite the dividers. When the shaft is being lagged have the post of the same size as the plates, or, at least, one dimension of the same size. If 10x12-inch plates are used, they should be put in with the 12-inch face upward. The posts should be 8 or 10 by 12, the outside faces being placed flush with the outside of the plates. This will make the posts line up with the lagging, and no lagging need be put behind the posts. The amount of timber required is less, and the saving in time in putting in is an item of even greater importance.

Cyaniding Slimy Ores and Tailings.

Written for the MINING AND SCIENTIC PRESS by MATT. W. ALDERSON.

Part III.—Decantation.

When agitation has ceased, the vat is allowed to stand and the charge settles. By glass tubes, ½-inch in diameter and from 2 to 5 feet in length, the depth of the clear fluid can be easily ascertained. In one or two hours, when material is not very slimy, decantation may be commenced. Fig. 5 gives a good illustration of how this is done. Three-inch augur holes are bored in the sides of the vat, and these are fitted with plugs which are flush with the inside of the staves, so there will be no lodging places for slimes. As there is always more or less grass and rubbish with tailings treated, and these rise to the top of the agitator, a stick is laid across on top of the fluid near the edge of the vat, where the solution is to be drawn off, and before the first plug is pulled. This prevents other than the clear fluid flowing out, and also provides a clear spot at the side, so that when the decantation is near its close one can tell how near he is to the slimes. By proper arrangement of the holes and care in decanting, one can draw the fluid down until not more than half an inch of clear solution will remain in the vat.

FIG. 5.—DECANTING THE GOLD SOLUTION.

It is important to map out intelligently what one expects to accomplish in a decantation scheme. In other words, the proportion of fluid decanted determines in a measure the extraction. I have known persons to make two decantations of about 40% of the fluid contents of a vat and wonder why their tailings ran high and they were not able to make a good extraction. To make the matter plain, let us suppose we are treating an ore from which we are able to secure an extraction of $10. We have used one ton of solution to one ton of ore. Each ton of solution, therefore, will carry $10 in gold. We make a decantation of 40% of the total fluid in the vat. We have thus secured $4 and left $6. We make another decantation of 40%, taking out $2.40 and leaving $3 60. This latter amount goes out with the tailings, when most of it could have been saved. Suppose, again, our quantity of fluid had been regulated so that we could make decantations of 80%. In the first decantation we would take out $8, leaving $2. In the second decantation we would draw out $1.60 and leave 40 cents to pass out with the tailings. It will be apparent that one would save more money by making but one large decantation than by making three of 40% each.

On most material it will be found of advantage to use two washes, after the first or strong solution, to leave as little cyanide and gold as possible in the charge under treatment. Decantations of the solutions may run from 50% to 70%, but it should be remembered that when they are less than 50% one is leaving a percentage against himself. In the light of the above explanation, it will be seen that it will pay to take time to get a good percentage of the fluid at the first decantation, and that, on the contrary, the waiting of a number of hours for an extra inch or two on the decantation of the final wash may not be justified by what there is in it.

The speeding of a vat comes from so arranging matters that there will be no dragging in the decantations. If, during agitation, the surface of the contents of a vat presents a uniform appearance, the material has not been properly coagulated. The charge will settle if given time, but many hours' time will be needlessly wasted. With a small plant on low-grade tailings, this may mean a loss or a small margin of profit, when, by speeding the vat, the capacity of the plant could be practically doubled, with no additional cost for labor in running the mill, thus making the enterprise profitable. The surface of the vat at the close of agitation should present a mottled appearance, with alternating areas of clear fluid and organic matter. The practiced eye will detact a glassy appearance on the surface, if all is right, and the slimes will commence to go down before the fluid is at rest. Without this appearance and prompt action, it may safely be concluded that an insufficient quantity of lime has been used. The remedy is apparent. The use of other coagulants, such as soft soap, alum, soda, etc., has not been encouraging. Lime is the most effective as well as the most economical. The proper amount should be used at the beginning, as it is hard to successfully "doctor" a vat that does not go down as it should.

The skilled workman can devote his time to other matters while a vat is settling, knowing that he can decant very rapidly when the vat is ready by pulling a number of plugs at a time, as shown in illustration (Fig. 5).

When the final decantation has been completed, the plugs are replaced, the agitator is set in motion, thoroughly stirring up the contents of the vat, and then a plug, about 3x6 inches, at the lower end of the vat is drawn, allowing the tailings to pass out through tailings launder to such place as may be provided for them. The contents of the vat are thus discharged at the rate of about a ton a minute. The average time required for treating a vat, when making these decantations, is thirty hours.

The solutions decanted from the agitator pass to a gold vat. In this is a floating intake, consisting of a piece of rubber hose with outlet on lower edge of the vat through a faucet. The other end is attached to a float which rides the top of the fluid. To this is attached a screen to keep any rubbish from entering the extractor through the tube. The solution thus passes under uniform pressure to the zinc boxes, and such fluid as is drawn off is from the top and is therefore clearest of slimes and other impurities. In the earlier work the gold solution entered the extractor from a vat in which was a filter bottom covered with several inches of sand. This would work well for a time, but the accumulation of half an inch of slimes on top of the filter would effectually prevent percolation of the fluid, and the filter was abandoned for the simple expedient above described.

(To be Continued.)

THE discovery of large deposits of bauxite, which consists principally of alumina, in New South Wales, is of great scientific interest. Previously the mineral in question had been chiefly regarded as iron ore from the point of view of its iron contents. It now appears that it contains more oxide of aluminum than oxide of iron. Whether, however, the manufacture of aluminum on a large scale is likely to be immediately proceeded with is another matter. There has never been any difficulty in obtaining ample supplies of bauxite, which is of little more value in itself than limestone or pipeclay. The trouble is in the limited demand for aluminum itself, and the great cost of its manufacture. Demand is increasing, and the expense of production has been notably reduced of late years, and may still be made considerably smaller. Immense advance, however, will have to be made in these directions before the demand for bauxite begins to be in any way commensurate with the available supply.—Melbourne Standard.

Notes on Mine Sampling.

Written for the MINING AND SCIENTIFIC by GEO. J. BANCROFT.

Sampling a mine is simply a practical application of the doctrine of averages. A number of samples are taken on a vein, the average of which in width and value should represent the average width and value of the vein. The sole object of the engineer is to take such samples in such a manner that the assays of the different samples will form the basis of a correct estimate on the value of the mine.

The day of the expert who walks through a mine with a monocle in his eye, a compass in his hand and comes out and says in an impressive manner, "Gentlemen, this mine is worth so many thousands, so many hundreds, so many dollars and so many cents," is past. His day belonged to the golden past when all mining was considered a grand gamble. Modern science has taken mining from among the speculative ventures and placed it in the front rank of conservative industries. Engineers are recognizing more and more that it is almost criminal to recommend the expenditure of large sums of money on mining property without the most careful and painstaking investigation of all available information bearing on the value of the mine. With careful and intelligent engineering, mining ceases to be a gamble and becomes an industry in which the profits are as sure as in many other branches of industry, and are far greater in proportion to the capital invested.

There are several ways of sampling a mine. Some mines offer special facilities for treating large samples. The ore may be stripped for 6 or 8 inches deep over a section of the vein and the whole lot treated in the reduction works. This is very desirable if it is known just how much of the vein is ore, and if the expenses and time necessary are not prohibitive.

By far the most common method, and withal the most satisfactory, is the taking of comparatively small samples with a hammer and moil and sending each sample to a reliable assayer.

On page 633 are two illustrations showing the writer and assistant in the act of taking samples in this manner in the Independence mine at Cripple Creek.

The values in a vein are very apt to lie in strata parallel to the walls of the vein. Hence a sample should be taken across the vein, being careful to take an amount from each stratum proportional to its width.

The ideal sample would be taken just as a cheese sampler samples cheese. Of course, a vein of hard rock cannot be sampled in practice as one can sample a cheese, but if care is taken the sample will be sufficiently accurate for all practical purposes.

The important thing in sampling is to take the ore exactly as it is mined. There is always a tendency to take more of the soft than the hard. This is, of course, to be avoided, for the soft stuff generally runs higher, but sometimes lower, than the hard. In several camps, notably Cripple Creek and Kalgoorlie, W. A., "screenings" will pay to ship when the coarse rock is worthless. So the hard places in a vein must be patiently chipped off until the required amount is secured.

In regard to the width of the ore, a good deal of reliance has to be placed on the management of the mine, but an experienced engineer will often discover things about a mine of which the management is ignorant. I recall a mine in Cripple Creek which had been stoped for a width of 15 feet. The sampling proved that all the values were in about 2 feet of the 15, and that the rest was so low grade that it was inadvisable to take it out.

Veins that have ill-defined walls should be sampled into the walls a little way, for some of the wall rock is almost inevitably broken with the ore in mining. It is well to have a shot put into each wall every now and then, if the management has neglected it. A large ore body was discovered by the reporting engineer in a mine in the San Juan, Colo., by this simple precaution. The amount of ore to be taken per foot of width varies with the vein. In Bendigo, Australia, it is necessary to take about 10 pounds per foot of width, because the gold occurs in coarse particles and a small sample would be untrustworthy. Where the values are in fine particles and evenly distributed through the ore a small sample is as good as a large one. About 2 pounds per foot is enough in this case. Such veins as those of Gilpin county, Colo., or some of the veins on the mother lode of California may be sampled in this way. Where the values are coarser, or the vein "pockety," large samples should be taken.

The intervals at which samples should be taken vary, also, with the conditions. If an extremely accurate estimate is desired, as for a cash sale, and the vein is high grade, samples should be taken every 3 feet. In other cases 5 or even 10 feet will do. Between these limits the circumstances of the particular case must mould the procedure.

Samples should be taken on every exposed face of an ore body.

It should be borne in mind that it is customary for

miners to sink a winze or put an upraise in the richest part of an ore body. If this is found to have been done, the rich ore next the winze should be figured separately.

No part of the mine should remain unexplored. In an examination of a mine in Boulder county, Colo., a certain hole on the third level was regarded as a sump. In reality it was a winze connecting with an underhand stope from which $30,000 of ore had been removed, and the estimate of ore in sight was consequently very much too high. Of course, the most extreme caution must be taken throughout the entire examination to avoid the possibility of "salting," for, even if the owners are honest, one can never tell what influences may have been at work among the employes of the mine.

Each sample should be assayed separately and the result plotted on a map of the mine. In this way the size, strike and general habit of the ore shoots may be determined. In many cases the information gained in this way is of the greatest importance, and in every case there are sure to be facts enough developed to pay for the trouble.

The surroundings in general and the neighboring mines in particular should be carefully looked into for information bearing on the mine under examination. The possibilities of lawsuits should be carefully considered. It is not pleasant to look back upon a report which recommended the purchase of a lawsuit, no matter how good the showing was.

Once in a while the structure of the district will have a most important bearing on the value of a mine, as, for instance, the "contact" of Cripple Creek, the "indicators" of Ballarat, the "bluestone" of Kalgoorlie or the "great fault" of Cornwall.

The figuring out of the value of a block of ore from the data of the samples is a simple problem, but one that is often done wrongly. If a certain number of samples are taken on a block of ore the common method is to average the values and average the widths. This is obviously wrong, for two variables related as the values and widths of a number of samples cannot be averaged independently of each other and a correct result obtained; but this fact is often overlooked.

My attention was first called to the matter by T. A. Rickard of Colorado, and together we developed a method which we christened the foot-ounce method. Many engineers use the same or a similar method, but so far as I know a description of it has never been printed. In this method the value in ounces of each sample on a given block is multiplied by its width in feet, giving a product which we call foot-ounces. The sum of all the values in foot-ounces is then taken and the sum of all the widths in feet. Both sums are divided by the number of samples, giving the average value in foot-ounces and the average width in feet. The average value in foot-ounces is divided by the average width in feet, giving the average value in ounces. An example will illustrate. Let us consider three samples taken along a drift equal distances apart, as follows: (1) Twelve feet of ore averaging 1 ounce per ton; (2) 1 foot of ore averaging 12 ounces per ton; (3) 6 feet of ore averaging 3 ounces per ton. By the ordinary method we have an average width of $\frac{19}{3} = 6\frac{1}{3}$ feet, and an average value of $\frac{19}{3} = 5\frac{1}{3}$ ounces per ton. This is obviously wrong, as the bulk of the ore is only 1-ounce ore. By the foot-ounce method

12 feet	× 1 ounce	= 12 foot-ounces.
1 foot	× 12 ounces	= 12 foot-ounces.
6 feet	× 3 ounces	= 18 foot-ounces.
19		42

$\frac{19}{3} = 6\frac{1}{3}$ feet = average width in feet.

$\frac{42}{3} = 14$ foot-ounces = average value in foot-ounces.

$\frac{14}{6\frac{1}{3}} = 2.210526+$ = average value in ounces.

By the foot-ounce method, then, we have an average width of $6\frac{1}{3}$ feet and an average value of 2.21 + ounces per ton; by the ordinary method, $6\frac{1}{3}$ feet and $5\frac{1}{3}$ ounces per ton. This is an extreme case, but it serves to illustrate the error which may be made by figuring ore bodies in the ordinary way.

That this method is correct may be seen in the following way: Let us consider the block 30 feet long and 20 feet high, and let each sample represent a sub-block 10 feet long by 20 feet high by the width of the vein at the point where the sample was taken. Let us further suppose the mine is a gold mine, that gold is worth $20 per ounce, and that the ore is of such specific gravity that 15 cubic feet weigh one ton. Then sub-block 1 contains 160 tons of 1-ounce ore, having a total value of $3200; sub-block 2 contains $13\frac{1}{3}$ tons of 12-ounce ore, having a total value $3200; sub-block 3 contains 80 tons of 3-ounce ore, having a total value of $4800. Adding the totals, we find that the whole block contains $253\frac{1}{3}$ tons, having a total value of $11,200. By the foot-ounce method, $\frac{6\frac{1}{3} \times 30 \times 20}{15} = 253\frac{1}{3}$ tons, checking the above; $253\frac{1}{3}$ tons × 2.210526 ounces × $20 = $11,200, also checking the above.

Methods of Testing and Sampling Placer Deposits.*

By EDMUND B. KIRBY.

Every engineer who has had to do with placer work realizes how difficult it is to ascertain, even approximately, the average gold contents of gravel.

The problem presented often comprises gravel beds measured by hundreds of acres, or by miles of gulch bottom. The quantities which it is possible to use for actual tests, whether measured by panfuls or by thousands of cubic yards, are but a minute fraction of the great bulk. Moreover, the distribution of gold in this mass is irregular and uncertain to an extreme. From the nature of the deposit only small portions of it, at best, can be rich enough for pay. These local enrichments are due to the concentrating action of the stream at intervals during its long history. They are therefore subject to all the irregularities which might be expected from its ceaseless shifting, and the changes in the material deposited.

Notwithstanding these difficulties a business decision is called for, and it is always necessary to reach a sound conclusion without spending more time and money than the circumstances warrant. In most cases, therefore, it is best, if possible, to carry on the work by successive steps. If the general evidence examined proves satisfactory, it affords a basis for proceeding to the more simple and inexpensive tests. Encouragement from these will warrant more costly test workings, and the latter may be followed by the heavy and decisive work which is to settle the question at issue.

The Structure of Gravel Deposits.—In most cases presented throughout the West, the gold-bearing gravels are deposits from the present system of streams, and their form and position have probably been developed during the Quaternary period. The high gravels of the California ancient river system are of earlier date and form a class by themselves. As compared with the more recent deposits they are limited in quantity, and differ radically in structure, character of the gravel, grades and methods of working.

Only the first-mentioned deposits are under consideration here. They may be conveniently classed as "high bars" (above water level) and "bottom gravel" (at and below water level). The high bars are remnants of beds which were deposited before the stream cut down its gulch or valley to the present depth. They were originally terraced, but have frequently been shifted or changed in external shape by erosion. They were the most accessible and easily worked deposits, and, generally speaking, are now very scarce.

The deep gravel filling the present gulch or valley bottoms below water level constitutes the principal bulk of the deposits now remaining in every placer district. As a rule, it is inaccessable without the aid of skilled engineering, modern appliances and the use of considerable capital. Of late years these deep deposits have attracted some attention. This is on account of their abundance, and because of the possibilities which may follow their development. The uncertainties and difficulties of such work are very great. It has been best developed by "river mining" in California, and in various districts of the Northwest. During the last few years modern heavy machinery for excavating, hoisting and conveying has been brought into use for this work. Many mistakes have been made in its application, and most attempts of this kind have so far been financial failures. Steady progress is being made in perfecting such apparatus, and there is without question a large field for its application to cases where the conditions are suitable.

It is clear that the climatic and other conditions under which a stream cut down its channel in the bedrock were different from those which prevailed while gravel beds were deposited in this channel. In the first case there was a large volume of water and probably steep grades. In the second case both waterflow and grade must be less, and this is the condition which now prevails in our western rivers and streams. The present grades are generally less than 2%, and the transporting action on large gravel, even in time of freshet, has almost ceased. The bedrock is now protected from erosion by a more or less heavy bed of gravel, over the surface of which the stream flows. In many cases the processes of erosion and deposition have alternated frequently, and this accords with what is known of climatic changes during the Quaternary period.

The gravel beds are made up of various streaks or layers, some of which may be gold bearing, while others are entirely barren. These layers have all the irregularities of stream deposited gravel. They are sometimes quite uniform in thickness and value over considerable areas, as though spread out by floods. In other cases they form crescent-like, overlapping streaks, varying greatly in gold contents, and indicating their deposition in side bars by the stream as it shifted its position. During the deposition of gold-bearing gravel, the light or scale gold is apt to be distributed very uniformly throughout the entire mass. The heavy gold, on the other hand, tends to concentrate out in special streaks or layers. It is a frequent occurrence to find rich layers on top of barren layers, and many facts indicate that, during the deposition of rich gravel, its gold contents do not work down through undisturbed gravel beneath. When pay gravel exists in a gulch, it is generally confined to a ribbon-like layer on or near the bedrock. It is not likely that this is the accumulation of gold which has sifted down from the overlying mass. On the contrary, there is every reason to believe that the bedrock channel for a long period acted like a sluice. As the transporting power of the stream gradually lessened, its gravel was alternately moved and then redeposited. This sluice action, with the repeated shifting and loosening of the first deposits, caused their gold to accumulate in the bottom layers.

This pay lead or bedrock channel is usually of limited width, and meanders along the gulch, marking in general the course and width of the stream at the time. There may be two or more of these channels, and they are not necessarily in the deepest part of the gulch. They may be found higher up, along its sides, as portions of earlier channels, made before the bedrock of the gulch was cut down to its present depth. In such a channel the distribution of gold is very irregular, but, on the whole, it seems to follow the rule so often observed, and is heaviest on the inner sides of bends. It is usually necessary to work the channel by a pit or open cut. It is a rare occurrence to find that the general mass of gravel filling the gulch will average enough for pay. The slope required for the sides of the excavation increases the proportion of this poor gravel, so that the pay lead must be rich enough to bring up the average to the pay point.

Evidence Available in Placer Examinations.—A determination of the average value of gravel is only one of the numerous questions, both business and technical, which arise in a placer examination. It is often unnecessary, because the business decision to be made may be settled by other considerations. Moreover, the books and records of an established placer enterprise will often supply the data necessary to estimate the value of the ground worked. The reliance to be placed upon such evidence is matter for special judgment in each case. Generally, actual tests must be made, and the evidence to be secured may be roughly outlined as follows:

I. General evidence derived from the history, records, facts shown by prior workings and neighboring mines, structure of the deposit, etc., etc.

II. Evidence from sampling gravel already exposed. Such exposures may be found in surface gravel, natural banks and gullies, or prior workings.

III. Evidence from special test workings made for the purpose. These may include shafts down to water level, and such work may be made light or heavy as warranted by the circumstances and the facts developed during its progress.

IV. Evidence from heavy and decisive test workings. In high bars this may merely include a more extensive system of test shafts and drifts in the dry gravel, but in the water-bearing bottom gravel such work is very difficult and expensive. This should not be a serious objection, in view of the heavy investment which will be necessary to open and work a deposit of this character. The very existence of a pay channel, to say nothing of its grade, is uncertain. To risk a large investment on mere chance, without first feeling the way by such preliminary work, is not a course that will appeal to sound business judgment.

On account of the expense of testing gravel, it is impossible to cover a large territory. In practice, all that can be done usually is to select the most promising and workable locality, and decide the question at issue by the value of this portion. The test workings should be so arranged as to define the shape and limits of the pay ground. In a large area or a thick mass, there is no better system than a number of shafts. A channel may be exposed by a crosscut drift from a shaft, and a few cross sections of this kind at different points should give a fair idea of what may be expected from it. Bottom gravel may be 500 to 1500 feet wide, and the main difficulty at first is to locate the position of the bedrock channel. It will generally be best to secure some evidence on this point before starting a shaft. There is no better way of obtaining this than by a line of drop drill holes which will give an approximate cross profile of the bedrock, and will also give some evidence as to the presence of gold and the character of the gravel.

The units of measurement used for placer gravel vary according to the shape of the workable ground. In a thick mass it is the cubic yard. In a thin sheet, with the values on the bedrock, it is customary to use a unit of area such as the claim or the acre. For a channel, a unit of length is preferred, giving the yield per 100 or 1000 feet of length. The extreme irregularities of the deposit are always to be kept in mind, and figures of measurement (like those of value) are to be used with caution. In averaging the results of tests, each should be given a value proportioned to the volume of gravel which it is supposed to represent.

(To be Continued.)

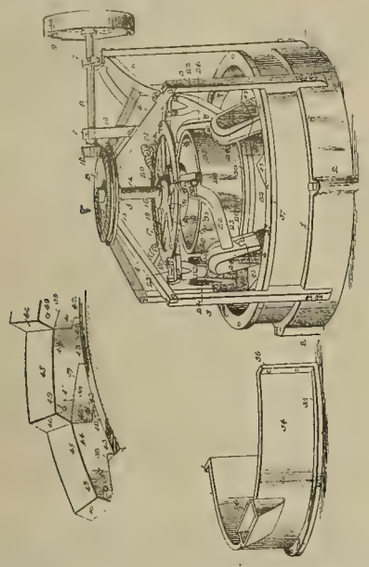
* Read before Colorado Scientific Society.

Latest Mining and Metallurgical Patents.

Patents Issued June 6, 1899.

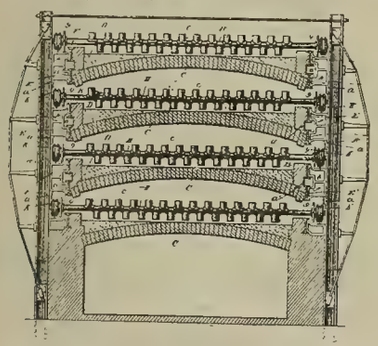
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ORE CRUSHER.—No. 626,326; J. F. Keyton, Baker City, Or.



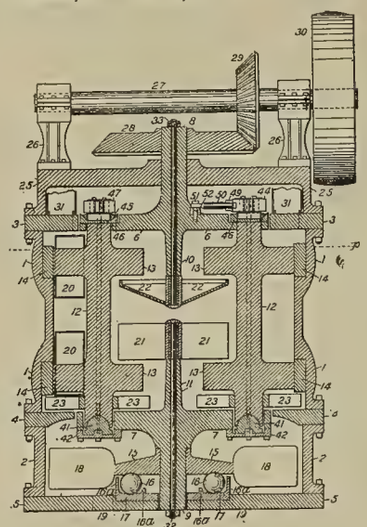
An ore crusher, the combination of a drag wheel involving a hub provided with slots, arms fitted into slots, an annular band or brace attached to arms, the arms being bent or deflected outside the brace, drag arms jointed to deflected projections, and stamps or mullers; the mortar having enlargements with recesses between them to form seats, and a groove at lower portion of one end of each recess, and dies removably fitted over the enlargement and having an under contour corresponding thereto and the recesses between same, and also provided with tenons to engage the grooves.

HEATING OR ROASTING FURNACE.—No. 626,632; W. E. Roberts, Butte, Mont.



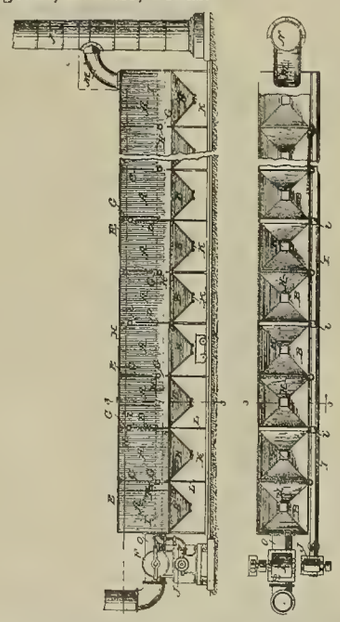
A calcining furnace comprising a series of vertical or upright posts between the ends of the furnace and at suitable localities to insure the strength of the structure, brackets carried by posts, longitudinal I-beams carried by the inner ends of brackets, and distant from posts, an arch of masonry carried by the I-beams, side walls and hearth carried by suitable supports, longitudinal continuous slots through the side walls, and extending from end to end thereof and past the vertical posts, and means for closing longitudinal slots when desired, substantially as described; a series of sets of arches, hearths and side walls of masonry carried by the longitudinal I-beams, each set of arches, hearths and side walls separated from the next adjacent set by longitudinal slots extending laterally from the heating chamber and into the open space between the side walls and the vertically arranged posts, whereby the entire masonry of the furnace may be carried by supports lateral to the side walls and heating chambers and access be had to the heating chambers from one end to the other; furnace composed of a series of ovens or heating chambers one above another, the combination with vertical supports ranged alongside the walls, of horizontal longitudinally disposed beams supporting the roof or arch of one oven, the floor of the next above and the side walls, and brackets carried by the vertical beams and engaging and supporting the horizontal beams; separate longitudinal beams one above another of differing weight and strength, the lower and heavier supporting the roof or arch of one oven and the upper and lighter the floor of the next oven above, in combination with vertical beams or columns ranged along the side walls of the furnace and brackets carried by the vertical beams engaging and supporting the horizontal beams; longitudinal tracks on brackets, continuous longitudinal openings through both side walls and extending past the columns, a rake, the ends of the shaft of which project through the longitudinal openings of the walls of the heating chamber and supports for shaft ends outside the walls of the heating chamber, but within the columns, and resting on tracks for supporting and operating the rake.

CENTRIFUGAL PULVERIZING MILL.—No. 626,426; F. G. Johnson, New York, N. Y.



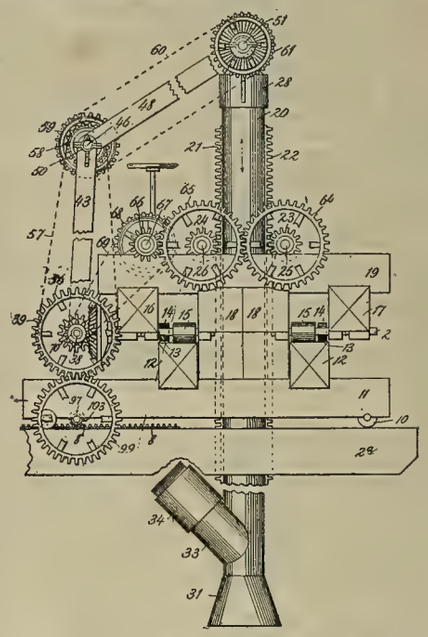
A centrifugal pulverizing mill, two or more vertical roller shafts, each of the same having two horizontal rollers, the upper and lower roller shafts holding headplates *6* and *7* rigidly held together by coupling bars, and each headplate having a central spindle shaft extending toward each other, the lower one of which having mounted thereon a series of radial fanblades, and the upper one of the spindle shafts having mounted thereon an upturned concave disk having vertical radiating partitions, in combination with an inclosing case having annular dies for the tread of the rollers; an upper inclosing case having annular dies for the tread of the said rollers and a lower case having within it an automatic blower mounted on the lower main shaft; the roller shafts having their horizontal support and propulsion in the direction of their circuit around the common center of motion by swivel connecting rods, the movable swivel ends of the rods being secured to the journal boxes of the roller shafts and the fixed ends thereof to the headplates, in combination with a surrounding case having annular dies for the tread of the roller; whereby the roller shafts are immovably held in a vertical position in the direction of their circuit around the common center of motion and yet are free to move and lean in a radial direction.

APPARATUS FOR CATCHING WASTE PRODUCTS FROM LEAD, SILVER OR OTHER SMELTERS.—No. 626,569; W. Sergeant, El Paso, Texas.



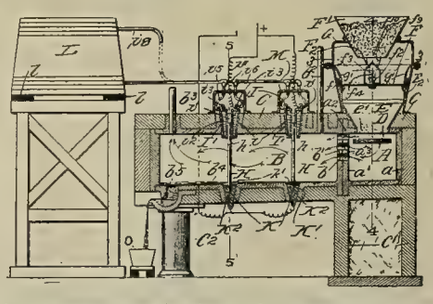
An apparatus for catching the waste product from smelters consisting of the trail or passage composed of settling chambers arranged in succession and having hopper-shaped bottom, baffle plates extending alternately up and down between settling chambers, the transverse air spray pipes extending adjacent to the free edges of the baffle plates, the exhaust fan for forcing the fumes and waste products through the trail or passage, the air main and fan for forcing the air through such main and connections between main and air spray pipes; longitudinally extended trail or passage for the fumes, transverse baffle plates alternately arranged therein and having narrow passages alongside their free edges and the transverse air spray pipes extending adjacent to the free edges of the baffle plates; standards whereby settling chambers are held in an elevated position, the alternately arranged baffle plates partially separating the chambers, the transverse air spray pipes located between the settling chambers and the main connected with pipes.

DREDGE FOR HARD OR SOFT MUD.—No. 626,491; J. T. Ford, Galveston, Tex.



A dredging machine, the combination with a support having an overhanging frame, of a main carriage movable on frame toward and away from the support, a supplemental carriage movable back and forth on the main carriage at an angle to the path of movement of the latter, a vertically movable suction pipe, transverse parallel bars on the supplemental carriage for supporting the suction pipe laterally, and a brake device supported by the bars for controlling the descent of the suction pipe; combination of a stationary support, the drive wheel (*85*) located thereon, a movable carriage for supporting the working parts, the shaft (*33*) mounted on the carriage and carrying the wheel (*96*), the idler arranged in fixed relation to the drivewheel, the movable gear (*91*), and drivechain (*92*), the shaft (*97*) supported by the carriage, and shiftable connection between shafts for reversing the movements of carriage; a vertically-adjustable suction pipe, a gear rack on the same, a pinion meshing with rack, and a brake on the shaft of the pinion to control the descent of the pipe.

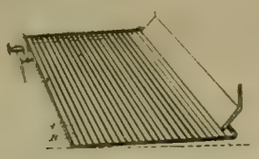
PROCESS OF REDUCING ALUMINUM FROM ITS COMPOUNDS.—No. 626,635; G. Schwahn, St. Louis, Mo.



As a process, subjecting a hot compound vapor containing aluminum to the action of a hot carbon-gas deoxidizer, in the presence of incandescent carbon, for an appreciable length of time, substantially excluding the air; as a process, passing a compound vapor containing aluminum through a chamber from which air is substantially excluded, and which contains incandescent carbon at two or more points between its ends, causing vapor to pass in the neighborhood of incandescent carbon repeatedly during its passage through chamber, subjecting vapor during its passage to the action of a hot carbon-gas deoxidizer for an appreciable length of time, and increasing the heat of vapor during its progress through chamber and while being acted upon by gas, until its temperature is not lower than that of carbon at a white heat; subjecting an aluminous vapor substantially free from silica, any alkali or any metal adapted to alloy aluminum, to the action of a carbon-gas deoxidizer and incandescent carbon substantially

free from silica, alkali or any metal adapted to alloy aluminum for an appreciable length of time, while substantially excluding the air.

CONCENTRATING BELT.—No. 626,461; G. Gates, Jackson, Cal.



An endless traveling belt having a regular general inclination so that pulp delivered at the upper end will flow toward the lower end; broad, flat tubular surfaces at the top of the belt with intervening offsets, each of surfaces declining toward the higher end of the belt and to the foot of the next offset, whereby extended surfaces are formed for the settling of sulphurets and to allow pulp to flow over the surface of the sulphurets thus deposited; an endless, longitudinally inclined belt composed of a series of wide, longitudinally disposed surfaces with shallow, vertical connecting offsets, drums around which the belt is movable, both drums so inclined from end to end that the belt surfaces have a slight downward inclination transversely from the lower toward the upper edge of the belt, and a means for supplying pulp and water along the upper edge of belt; belt having upturned flanges at its edges, drums around which the belt is movable, being inclined transversely of the belt, so as to produce a general flow of pulp from the upper side and end, while the belt surfaces decline from the lower end toward the upper side.

Some Rare Mineral Specimens.

The following recent additions have been made to the exhibit of the California State Mining Bureau in the Union Depot and Ferry House:

Strontianite (carbonate of strontium), Lassen Co., Cal., H. G. Staab; first occurrence of this mineral noted in California.

Crednerite (oxide of copper and manganese), H. C. Davey, Calistoga, Cal.; first occurrence of this mineral noted in California.

Silver ore (stalactite) assaying 140 ounces silver per ton, Esmeralda mine, near the San Marcos coal fields, Sonora, Mexico, Prof. E. T. Dumble.

Hydro-boracite (borate of lime and magnesia) containing 50% of boracic acid, Ventura Co., Cal., J. Ryan; first occurrence of this mineral noted in California.

Meteoric iron; cutting from the Roebourne meteor, found in N. W. Australia, beautifully etched by Prof. H. A. Ward.

Kermesite (oxysulphide of antimony), from near Mojave, Kern Co., Cal., H. E. Cunningham; first occurrence of this mineral noted in California.

Quicksilver ore from near Clayton, Contra Costa Co., Cal., Dr. Wm. Rider Powell.

Petrified wood from the stump of a tree in Humboldt county, the body of which was worked up into shingles, R. F. Herrick.

Gold quartz, Gold Bug mine, Josephine Co., Oregon, J. D. Ludwig.

Gold in chlorite, New South Wales.

Chrysocolla (silicate of copper), Copper World mine, Ivanpah, San Bernardino Co., Cal., Herbert Lang.

Cinnabar (concentrates from soft ore), Integral mine, Trinity Co., Cal., A. B. McCaw, M. E.

Gold quartz, showing free gold, from a ledge 4 to 5 feet wide near Colville, Mono Co., Cal., Martin H. Shields.

Gold and silver ores from Moore Hill mine, near Cathay, Mariposa Co., Cal., Walter Mayerhofer.

Antimony ore (stibnite), Metallic mine, twenty-four miles from Mojave, Kern Co., Cal., W. A. Johnson, per A. Blanc.

Hubnerite (tungstate of manganese), Runnelville, Cochise Co., Arizona, Prof. Wm. P. Blake.

Rich quicksilver ore, Bryan & Sisk mine, Clover creek, Shasta Co., Cal., J. M. Bryan.

A large number of gold quartz specimens from Calaveras, El Dorado and Placer counties.

Gold quartz, Golden Jubilee mine, Trinity Center, Trinity Co., Cal.; 460 pounds of this rock yielded $220.64 gold and silver.

H. S. DURDEN,
Curator.

A NOVEL method of saving gold from tailings, says the *South African Mining Journal*, consists in the employment of a funnel-shaped vessel, with the small end downwards, in which a quantity of water is placed, with a layer of kerosene on top of it. The tailings are put in from above, half a ton at a time, and the agitation of the fluids causes the separation of the gold, which, for some unexplained reason, takes up a position in suspension between the kerosene and the water. A. W. Howitt, late Secretary for Mines in Victoria, vouches for the correctness of the description, his son and a Mr. Godfrey being the patentees. H. C. Jenkins, A.R.S.M., and Mr. Meekinson, the metallurgist and engineer respectively of the Mines Department, have been instructed to investigate and report on this process.

Some Experiences of a Working Miner.

NUMBER XX.

Written for the MINING AND SCIENTIFIC PRESS.

The G—— G—— M—— Co. was a corporation and had an abundance of money, apparently, for speculative purposes, but there appeared to be a dearth of mining talent and a lack of common sense in the outfit. Evidently realizing the shortcomings of the concern, they employed at no small expense a certain Madame B——, whose specialty was divining the whereabouts of rich veins and deposits of gold and other ores, and on a pinch she could make a pretty good bluff at metallurgy and mechanical engineering.

After the company was organized and ready for business Madame took a hand and a large deposit of gravel on C—— creek was investigated; this was found to be very rich in gold, much to the surprise of those who lived in the neighborhood, who had never suspected that the gravel was gold bearing, but Madame went into a trance and, coming out of it alive, positively asserted that the spirit of a departed Indian chief, who had in life inhabited the section where the gravel was found, had told her there were great riches in the bank of gravel. The deposit lay 60 feet or more above the creek bottom and it was apparent the only economical way to work the deposit was by the hydraulic method. This necessitated a ditch. There was plenty of money and a ditch was built five miles in length, but in fear that there would not be sufficient water in this ditch, a second one was dug on the opposite side of the canyon. This was also about five miles long. The two ditches were finally completed and flumes arranged, several hundred feet of iron pipe laid and a full equipment for hydraulic mining put in, and at last the giants were turned on the gravel bank. Piping was kept up night and day for a week and then the water was shut off for a clean-up, to get an idea of how the thing was going. The clean-up showed several panfuls of fine, nicely washed iron rock, and a few hundred specks of gold—perhaps twenty cents in all. About this time Madame B—— had another spell and, as before, surviving it, declared that the chief had not been sufficiently plain in his description of the wealth on C—— creek. It was not in the gravel deposit at all, but in veins of silver-copper ore. A score of quartz locations were made, and open cuts, shallow shafts and tunnels were made, some of the latter nearly 100 feet in length. Not one of these developed anything. The Madame then denounced the chief as a deceiver and rousted out some other kind of a spirit who told her that on a certain hill near D—— there was a rich mine, but no one could treat the ore unless the secret were learned from the aforesaid spirit. The ground pointed out was located and considerable work done. The Madame managed in some manner to get big assays from any of the rock, but somehow the assayers who did a commercial business at D—— could not get anything out of this rich ore. The spirit came to the rescue, however, and told Madame how to build a mill to treat this peculiar ore, and the mill was actually built. It had a single steam stamp with a cylindrical screen. Below were half a dozen shallow pans, each about 8 inches in depth. There were settling vats, and roasters, pulverizers, and I cannot remember what all. It cost over $20,000 and never worked but three or four tons of ore and that contained nothing, and this failure wound up the G—— Co. which had spent over $75,000 on the advice of spiritual miners and had gone broke.

* * *

One can work very close to a lot of gold underground and miss it by an inch or two. Several years ago when the original owners were working the B—— mine it became necessary to cut a hitch in the foot wall, or rather what they called the foot wall, for the purpose of setting in a post. The hitch was cut and a very fair prospect uncovered. That is, some of the pieces of rock chipped out showed a little gold, but it was a mere nothing as compared with what had been taken out a short distance above, and it was looked upon as a sort of small offshoot from the main vein. Years after, when other men were working the mine, they were taking up this foot wall ground, and when they came to the old post it had to come out. It was removed and the rock under it was also cut out, and within a space of not over 100 square feet under and about the post nearly $100,000 was taken out in a few days. The first miners had the prospect but did not follow it.

* * *

Tenderfeet had worked the B—— B—— mine with very indifferent success, and having exhausted their means and having realized very little from the mine went in search of assistance. They found a man after a short time who agreed to put up a grubstake and work himself, being a miner, for an equal interest. When he arrived at the mine and went to the bottom of the inclined shaft, about 30 feet deep, he remarked that the hole was too small to work in and suggested putting a hole in the hanging wall for the purpose of cutting out more ground. Here comes the element of luck, for it was nothing else. One of the original owners thought the hole should be placed on the foot wall side as it would be easier drilling. The new partner made no objection and the hole was drilled into the foot, charged and fired. After a time one of them went down to see the effect of the shot. He had hardly reached the bottom when he called out to those on the surface, "Come down here; gold till you can't rest!" The men above tumbled over each other in their haste to get to the bottom of the hole, and there, sure enough, was gold and apparently plenty of it, and they scarcely rested for several days till they had taken it out, breaking out the floor of the inclined shaft nearly to the surface and getting about $15,000 for their labor. The first two had worked right over the rich streak, within 6 inches to 1 foot of it all the way down.

* * *

Mr. A—— was a well-to-do business man; not rich, but very comfortably provided with this world's collateral. He took the notion to abandon business and to engage in mining. He went to C—— and made his first venture, and it was successful. A few months' work had swelled his capital 50%. His fortunate experience also swelled his head and after six months' experience he concluded mining was the simplest, easiest and withal the most pleasant way of making money. The latter portion of his conclusion was correct, all right, but when it is classed as the simplest and easiest, he who thinks so without having learned so from his own experience had better hesitate. A——, besides being well off and successful, was also obstinate and hard-headed. Having once determined in his own mind to do a certain thing no amount of dissuasion could turn him from his purpose. He was also a scholar and a firm believer in the principles and laws of nature. Near the bar from which A—— had taken a goodly sum in placer gold was a deep hole in the river. This was commonly known as the pot hole. Now, A—— argued: "As that hole is the deepest part of the stream and gold is probably the heaviest substance in the stream, and as the stream has been rich elsewhere, the pot hole must have caught and retained a large amount of gold, for the gold in the stream above the pot hole is distributed for miles along its course, and it is simply a rational conclusion to believe that a large amount of gold has gone into that pot hole and having gotten into it it could not possibly get out." Many others had reasoned in the same manner before about other pot holes to their sorrow. Old and experienced miners told A—— he could get nothing from the pot holes, but he turned a deaf ear to all advice and told them the reason they had failed was from not knowing how to go about it. It was an inexorable law of nature that the gold should seek the lowest places, etc. He went to great expense, built pontoon bridges and had about exhausted his means when ready to reap his reward. Is is scarcely necessary to say what the result proved to be; briefly told, it was no gold. This experiment ruined A—— financially and it really cost him his life, for he was not a strong man physically and the loss of his money brought on illness to which he succumbed. It is simply another illustration of how easily a novice at mining may overestimate his knowledge and capacity to handle a novel proposition.

MINER.

Deep Mining on the Rand.

So far as the first row of deeps is concerned deep level mining on the Rand has, under careful and skillful management, proved an unqualified success, and the time is fast approaching when the second row all along the line will enter the ranks of producers and swell the output and the dividend list. The success achieved has caused renewed inquiry as to the possible depth to which mining on the Witwatersrand bankets may be practically and profitably pursued. Mr. John Hays Hammond long ago gave his opinion that 5000 feet was a reasonable depth to expect to attain both practically and on a commercial basis. Mr. Hammond estimated "that in the case of a deep level mine of 250 claims and with two shafts, each 2500 feet deep, the extra capital which would be required to pay for the sinking and equipment of such shafts would be about £800 per claim." Truscott gives the average profits per claim on the outcrop companies at £31,700, and this is now being exceeded in actual results, £45,000 per claim being nearer the actual earnings. He estimates the extra cost of hauling from 2500 feet to be about 3s 3d per ton, so that, allowing for both factors of increased expense, viz., shaft sinking and haulage, the margin of profit is affected only in a very small degree. For depths of from 2500 to 5000 feet it would seem that an estimate of costs would have to be proportionately increased, but hitherto every year the cost of mining has been reduced, and the probability is that by the time the mines containing the reef at a depth of 5000 feet reach the producing stage their working cost will be much higher than those of the deeper producing mines are to-day.

Shaft sinking is already being done much more rapidly, and new methods and discoveries are constantly being introduced which will have a most important bearing in the future of deep levels.

Diamond and Gold Mining in Minas Geraes, Brazil.

The following interesting description of the diamond and gold mines of Brazil and the methods of working them is from the report of Mr. Dawson, secretary of the United States Legation in Brazil:

Minas Geraes is the most populous State in Brazil. It has 3,000,000 or 4,000,000 inhabitants and its area is about 222,000 square miles. On account of its elevation, the climate is for the most part cool, temperate and healthy. There is no winter in the ordinary sense of the word. The surface is a great plateau with a general height of 2000 to 4000 feet above the sea. It is varied by an extensive river system and mountain chains, the latter rarely reaching an elevation of more than 6000 feet. In the southern part of the State are several lines of railway; coffee is largely exported; immigration has been considerable, and the commercial relations resemble those of the neighboring States, Sao Paulo and Rio de Janeiro. The northern part, including four-fifths of the area, is without railways and is more isolated, self-supporting and characteristically Brazilian. In this region are found the diamond mines. It contains a large population and is one of the most prosperous parts of Brazil.

In mining, Minas is pre-eminent among the States of the Republic. It has produced and still produces by far the largest proportion of the mineral output of the country.

Diamantina lies 680 miles from Rio de Janeiro, and has from 6000 to 8000 inhabitants. As its name indicates, it is the capital and center of the principal diamond district of Brazil. It was founded in the last years of the seventeenth century as a gold mining camp; in 1729 diamonds were discovered. These were at once declared State property by the King of Portugal, and for a hundred years mining of diamonds in Brazil was a Government monopoly. In 1832 the Brazilian Government legalized private mining. Before that time the Government superintendents and contractors had worked the mines with gangs of imported slaves and in a most short-sighted manner. The district shows the indelible results of such a regime. To this day, there is an enormous preponderance of negro blood, and immense deposits of diamond-bearing gravel are irrecoverably lost, because they have been covered with detritus of other workings.

There are six important diamond districts in Brazil:

(1) Diamantina.

(2) Grao Mogul, also in the State of Minas and 150 miles from Diamantina.

(3) The Chapada Diamantina in the State of Bahia, which produces quantities of amorphous and black diamonds, used for making drills.

(4) Bagagem, 200 miles south and west of Diamantina. This was worked as early as the middle of the last century and produced the celebrated Estrella do Sulof, 254 carats; but the general results were unsatisfactory as compared with those of Diamantina and Grao Mogul. The district has been but imperfectly explored.

(5) Goyaz, in the State of the same name, near the River Araguaya, a navigable tributary of the Amazon.

(6) Matto Grosso, 100 miles north of Cuyaba, the capital of the State, and 1000 miles west of Rio de Janeiro.

The first three districts lie on or near the crest of the great mountain chain of the Sierra de Espinhaco, or its continuation under different names, which forms the watershed between the Sao Francisco, flowing north more than 1000 miles before it turns toward the Atlantic, and those rivers which flow directly into the ocean between Rio de Janeiro and Bahia. It is the opinion of experts that these three diamond districts are all parts of a great diamondiferous region extending in a narrow belt along the crest of the sierra and down its slopes for more than 500 miles. It is therefore probable that further discoveries may be expected in the intervals between the districts already productive. That in the vicinity of Diamantina the country rock, from which the diamonds have been washed by erosion into the beds of streams, exists only in the central sierra and not in the side mountain chains, is proved by the fact that diamonds have been found in all, or nearly all, of the streams which flow into the left side of the Jequitinhonha, and none in those flowing into the right bank. The Jequitinhonha is the most famous of all the diamond rivers, and the most extensive and successful operations in Brazilian diamond mining have been conducted in it and its upper tributaries.

Four distinct kinds of mining are practiced in the Diamantina district. The first is the most ancient and simplest. Near the top of the sierra the small streams are very steep in their descent and have precipitous rocky sides. Their beds are filled with boulders, and in the interstices the diamond-bearing gravel is found. This gravel is called the "formacao," and is easily recognized by an experienced miner, for the reason that it contains certain minerals whose presence indicates the diamond. The diamond is a heavy mineral, its specific gravity being about 3.6, much greater than that of ordinary rock. When the original deposits in the high sierra were eroded and washed into the streams, the diamonds and other heavy minerals were separated from the bulk of the detritus by the action of the water. The heavy gravel thus left at the bottom and caught among the boulders is the formacao. There are more than thirty minerals, some of which are always found in it. Among them are tourmaline, specular ore, disthene, rutile, gold and various phosphates. The presence of these shows that the existence of the diamond among them is probable. The formacao is prospected for in the dry season, and as soon as found is dug out and piled near by the water. When the rains interrupt the digging, the miners work up the gravel. The operation is very simple. The gravel is first washed in a "bacu," an excavation a yard wide and a yard and a half long on the bank of a pond or stream. Its lip is a few inches above the surface of the water and it deepens slightly to the rear. A cubic foot or more of gravel is placed in the back end and the workman dashes water against it out of a large concave wooden plate, giving it a peculiar rotary fling. This rapidly separates the lighter and larger stones from the smaller and heavier ones. When concentration by this rough method is as complete as possible, the gravel is worked with the "batea," a wooden dish about 30 inches in diameter, with a sort of pit at the bottom. Filling the batea with the concentrate and water, the workman agitates the contents, whirling and shaking them, meanwhile pouring and scraping the lighter gravel from the top as fast as he separates it. The operation is similar to gold-panning, but requires greater skill. It is said that a man may be a first-rate gold-panner and yet useless for diamond washing. At the end of the process, the diamonds are simply picked out by hand from the remaining minerals. Their peculiar luster makes them easily recognizable even by a tyro. The Brazilian method of washing alluvial gold is substantially that described above. By its use, practically all the diamonds and placer gold which Brazil has produced have been obtained. The native Diamantina miners know no better method.

At present the small stream washings in the Diamantina district are not important or productive. Two hundred years of search has exhausted most of them. Those who work them are usually men with little or no capital. They go in small parties and work somewhat at random, trusting to the chance of finding virgin gravel and making a rich haul. The rewashing of ancient concentrates of the old workings is also extensively pursued.

The second method of mining is that practiced in the beds of the larger streams. The opening of one of these mines is an extensive and complicated undertaking, requiring the employment of thousands of dollars and hundreds of men. At the beginning of the dry season a spot is selected which is believed from tradition or ancient documents to be virgin. Just above the spot selected a rude dam is erected and also a sluice around it, through which the waters of the river are turned. The bed thus exposed is usually found to be of sand, largely the detritus of ancient workings. This sand is carried out a shovelful at a time in little wooden pans on the tops of negroes' heads. Naturally, such a process is tedious and expensive. The work could be done many times more cheaply and quickly with dumpcarts or even with wheelbarrows. From time to time attempts have been made to introduce them; but they have not been successful, owing to the conservatism of the native miners. The excavation is often carried to a depth of 30 or 40 feet before bedrock, where the formacao is to be found, is reached. The hundreds of workmen climbing the slopes of the hole in long lines, each balancing a pan of earth upon his head, look like ants following their paths in and out of a hill. The work is done in great haste, because the first considerable rains in September or October wash away the whole structure and fill up the excavation. The water that percolates into the pit is pumped out with rude pumps worked by overshot wheels, a portion of the river being diverted from the sluice for this purpose. These pumps are simply wooden tubes, in which work leather buckets opening upward. A stream of water is kept continually pouring down from the top to keep them running, otherwise they would not draw. The construction of the sluice, dams and wheels shows considerable primitive engineering skill. No nails or iron are used. The joints are mortised or bound together with vines. The builders have no idea of exact measurements, even the slope of the sluice being determined by the eye alone. Nevertheless, such is their inherent skill that their work nearly always serves its purpose. However, they are unequal to difficult and novel problems. For example, one famous spot in the Jequitinhonha called the Pocao (pothole) de Moreira, reputed to be virgin and fabulously rich, was unsuccessfully attempted several times in the early part of this century. Every time before the bottom was reached the rains came and destroyed what had been done. A few years ago Antonio de Lavandeyra, a Cuban engineer, by the use of modern methods and pumps, succeeded in reaching and uncovering the bedrock. The practical results were a good example of the discouraging uncertainty of diamond mining. Only four diamonds were found. It is now believed that one of the early contractors, in the good old days before the formacao in the Jequitinhonha had been covered up with sand, had exposed or dredged the spot and taken out all the diamonds, and then had not thought it necessary to make any record of his doings for the Government or posterity.

The whole bed of this richest of all diamond rivers, from its source to Mendanha, fifty miles below, has probably been worked. Below that point the valley is too broad and the bed too much choked with sand to permit operations of the kind I have just been describing.

The gravel found is carried out of the excavation and placed in piles until the enforced leisure of the wet season gives a convenient opportunity to wash it. If the ground is virgin, the miners are likely to get a rich reward; if the gravel has been washed before, they lose all they have spent. The river mining is usually carried on by a local expert, who forms a company, to which his speculative neighbors and friends subscribe. No foreign capital is employed in it.

(*To be Continued.*)

White Rock Silver Mine.

The White Rock silver mine, near Drake, New South Wales, which at one time was floated for a million sterling, has been the despair of numerous plucky prospectors. Though it has not returned a profit on the capital expended, it is of great geological interest. E. F. Pittman, the Government geologist of New South Wales, visited the mine. "The White Rock deposit," he says, "has hitherto been regarded as a felsite dyke, intersected by veins of silver-bearing galena and zinc blende. I had never had an opportunity of inspecting it until recently, when I spent several hours in examining the deposit, which appears to me of such an unusual and interesting character that I determined to pay it a second visit during the Easter holidays. In my opinion, the argentiferous material is a volcanic agglomerate or breccia, and forms the filling of a volcanic neck or chimney.

"The agglomerate, which is of a greyish-white color, consists essentially of felsite, and contains numerous rounded and sub-angular boulders, many of which show rhyolitic structure; they vary in size from that of a pea or less up to several feet in diameter. This agglomerate is intersected by numerous minute veins of galena and zinc blende, which in places impart to it the character of a stockwork, while occasionally larger banded veins up to 2 feet in width are seen striking in various directions. These consist of quartz, with galena, zinc blende, pyrites, native silver, ruby silver ore, calcite and chalybeate. The agglomerate has been much silicified by the infiltration of mineral solutions from below, and is extremely hard and tough.

"In form the mass of ore is rudely circular, or rather cylindrical, its diameter being probably about 600 feet, though it is not possible to exactly define its limits, on account of its surface being in places covered by soil. It occupies the floor or center of a circular horse-shoe-shaped valley, the walls of which rise with a regular and rather steep inclination to a height of from 200 feet to 600 feet above it, and are quite isolated from the surrounding mountains. The rock of which these walls are composed is a dark grey felsitic lava, which in one place was observed to have a columnar structure, the columns being vertical.

"The valley has only one opening, which probably represents a breach in the old volcanic cone, and through this opening the White Rock creek, which rises within the circular valley, flows towards Fairfield creek. The diameter of the crater from rim to rim is probably rather more than half a mile. The altitude of the White Rock is about 550 feet above the town of Drake, and the altitude of the highest part of the rim of the crater is about 600 feet more. There is every reason to believe, therefore, that this is the point of eruption from which all the lava and felsite breccias, which have long been known to occur in the vicinity of Drake, were derived.

"The White Rock ore deposit has been worked by an open cut having a length of 150 feet, a height of 70 feet, and a mean width of 30 feet. In addition to this a vertical shaft has been sunk to a depth of 186 feet, and drives of 100 feet and 140 feet have been put in to the north and south at the 180-foot level.

"The geological mode of occurrence of this deposit appears to me to be of peculiar interest, more particularly as there are, so far as I am aware, only two analogous metalliferous deposits known in the world. These are the Bull Domingo and Bassick mines, Colorado."—Melbourne Standard.

THE announcement recently made by the Geological Survey that the coal product of the United States in 1898 was 219,036,000 short tons against 226,287,000 for Great Britain shows that the United States is rapidly gaining upon that country as a coal producer and will soon become the leading coal-producing nation of the world. As an exporter of coal, however, the United States takes low rank in proportion to its production, and stands fourth in the list of coal-exporting countries.

Filter-Press Process of Gold Ore Slimes.*

By WILLIAM MCNEILL.

Various processes have been tried for treating that part of the tailings from stamp-mill treatment known as slimes, which are usually separated from the tailings, to be treated by cyaniding. The difficulty in treating these eliminated slimes is generally admitted to be chiefly mechanical, the gold being in a finely divided and easily soluble state. In the Transvaal the lime or coagulation process has been attended with marked success. Briefly described this process consists in the coagulation of the slimy particles by the addition of lime, settlement of the flocculent precipitate and treatment by weak cyanide solutions which are decanted after settlement. The slimes after decantation contain about 50% of their weight of cyanide solution, which is partly removed by dilution with weaker solutions. It will therefore be seen that this method requires a large amount of solution compared with the ordinary percolation cyanide process, and even with the use of successive weaker washes still leaves in the slimes 50% of their weight of weak cyanide solution, which must necessarily contain a certain percentage of gold.

The coagulation process followed by decantation, as above described, has proved itself an economic success for slimes which are not very rich, and where water is fairly plentiful. The conditions are, however, different on most of the West Australian gold fields, where water is not abundant, and where the talcose, clayey nature of the ores of the oxidized zones renders it impossible to crush them either by a wet or dry process without the production of a large percentage of rich slimes, in many cases carrying as much as one ounce gold per ton of ore.

C. A. Moreing was one of the first to consider the best and most economical method for treating slimes, more especially those resulting from the crushing of West Australian ores. The author does not contend that the coagulation process followed by decantation could not be used with more or less success upon the ores of the character met with in West Australia, but is of opinion that the elimination of the dust or slime particles, and the treatment of the same in the filter-press plant described below, offers in the case of Kalgoorlie and similar ores special advantages. In many cases the author believes that filter presses might be advantageously substituted for decantation methods. Considering the large number of industries successfully using filter presses for dealing with precipitates of a slimy nature which cannot be filtered by the ordinary percolation methods, even when the withdrawal of the liquid is assisted by a vacuum beneath the filter, it might have been anticipated that these appliances would have been more largely adopted for dealing with gold ore slimes than has hitherto been the case. Several previous attempts have been made to employ filter presses for this purpose, but have not been very successful.

The ore at the Hannan's Brownhill mine having been dry crushed and passed through a 25 or 30-mesh sieve, is delivered to a separator, which divides it into about equal quantities of slimes and sands. It is only proposed in this paper to describe the separation and the treatment of the first product, the slimes. The crushed ore, as it leaves the screens, is elevated into the separator, and passes directly into a central conical hopper without the intervention of any automatic feeding appliance. The intermittent discharge from the buckets of the elevator does not materially interfere with the action of the separator, as owing to the length of the discharge chute of the elevator, combined with the construction of the hopper (which when the supply is properly proportioned to the size of the machine, is kept with a certain amount of material at its delivery end), a regular stream enters the machine, the baffle disc rotating with the center spindle further assisting in an even distribution of material. The vertical spindle of the separator is driven by means of the cone pulley and bevel gearing, and imparts a rotary motion to the disc and fan. The material falling upon the disc is thrown off by centrifugal action in a fine spray and subjected at the same time to the action of an air current induced by the fan. This current carries off the lighter particles with it into the outer casing, where they settle down into the conical chamber and are ultimately discharged.

The coarse particles or sands fall down over the grid against the action of the air current and collect in the inner chamber, and are withdrawn as required through the spouts. The separation required can be regulated either by altering the speed at which the machine is driven, or by the adjustment of the circular damper which regulates the amount of the annular opening through which the air current circulates. With some ores a bumping arrangement has been found necessary in order to shake down the material, which tends to collect on the conical sides of the separator, even though these be constructed at a steep angle. Compared with revolving or shaking screens, this separator offers the following advantages: (1) Absence of all screens which are liable to choke and require constant renewal; (2) easy adjustment and regulation of the size of the particles carried over; (3) the same air current continuously circulating within the machine, no dust escapes out of the apparatus.

From experiments conducted by the author upon oxidized ores from the Kalgoorlie fields at the works the makers of the separator, it was found that after reducing the ore by dry crushing so as to pass a 25 or 30-mesh screen, the fine dust particles of slimes could readily be separated. In some instances the sands assayed higher than the slimes, but no great importance can be attached to this consideration, as it evidently depends upon the state of the gold, and if this were very fine the slimes might be found to be the richest. The separator cannot be regarded as a concentrator, but simply as an apparatus for withdrawing the fine dust or slime-forming particles, whose surface is large in comparison to their weight. In many respects its action is similar to that of a hydraulic spitzkasten or pointed box. It may also be pointed out that all gold withdrawn from the slimes will necessarily be in a very fine state of division, and admirably suited for recovery by cyanide if the mechanical difficulty of filtration can be overcome.

The separation of the slimes from the crushed ore having been effected, either of the following methods, or a combination of them, could be used for the after treatment by the filter press: (1) Agitation of the slimes with cyanide solution and delivery of the sludge to the press, finally washing the charge in the press, or (2) if preliminary water or other washes be desirable, to agitate with the same, deliver the resulting sludge to the press and effect the extraction of the gold with the charge in the press by passing through it the cyanide solution, finally washing the charge as before.

In the general arrangement of the filter-press plant at Hannan's Brownhill, the slimes are introduced into vats and agitated by paddle with cyanide solution as long as may be found necessary to dissolve out the gold. The contents of the vat are then run into a receiver and forced by means of compressed air at a pressure of 60 or 80 pounds per square inch into the filter presses, the filtrate or affluent from the presses being delivered through a pipe into a vat, from which it flows in a constant stream through the zinc precipitation boxes to the sumps. The cakes having been washed in position so as to remove any cyanide solution they may contain, the press is opened and the cakes allowed to fall into a truck for tramming to dump.

The pneumatic forcing receiver or montejus consists of a cylindrical steel vessel with dished ends. The pipe leading from it to the press reaches almost to the bottom of the receiver, thus insuring, as soon as the air pressure is turned on, the whole of the contents of the montejus being discharged into the press. Prior to discharging the receiver, the charge is stirred up by admitting a certain quantity of compressed air through a small pipe to the bottom of the receiver.

The filter presses are of the distance frame, flat plate and four-eyed type, each press having twenty chambers forming cakes 28 inches square by 3 inches thick. From experiments made by the author at the works of the manufacturers of the pressing plant at the Hannan's Brownhill mine, it was found that with the slimes of some of the West Australian ores there is no difficulty in forming cakes of this thickness with ore that had been dry crushed. The cakes were examined by A. C. Claudet and found to carry 20% of moisture and to weigh about 130 pounds per cubic foot, from which figures it will be seen that one press treats per charge about 1½ tons of dry slimes. The operation of filling and washing a charge in the press is as follows: The sludge is forced into the press from the receiver through a passage by air pressure as described. This passage extends through the plates and communicates with the interior of the distance frame. The sludge continues to flow in until it completely fills the space between the plates, the liquid being forced out by pressure through the filter cloths on either side of the plates, and passes through the channels on the surfaces of the plates to the openings to the discharge pipe at the press head, and the opening would also serve for discharge of the effluent liquid during filling, but as it is connected up to the washing pump it is only used for the passage of wash water. After the cell has become compacted with material and no more liquid issues, the sludge inlet is shut and also the valve on the outside of the press. Water is then forced in and along the drainage channel on the surface of one of the plates through the filter cloth placed on this surface, and then through the cake, displacing the cyanide solution, and finally escaping through the filter cloth on the opposite side and out of the press through the opening. The tightening gear and other details call for no remarks, as the designs made may be widely varied without affecting the action of the press.

The chief advantages gained by the use of a press of the type described as compared with the usual type of press with recessed plates and central charging hole, mostly in use for sewage purposes, are that it permits of the cyanide solution contained in the cakes being effectively replaced by wash-water, and any desired thickness of cake secured by the width of the distance frame employed.

The question of the efficiency of washing and displacement of the cyanide solution contained in the cakes by the wash water is one of great importance when dealing with rich slimes, and this point alone would be sufficient to warrant the employment of filter presses in preference to the decantation methods. Experiments carried out on 3-inch cakes show that the washing is most complete, and that uneven percolation does not take place. One simple experiment made to investigate this point was to saturate the cake with a brine solution having a specific gravity of 1.100, and then to wash out this brine solution with water, and observe the rapidity of the fall in the specific gravity of the wash water as it issues from the press. The rapidity of this fall in specific gravity is a measure of the efficiency of the washing, for the drop is comparable to the displacement of the brine solution in the cake, because if channeling or uneven percolation through the cake had taken place there would have been a slow fall in the specific gravity of the wash water delivered by the press caused by the continual withdrawal of some of the brine solution. In many experiments it was found that a quantity of wash water equal to little more than the cubic contents of the cake was sufficient to bring down the brine soluble to 1.001. It is to be regretted that time did not permit of the experiments being followed by others in which the investigations were not only quantitative, but were accompanied by careful chemical analysis of the cakes and wash water. The author has, however, from more than one authority received confirmation of the efficiency of the washing in filter presses, a comparatively small quantity of liquid being generally found sufficient, except when dealing with precipitates of a very difficult nature, and from which it was required to wash away the last trace of the mother liquor, conditions which do not usually occur in the treatment of gold ore slimes. The author is not able at present to give particulars of the cost of the treatment of slimes in filter presses.

As regards the time occupied and the extraction obtained in the filter press, experiments made with 5 dwt. slimes when the mill was first started gave tailings assaying 1 dwt. after three hours' agitation, and the following average time for the completion of the cycle of filtering, washing, emptying and closing the press: Filling press from receiver, 15 minutes; washing cakes in press, 19 minutes; discharging and closing press, 16 minutes; total, 50 minutes.

The advantage of the filter press treatment is that the amount and strength of the cyanide solution can be regulated to suit the character of the ore under treatment. The amount of solution required for the usual cyanide filtration method, say one and one-half times the weight of the slimes, is sufficient to reduce the pulp to such consistency that it can be readily forced into the filter presses. In districts where water is not abundant the small amount of wash water required is also of great importance, for by the use of the press a minimum amount is required to displace the cyanide solution contained in the cakes.

By the successful and economic separation of slimes dry, without the aid of water, and the treatment of separated slimes, the advocates of dry crushing processes may certainly consider that their cause has received no mean impulse, for a process on these lines certainly enables the greater part of the float gold to be secured.

Generally, the author is of the opinion that the future will see filter presses more extensively used for the treatment of gold slimes, particularly in districts were water is scarce and where ores are of such a nature as to be difficult for ordinary filtration, on account of the excessive percentage of slimes produced when they are crushed. A filter press plant is not expensive for up keep, requires considerably less water, and will probably be found to give a greater extraction than any decantation method.

* Abstract of paper read before the Institution of Mining and Metallurgy in London.

Electrolytic Corrosion of Metals.

The extreme difficulty, if not impossibility, of preventing electrolytic corrosion in buried metal structures under certain conditions, is generally recognized, and although many of the best electrical experts in the country have now been grappling with the problem for a number of years no really satisfactory or practical solution has been offered. Nikola Tesla has suggested that were alternating instead of direct current employed for operating various street railways the difficulty now experienced through electrolysis would be done away with. This may all be, but it must be borne in mind in this connection that the application of the three-phase alternating current to street railway propulsion is of recent date and in actual use in but very few localities, and it is therefore scarcely to be expected that the street railway companies of a city such as New York would voluntarily change over to a more or less untried system, entailing as it would an immense outlay in money for new apparatus and machinery.—Electricity.

Mining Summary.

ALASKA.

(Special Correspondence).—Quartz mining is making a good showing here. A few good steady all-around miners can get steady employment here. Wages are $3.50 a day and board $7 per week.

Ketchikan, May 8th, '99.

Juneau *Miner*: Good reports come from some of the creeks in Porcupine district. The news from Porcupine, Calhoun and McKinley creeks is good. All are working, but Trail and Takeen are reported bad and men are leaving in disgust. There is too much snow on the ground for mining on most of the creeks. It may be the middle of June before mining operations are in full swing, and it will require this summer and next before the value of the Porcupine as a placer mining region will be known.

ARIZONA.

Prescott *Miner*: The Harlan mill on Turkey creek closed down on account of a scarcity of water. Mr. Harlan is putting in a pipe line 2400 feet to a spring, which, when completed and added to his present supply, will furnish enough to run continuously.——Mr. Taft has encountered a supply of water in his Sterling property on Big Bug. Between the water from the Sterling and that from the Lottie tunnel there is a large flow in Big Bug creek.——The Garcia G. M. Co., owner of the Garcia mine on the Hassayampa, near Wickenburg, which closed down for several months, resumed work and has a large force engaged in developing the property.——The Ardath M. & M. Co. have men at work erecting a mill and hoisting works on their Oriole mine at Santa Domingo mountain, near Wickenburg.——Mr. Cleveland, who has a lease and bond on the Cumberland mine, owned by T. Roach and others in Pine Flat, recently struck a body of ore 32 inches wide at a depth of 160 feet. This mine shows several shoots of ore. He has eight men at work developing it.——The company which purchased the Buster group in Pine Creek district has ten men at work building a road to the property. Mr. Hooper is in the East on business connected with the property, among other things to buy a mill. The mine is opened by two tunnels, in which there is a continuous ore body 900 feet in length. The company will run another tunnel, starting near the gulch, and connection with the upper workings will be made by upraises, and the ore will pass through it to the mill.——The Mohawk group, owned by ex-Supervisor T. Roach, adjoins the Buster group and is promising. A strike was made last week in a drift being run at a depth of 100 feet, where an ore body 4 feet wide was encountered. The ore averages $15 per ton.——Watts & Hanger also have a claim in the same district which they are developing.

Yuma *Sun*: G. Miles and F. O'Brien have gone to the Copper Mountain country, where they begin development work on a ledge of copper.——The Arizona C. & G. M. Co. of Phœnix, whose mines are in the eastern portion of Yuma county, near the Maricopa line, have made arrangements with Eastern capitalists for reduction works on their property.——Reports come from the Santa Maria district, in the extreme northeastern corner of Yuma county, that several copper strikes have been made.——C. E. Eichelberger has returned from a trip to the King district, where he has men at work on a prospect. The discovery of water in that vicinity has stimulated prospecting.——Water has been struck at a depth of 1000 feet within four miles of the King of Arizona mine. The company is erecting a mill and cyanide plant. The well will be sunk 100 feet deeper. There are several tons of ore on the dump and the force of miners is being increased.

CALIFORNIA.

Amador.

The Bunker Hill and Mayflower mines near Amador City have been sold at public auction. The sale was ordered by J. F. Aldrich, receiver of the Spring Garden National Bank of Philadelphia, Pa. The property is an asset of the bank, which was mortgaged for $200,000. The sale was ordered by the District Court of Philadelphia. The bidding was opened by C. R. Downs of Sutter Creek, Cal., who bid $21,000 for the property. The only other bidder was a Mr. Cheney of Philadelphia, who added $100 to the offers of Downs until the price reached $30,500, at which price Downs took the property. Downs is associated with W. F. Detert of Jackson; W. J. McGee, a local attorney, and State Senator Voorheis.

The Lincoln shaft at Sutter Creek is down 1000 feet.

The three-compartment vertical shaft at the Wildman-Mahoney is down below 500. Power drills will be put in as soon as the machinery arrives from the East.

The Kennedy M. Co. has appealed from the decision of Judge Nicol of Tuolumne county, in the case of the Argonaut M. Co. vs. Kennedy M. Co.

Supt. D. Fisher of the Hobart M. Co., operating the Spagnoli mine at Wieland, reports the shaft down 81 feet and sinking. It is the intention to erect a 10-stamp mill.

Butte.

Oroville *Register*: The Enterprise mines are busy, the owners taking out considerable gold.——The Gem gives employment to a number of men.——At the Golden Trout new machinery is being put in.——At the Slater mine good ore is being crushed. At the Crystal Peak a 200-foot upraise is being made.

Calaveras.

Several tons of quartz crystals and a large amount of agatized wood have been taken from the Green Mountain gravel mine, in Chile gulch. The crystals are of various sizes, some weighing over 100 pounds.

The Hobart Estate Co. and the Utica M. Co. are finishing their new electric plant near Murphys. The building has been built of lava from Table Mountain ranch. Its walls are 3 feet in thickness. The water power is expected to maintain a minimum of 2500 H. P., 1000 of which will be needed at the Utica mines and mills, which are again running.

The Angels mine has been cleaned up and placed in working order, the hoist and other machinery renovated under the direction of its owner, J. V. Coleman of San Francisco. As soon as a 20-stamp mill has been erected, work will be resumed on this property.

The new addition to the Gwin mill is provided with concrete foundations for the mortar blocks which are 14 feet in length. An air hoist has been put in on the 1400 level. The hoist is secured to a car and can be moved from place to place as required.

Mokelumne Hill *Chronicle*: It is reported that preparations are being made to resume operations at the Esperanza mine near Mokelumne Hill. The mill is to be increased to eighty stamps, a new hoist is to be erected and the shaft is to be sunk an additional 500 feet.

Angels *Echo*: The Bruner mine, two miles south of Angels, employs twenty-five men.——The Harris mine, one mile south of Angels, is to be operated on a more extensive scale than heretofore.——A 20-stamp mill is to be erected on the Angels mine.——Grading for the 120-stamp mill at Robinson's Ferry goes steadily on. This mill when completed will be the largest in the State.

El Dorado.

Placerville *Democrat*: One hundred men are employed at the Griffith.——A number of pockets are reported to have been taken out in the Kelsey district the past month.——Owners of the Ida Livingston, Kelsey district, have resumed operations, with J. Kelley Supt. A new shaft is down 50 feet.——T. Smith and P. Stingle have leased the Delmatia mine and are cleaning out tunnel and winze.——Roberts & McGraw have struck good prospects in their quartz mine in the Kelsey district, and are having a crushing made at the Ranney & Smith mill.——The Gopher-Boulder has installed new machinery, preparatory to resuming crushing.——The citizens of Georgetown have established a local mining district, with the boundaries as they were previous to the act of March 27, 1897.——J. S. Blackiston has bonded his Crystal mine at White Rock to A. S. Moore of San Francisco for sixty days. The mine is to be prospected for quartz crystals and gold.

Kern.

Six mills are in operation in the Randsburg district.

A run of ninety-five tons of ore from the Winnie mine, Randsburg, made at the Barstow mill, yielded $887, being the second run from that mine milled at Barstow. The first, of forty tons, made two weeks ago, gave $538.

The owners of the asbestos mine near Bakersfield are reported to have an offer from New York for the entire output.

The Wedge mine, Randsburg, has had a run of thirty tons of ore at the Red Dog mill which yielded $2500, averaging $80 per ton.

Mono.

Bridgeport *Chronicle-Union*: C. H. Glines and J. Hays, owners in the Arnot and Par Value mine on Green creek, are at the property getting the mine and surroundings ready for working this summer.

Nevada.

It is reported that a new shoot of ore has been struck at the Pittsburg mine on Gold Flat, near Nevada City. The mill will be put in repair and started up.

The North Star Mines Co. of New Jersey is a successor to the North Star M. Co. The North Star Mines Co. is capitalized for $5,000,000, or 500,000 shares, par value $10. J. D. Hague is president; W. L. Bull, vice-president; W. D. Pagan, Secretary. The directors include the foregoing, with A. G. Agnew and Benjamin Strong, all of New York. C. G. White of Boston will be added to the board. President J. D. Hague says: "The old North Star M. Co. has been operating for years in the Grass Valley mining district and acquired the North Star mine, which had up to that time produced $3,000,000 gold. The company reopened the mine, it having been idle, and it has since produced $2,500,000. The company has been acquiring additional property adjacent to the North Star, which in times past had been productive, in this way acquiring two or three large mines and a number of adjacent mining claims which have been consolidated and conveyed to the North Star Mines Co., the new company which will develop at great depth the combined property comprising the North Star mines, the New York Hill and the Massachusetts Hill or Stockbridge mine. These three mines have produced in the aggregate $12,000,000 to $15,000,000 and are now to be opened at greater depth. The Massachusetts Hill mine has produced within the last two years $800,000, nearly all of which came out of ground purchased for $30,000 to $40,000. The new company is in productive condition, taking out $30,000 to $40,000 per month, and has paid two dividends of $50,000 each since November."

Tidings-Telegraph: Moroney, Webb & Baldwin, who are interested in the Slide mine, at French Corral, have ordered a mill for their claim. The new mill will have a capacity of fifty tons a day. A Bartlett concentrator will be put in.

Placer.

T. Haney is working six men at Bloody ravine.

B. Kavanaugh is taking out pay from his mine near Bald mountain.

S. Savage has put up hoisting works at the Savage mine and is prospecting.

The shaft at the Whisky Hill copper mine is down 135 feet. Cuts have been run, opening up 1200 feet of the ledge. The rock yields 9% copper, $3 in silver and $5 gold per ton.

J. McAninch, G. Cowan, E. B. Quigley and J. Shiels have bonded the Glen Consolidated mine in Duncan canyon to a Colorado company.

Riverside.

In the Virginia Dale district a scarcity of water has obliged several of the mills to suspend operations. The water supply is derived from wells sunk in a dry lake basin north of the mines. The O. K. and Arbois are operated steadily, but several mines are shut down.

Los Angeles *Herald*: It is reported from San Diego that an effort will be made to work the lepidolite mines near Pala. An agreement has been filed in the recorder's office at San Diego whereby N. G. Douglas and other owners of the mines agreed to supply W. J. Schieffiin, a New York druggist, with as much lepidolite as he might want, up to 1200 tons a year, at $40 a ton. The agreement stipulates that none of the mineral shall be sold to anyone else for five years. This mineral is a lithia mica and contains handsome crystals of pink tourmaline (rubellite) in radiated groups.

San Bernardino.

Yuma *Sun*: G. Livingston and H. Randolph have gone to gold mines twenty miles from the river above Ehrenburg in California on which they will do development work. They have a ledge of free gold.

The Rose mine on the San Bernardino range, fifty-five miles easterly from Victor, is running, but there is a scarcity of water.

San Diego.

Lepidolite, with tourmaline, occurs near Mesa Grande in large granitic veins, not far from the Indian rancheria.

It is reported that a discovery of gold-bearing quartz has been made on the Warner ranch northwest of Julian.

Yuma *Sun*: There are eighteen men using dry washers and rockers in the Potholes district, twelve miles above Yuma, with good result. W. Boyle and partner, Mr. Riley, exhibited $22.10 in coarse gold which they took out of seven yards of dirt. The richest gravel is on the banks of the river under 2 feet of dirt which they strip, as it does not carry enough value to pay working in a rocker. It is impossible to reach bedrock, owing to the volume of water. This district has been producing gold for thirty years, but has never been systematically operated, the rocker and dry washer being the only methods used.

Shasta.

(Special Correspondence).—Near Igo J. P. Wright, who has been developing a silver property for a number of years, has found a 20-inch ledge, from which he made a shipment of several tons to the Selby Smelting Works. The returns were 500 ounces silver per ton.

H. Christensen is developing his claims near Igo, taking out a fair grade of smelting ore.

Price & Wartechek, on Muletown, are making their first shipment. They began work on their property two months ago. They haul their ore ten miles to the smelter.

There is a probability that the Afterthought copper mines will resume work. The property has been idle a number of years. They are twenty miles east of Redding.

F. Hurst has four men developing the Dobrowsky claims near Shasta. He made two twenty-ton shipments four miles by wagon to the smelter, and received $14.72 per ton on one and over $20 on the other lot.

The Mt. Shasta mine is pushing development work to 500 feet depth and employing eighty men. In consequence of development only five tons of ore per day are hauled to the smelter.

M. T. Howell & Co. are making a second twenty-ton haul to the smelter at Keswick.

Near Copley a group of thirty copper claims belonging to Ellis, Murray & Co. are being developed under bond.

Shasta, June 12th, '99.

Four hundred men employed by the Mountain Copper Co. at their mines at Iron mountain struck on the 13th inst., the result of a demand for increased wages. Last week the company raised the wages of 500 men at their smelters at Keswick 10% to 15%. Sunday a committee of miners at Iron Mountain demanded an increase. The quarrymen receive $1.60 a day, muckers $2.10 and miners $2.60. The committee asked an increase of 40 cents a day for each. The company was allowed until June 15th to announce its decision. On the morning of the 13th several of the men known to have led the demand for greater wages were discharged. The 400 at noon quit work and marched to the office and demanded their time. Enough ore is in the roasters to keep the smelters busy for a month.

Redding *Free Press*: It is reported that an agreement to purchase the Lowdon-Friday has been made by the Uncle Sam G. M. Co.—virtually a consolidation of the two properties in the Backbone district. The option is given until January 1, 1900. The consideration is withheld. The property of Lowden & Friday, known as the Cleveland Consolidated group, consisting of eight claims, adjoins the Uncle Sam. From the mines to a proposed smelter is a mile. From the smelter site to the railroad is three-quarters of a mile.

Redding *Searchlight*: H. C. Woodrow of Salt Lake, who has a bond on the Trinity group of gold mines at the head of Dog creek, six miles from Delta, reports that he will put three shifts to work on a mine of the group. He will sink a shaft 200 feet and drift under the ore body. There is now a 10-stamp mill and an electric plant on the property. A steam hoist will be put in.——C. D. Galvin and F. Grotefend are developing the King Copper property, three miles from Copley. Twenty-two men are employed in seven tunnels. It is thought the ore body will soon be reached.

Sierra.

The Plumbago mine, on the north side of the Middle Yuba river a few miles from Forest City, has been worked in a superficial way for years, and at times produced rich ore. C. Hegarty, Sr., of Moore's Flat, Nevada county, sold it to New York capitalists, and M. W. Mather was sent to take charge. Mr. Mather abandoned the shafts which had been sunk near the top of the ridge, and on the hillside ran three tunnels into the hill. Two of these are half a mile in length, and a fourth is contemplated which will have 1700 feet vertical depth from the top of the ridge. The tunnels were run on the ledge, which varies in size from a few inches to 5 feet in thickness. A 10-stamp mill is running night and day on ore. Bunches and pockets of rich ore are occasionally found.

Siskiyou.

Yreka *Journal*: The hoisting and pumping machinery for the new company to work the Nehrbass and Rostel grounds, adjoining the Blue Gravel mine at Greenhorn, will soon be working. Mr. Stevenson, who is to superintend the operations, has arrived in Yreka, and F. D. Fraser, who bonded the property, also returned.——Johnson & Kelly, who are mining old ground in the Greenhorn Blue Gravel mine on commission, are said to be getting pay from the present working. They do the timbering, hoisting gravel and sluicing at their own expense and pay 10%.——C. Fairchild has started his mill on Humbug, near Sucker creek, and finds good pay in the quartz. He has a 14-inch ledge and is close to the Thresh & Coulson ledge.——Mining is soon to be commenced in Yreka creek, in the vicinity of Hawkinsville, by the company which bonded the creek from Shasta river to the McNulty place near Yreka.——T. Austin & Co., working deep diggings north of the high school grounds, continue to find the average pay gravel.——Work at the Cherry Hill quartz mine on Cherry creek is carried on with success. It is the intention to run a 1500-foot tunnel towards the ledge 1000 feet below the surface, a survey having been made for that purpose.——J. C. Burgess is prospecting the ground at Cottonwood creek, near Henley and Hornbrook, for the company having a bond on same.

Yreka *News*: L. Erickson has out ore for crushing.——The Gold Ball and Aromas mines are working to their full capacity.——The Salmon River Co. is running with a large force.——Mr. Peterson of Eddys gulch cleaned up twenty-six ounces from a short run in his placer claim.——Peters Bros. have a ledge on White's gulch.——The Jumbo mine is reported to be bonded to Colorado parties.——The Gold Run is working twenty-two men.——The Knownothing has large bodies of ore and employs fifteen men.

Trinity.

The Morning Star mine, on Coffee creek, owned by Frue & Norton, is to put in power drills. There are two shafts—one 70 feet, the other 57 feet—and 310 feet of tunnel.

F. L. Dimock of Trinity Center has opened a copper ledge three miles above Trinity Center. There are two claims—Happy Day and June Day. A small cropping a few feet underground developed into a copper ledge 3 feet in width.

Redding *Searchlight*: T. J. Loftus recently discovered a ledge between porphyry and serpentine walls 100 yards west of the trail from the Nash mine store to the Keating mine. He has located a claim.——W. R. Conant is doing development work on his claim on Deacon creek.——H. Z. Osborn, formerly editor and proprietor of the Los Angeles *Express*, and M. H. MacIlvane, manager of the Nash mine store, have bought the one-half interest of J. Murphy in the Forest Queen mine and are running a tunnel which is expected to cut the ledge at 65 feet.——D. Donovan has located a claim on the Calahan trail near the Nash mine, one mile from the mouth of Hickory creek.——W. Maitland, Supt. Nash mine, has bought a copper prospect from C. J. Farmer. The claim is on Ram's Horn gulch, and, in addition to copper, shows gold and silver.——Ten men are employed at the Nash mine. The company is getting in such a shape as to work to advantage next year.

Tulare.

Porterville *Enterprise*: D. B. James, Supt. Minnie-Ellen mine, on Deer creek, reports finding ore in a vein 7 feet wide in one of the drifts. In the main vein they are in 30 feet of ore and still crosscutting. They have ore 90 feet wide in some veins. There are 3000 tons of ore on the dump.

Tuolumne.

The Tuolumne Mother Lode & Development Co. of Fresno has bonded the Columbus mine, which is a part of its property in this county, to San Francisco capitalists for $20,000. The Mother Lode Co. also owns the Big Oak group. This sale would give them $5000 for sinking on these mines, and the balance of $15,000 will go to stockholders as dividends.

Jamestown *Magnet*: Four claims on Whisky hill below Jamestown, known as Trio properties, have been incorporated under the laws of Wyoming, to be known as the Harvard G. M. Co., with a capital of 200,000 shares at $5 each. The claims included are the Trio, Mooney, McCann and Clark. The Erin-go-Bragh and Cloudman at Stent remain in the hands of the Trio trustees. It is reported a mill will be built.

Carters *New Era*: The Missing Link, adjoining the Buchanan, south of Carters, is being prospected by open cuts. A 6-foot vein has been found.——At the Buchanan a two-compartment shaft is being sunk which is down 650 feet. The company, it is reported, will put in an electric plant on the Tuolumne river. The mine has a 20-stamp mill and chlorination works.——The hoist, pump, buildings, etc., of the Junction mine, near Soulsbyville, have been transferred to the Laurel mines, near Arrastraville, owned by the Laurel G. M. Co. Eight men are employed at the mine.——The Chaparral, one of the pioneer claims of the east belt, is opened by two tunnels to a depth of 200 feet on a vein 2 to 7 feet

in width. The mine is being operated by Judge Lindsey of Columbia.

COLORADO.

The Argo smelter, at Denver, has complied with the eight-hour law and is running. The Guggenheim smelter at Pueblo is running. The closed works are under guard. At Central City men in the stamp mills are expected to strike. The mines already closed are the Commodore, Amethyst, Bachelor, Bachelor No. 2 and Last Chance, at Creede district; the Calliope and Hagerty, at Ouray; the Caribbeau and Montezuma, near Ophir; the Iron Mask and Black Iron, at Red Cliff; Smuggler, at Aspen. The Porter Fuel Co., at Durango, employing 150 men, has also closed. At Leadville 900 men have been discharged. Little except development work is going on. Four mines of the Colorado Fuel & Iron Co.—three near Canyon City and one in Pitkin county—have been closed down.

BOULDER COUNTY.

A strike of silver ore has been made in the Belcher mine on Caribou hill in the 200-foot level; almost solid silver ore was found. Three shifts are sinking the main shaft and when this lift is completed the shaft will be down 300 feet. Shipments are being made.

CLEAR CREEK COUNTY.

Georgetown *Courier*: By accident Mr. Anderson has located a new body of mineral in the 850 level of the Alluude mine.——A mill-run of ore from the Onie Bell returned four ounces gold and fifty ounces silver to the ton. ——Another tin discovery is reported in Clear Creek county.——A raise is under way on the Comet mine, Silver mountain, to connect with the old shaft. When the connection is made daily shipments are expected.——The Atlantic Milling Co. has entered into a contract with the Enterprise Tunnel Co. at Empire to do their concentrating. The output of the mine is now twenty tons per day, which will be increased.——H. Kneisel and others are developing a group of lodes on Democrat mountain. They have driven a tunnel 700 feet and within another 100 feet expect to reach a junction of lodes.

GILPIN COUNTY.

A recent strike in the Whiting mine, on the 320 level, is in ore assaying $200 per ton. Shipments from this property average thirty tons per day.

Eighty-three cars of ore were shipped from Blackhawk the first week in June.

The Maine is to resume operations under Mgr. Brereton. The present 250-foot shaft is to be sunk 100 feet deeper.

A new 25-stamp mill is to be built in Four-mile gulch, near the Rocky mountain concentrator, to be under the same management as the latter. It will be 33½x50¾ feet on the ground, of the slow-drop type.

Central City *Register-Call*: In May there were treated at the Rocky Mountain Concentrator in Black Hawk, 1250 tons of ore which produced 395 tons of concentrates. Mgr. J. Hannigan says A. L. Collins intends to put up a 25-stamp mill on the site of the offices at the rear of the concentrator. The mill will have twenty-five slow drop stamps weighing 700 pounds each and dropping thirty-five times to the minute.

GUNNISON COUNTY.

(Special Correspondence).—R. W. Spensley, formerly of Leadville, has gone to resume work on the Union Park placer property, which is near the Watson or Taylor Park placer. He is putting in a bedrock flume, which will have a length of 4000 feet and is 3¼x3½ feet. The company have already in 1600 feet of flume besides the one now building. Thirty men will be employed this season.

The Mgr. of the Watson placer is also on the ground and will start work. They will soon begin using the giants. It gives employment to fifty men.

Work has been resumed on the Maple Leaf property, on Cochetopa creek. The shaft will be sunk 100 feet farther and drifts and crosscuts will be run. The shaft is now 50 feet deep. Some rich ore has been shipped from it in the past.

At the Tuller & Riley property considerable development work had been done during the latter part of the winter, which has produced seventy-five tons of ore that will pay to ship. The vein is 8 to 20 inches wide and is in a dyke which cuts the schist formation nearly at right angles. The vein has been exposed by open cuts and shafts for 2000 feet, and in all these places free gold can be seen in the quartz. There is also tellurium in the rock. An offer of $40,000 has been made for this property by outsiders, but the owners demand a higher price; a deal is expected at a compromise price. The property is well situated for milling purposes, as it is thirty rods from Beaver creek, where power can be generated for all purposes.

It is rumored that the ore from the Diamond K did not run as well as expected, and work may not be resumed.

It is understood the Daniel Dorondo is under option to Denver people.

Ross & Breden report a rich strike on the Iron Cap hill. The rock is jasperized quartz and gold can be seen with the naked eye.

Work is steadily progressing at the Venable but all information is being suppressed at present for some cause.

The Underhill M. Co. have put a force of men on their three claims, west of the village of Spencer.

J. Dunbar is doing assessment work on a group of eight claims near the Iron Cap property.

The deal has fallen through on the Iron Cap mine.

The Vulcan mine has again started and they are filling the mine with miners as fast as they can secure good men. None of the strikers are being put on the force. The mine will again take rank among the foremost in the county.

The first car of ore from the Midland under its present management has been sent to the smelters. If it proves satisfactory many more will follow.

Mr. Johnson, the principal owner of the Branch mine, has put on a whim and is sinking. The shaft is 60 feet deep. This property is a copper prospect. The vein is 3 feet wide at 50 feet and will run 25% copper and some gold. The ore is principally red oxide. There are a number of other prospects near the Vulcan that show good values in copper.

It is reported the Standard and Sterling properties, on Cochetopa creek, are to be started. These mines produce milling ore which may be suitable to cyanide treatment. The vein is 3 to 7 feet wide and runs $10 per ton.

J. P. Smith has secured an option on the Keystone group through G. W. Bartholemew. He expects to open the property and ship ore. The property has large bodies of galena ore, which also carries silver, copper and gold. The vein is 15 feet wide; 2 feet of it will pay to ship without sorting, and the balance is a good concentrating ore. The property is developed by two tunnels, each 700 feet long. A number of other veins are found within the limits of the claims, but have had little development. The property is favorably located, both as to railroad and water power, being half a mile to each. The price to be paid is somewhat less than $50,000.

J. A. Goodwin is in Boston trying to float a property from this county with a good prospect for success.

Gunnison, June 10th, '99.

HINSDALE COUNTY.

The Lellie, seven miles from Lake City, which has averaged a shipment of 3¼ cars of ore per week for eighteen months, is to be equipped with new machinery, comprising hoist and compressor.

LAKE COUNTY.

(Special Correspondence).—It is estimated the section which holds the down-town mines at Leadville makes 2000 gallons of water per minute. To keep it unwatered five pumping plants are employed constantly, having a combined capacity much in excess of the present demand upon them.

The Weldon, one of the down-town groups, is operating its two principal shafts and will soon be producing, as formerly, 150 tons of lead-carbonate ore per day. Mgr. T. S. Schlessinger states that the force of thirty men will be increased.

The Neubian M. Co., also under the management of Mr. Schlessinger, is preparing to sink a shaft on a forty-acre tract which they control in the down-town district.

Leadville, June 7th, '99. WASCOTT.

The Comstock Mining and Leasing Co. has secured five well located claims near the Antioch, with a territory of fifty acres. These claims include the Amelia, Prince Albert, Comstock Nos. 1 and 2 and Thunderbolt. The new company will put down a shaft 800 feet. The officers of the company are A. W. Lawrence of Boston, Pres.; G. Flint of Boston, Sec'y and Treas.; R. B. Estey of Leadville, Gen. Mgr. One of the new shafts sinking on the Alhambra placer of the Revenue Co. will be sent down 600 feet. A second shaft has been started on another part of the ground and a third shaft will be started. The Revenue people have 140 acres of ground in their combination, which lies between California and Iowa gulches, and is about a mile east of south of the city. The officers of the Revenue Co. are R. C. Surbridge of Boston, Pres.; G. M. Steer of Boston, Sec'y and Treas.; R. B. Estey of Leadville, Mgr.

The President mine on Breece hill has commenced shipping fifteen tons of gold ore daily, adding another to the list of producers of the gold belt.

The Louisville mine, owned by D. H. Moffat, is now a producer of zinc ores as well as oxide and sulphide ores carrying gold, silver and lead. Zinc is being broken for the zinc mill in California gulch.

MINERAL COUNTY.

(Special Correspondence).—The owners of the Amethyst resumed management of that property on June 1st, at the expiration of Carver & Miller's lease.

The Commodore maintains its shipment of 400 tons per day.

The Happy Thought mine has been pumped out down to the seventh level, giving access to ore blocked out on that level. Part of this ore is concentrated at the Happy Thought mill and the balance shipped to the smelters.

Creede, June 12th, '99.

MONTROSE COUNTY.

The La Sal mountains, near the boundary line of Colorado and Utah, promise to be the scene of active prospecting and development during the coming season.

The sandstone surrounding the La Sal range extends entirely around the mountains, and everywhere is more or less impregnated with copper. The circle commences at La Sal creek, on the Colorado side of the range, where the Paradox mine is located. The ore is found again in the Big Indian mine, on the south slope, then in the Salt Wash district, on the west end, then in the Welsh and Huntsman, on the north, and from there the line is traced back to the Paradox, the distance being about 200 miles.

The Salt Wash district has been examined by T. L. Darby, who says that it is not likely to prove valuable, but other mines have opened into bodies of ore and are being developed. The Huntsman group of three full claims has been sold for $80,000 and the owners are putting the property in shape. The company will ship forty tons of ore to Salt Lake City.

R. Dillon has located a tunnel. The tunnel will reach a vertical depth of 1500 feet from the apex of the mountain.

A number of low-grade gold prospects have been found in the vicinity of Miners' basin and a company has been organized to build reduction works. Chicago people have bought the Mazeppa mines in Beaver basin and are considering the building of cyanide works.

OURAY COUNTY.

Sunday the Wedge M. Co., at Ouray, posted a notice informing the employes that the miners would go down the shaft on the company's time and come up on their own time, and take one hour for dinner. This action was not in accordance with the eight-hour law, according to the miners' views. The mine was closed down and the men paid off.

One hundred cars of ore were shipped from Ouray in May.

The force of men on the Revenue mine is larger than it was last year.

The Atlas, on Bear creek, is proving a success and working with increased force.

PARK COUNTY.

It is reported at Colorado Springs that the Green Mountain M. Co. has sold its thirty-two claims and 2500 acres of placers, patented, to the Calumet & Hecla M. Co. The property is located in Alma district and is undeveloped The Lee shaft is in a 5-foot vein of copper and iron pyrites. The mines are equipped with machinery, and two mills are in operation.

SAN JUAN COUNTY.

(Special Correspondence).—On the 9th inst. B. W. Sweet of Denver secured a contract to erect a 50-ton concentration mill at Gladstone, near Silverton, for the Red Mountain & Bonita G. M. Co., of which Dr. C. A. W. Zimmerman is Gen. Mgr. and whose home office is at Quincy, Ill. The mill will comprise stamps, rolls and concentrators. The Gates Iron Works are to furnish the machinery.

Denver, June 9th, '99. WASCOTT.

The Silver Queen is being developed by its owners, most of whom are residents of Kearney, Neb. It is to be further equipped with machinery. The development is mostly tunnel work at different levels on the vein. The ore is smelting and of a grade to stand shipment. It is claimed ores of the value of $30,000 have been shipped.

SAN MIGUEL COUNTY.

Denver *Republican*: Shipments for May from the Ophir district show an increase. The last week was the heaviest of the month, the total being thirteen cars—four cars of concentrates from the Caribbeau, four cars of ore from the San Bernardo, one from the American Frenchman, one from the Montezuma, two from the Butterfly and one from the Alta.

SUMMIT COUNTY.

The Hamilton mine and mill, in Summit gulch, are expected to start up in a few days. Concentrates, accumulated during latter part of winter, are being shipped.

TELLER COUNTY.

(Special Correspondence).—The Work properties on Raven and Gold hills are worked by sixteen sets of lessees. The gross receipts from sale of ore for the year ending June 1, was $46,102.

The output of the Orpha May on Bull hill was 750 tons of ore for the month of May, averaging four ounces gold to the ton.

A recent shipment of ten tons of high-grade ore from the Last Dollar on Bull hill brought $1900 to the ton. This came from a newly opened body of ore containing a streak of quartz carrying fine gold and is below the sixth level.

The Isabella Co. has declared a dividend of 2 cents per share, amounting to $45,000, payable June 26th.

The National M. & L. Co. are preparing to develop a group of properties on the north slope of Tenderfoot hill. It is claimed this company paid $5000 for the group of twenty-one acres.

The Matoa G. M. Co., whose Matoa mine is on Gold hill, have purchased an adjoining property known as the Johnson lease, claimed to have produced $500,000. The purchasers will sink 200 feet to the 800 level.

Cripple Creek, June 11th, '99.

Denver *Republican*: A large quantity of mineral is being broken by two sets of lessees operating on the Pinnacle Co.'s ground, who recently made good strikes.——On the Lansing the lessees are getting the lease in better shape as regards equipment. In the breast of the drift run at the second level the ore body measured 5 feet.——The strike made on the Mitchell of the same company is holding out. The lessees are preparing a carload shipment to be sent out this week. There are ten tons in the bins. The find is supposed to be a new vein, the strike being toward the Lansing workings.

IDAHO.

J. Lefler, a prospector, reports a discovery in the Crooked river country, midway between Buffalo Hump and Salmon river.

Warner Bros. have 8 feet of lead, of which 5 feet is solid quartz and 3 feet granulated quartz which assays $45 and this has been stripped for 900 feet. The claim is named the Drum Lummon.

Smith & Blake have also made locations, their principal one being the Monday, parallel to the Drum Lummon on the west.

While water has been plentiful the Granite M. Co., has been ground sluicing its ledge east of the old works and uncovered it where it was 18 feet wide. In the old workings the ore is a high-grade gold ore, but base, the amount of free gold saved on the plates being small and concentrates run high enough to ship to the smelter. Where the vein was recently uncovered it is galena, the surface assaying 30% lead, $13.27 gold and two and one-half ounces silver, making ore worth $40 per ton.

The second payment of $25,000 on the bond of the Big Buffalo mine at Buffalo Hump is reported paid. Since the first payment a shaft has been sunk 60 feet. The Big Buffalo was purchased on a bond by Clark & Sweeney of Spokane, and it is understood to have been floated in New York.

There is excitement in the Boise basin country over the discovery of a rich gold ledge three miles west of Idaho City.

Placer gold is reported discovered on the St. Joe, near the mouth of Slate creek. The gold was found on a side gulch high above the creek, but at last reports bedrock had not been reached.

The Helena and Frisco mines at Wallace have started up with twenty to twenty-five men each, under military protection.

Spokesman-Review: The Monte Cristo mine at Buffalo is working seven men, running three shifts of eight hours each. They are down 30 feet in the shaft, in ore, with neither wall in sight. The quartz from the shaft shows free gold.——The Saint Paul, adjoining the Monte Cristo, has had crosscutting on the surface and shows the same character of ore as the Monte Cristo. For 4500 feet the ledge shows a width of 6 to 10 feet on the surface. ——On the Big Buffalo workmen are crosscutting. It is said that the crosscut is in over 40 feet and the other wall not reached. ——F. Brown, constructor of the trail into camp, says the workmen are within thirteen miles of camp, and he thinks ten days more will see the work completed.

Boise *Statesman*: The DeLamar M. Co. is reported to have purchased the Big Buffalo mine for $500,000 on June 7, the first payment of $25,000 to be made July 15. This mine is the original discovery of the Buffalo Hump camp.

Salt Lake *Tribune*: At Salmon City, F. Ibach arrastraed ten tons of ore from the Kittie Burton on Indian creek, which turned out a bar weighing thirty ounces in gold, with ten ounces remaining in the crevices of the arrastra, which continues to run on the same class of ores. There are 18 inches on the foot wall that will average $75 per ton.——The representatives of New York parties who recently bought the Ulyssus group of Suydam & Ibach are letting contracts for a 5-stamp mill, etc., the machinery for which is at Red Rock station.

NEVADA.

Repairs to the hoisting engine at the C. & C. shaft in Virginia City have all been completed and work resumed in the Consolidated California & Virginia mine through the shaft. The first elevator will be raised, the defect located and remedied and the elevator again put at work. Meantime the second elevator keeps the water down, running eight hours out of twenty-four.

The New Pass M. Co. has shipped its first gold bullion from ore running $16 per ton.

The Dexter M. Co. of Tuscarora has sent over $5000 in bullion to Salt Lake.

De Lamar *Lode*: Searchlight lies between Manvel, San Bernardino county, Cal., and the Colorado river, being ten miles west of the latter and twenty-five miles northeast of Manvel, the terminus of the California Eastern railway. There is a good wagon road to the camp. There are 150 persons in Searchlight district, and twenty of the properties are working. Among those developing mines are F. W. Dunn, E. J. Coleman, F. C. Perew, B. Macready of Los Angeles, and Daugherty, Rose & Colton.——The New Years Gift and Searchlight are owned by the Searchlight M. Co. On the New Years Gift two shafts have been sunk 100 feet apart and connected at the bottom by drift. There is also a drift 30 feet east of the shaft and an upraise 50 feet. The shafts were sunk on the vein, and in sinking considerable ore was taken out and one carload shipped. On the Searchlight two shafts have been sunk, one 100 feet and the other 120 feet. They are parallel claims; the shafts were sunk 120 feet apart and on the vein. A drift will connect the shafts. The drifts were run in the wall and the ore left in place. All the ore extracted in sinking is on the dump with the exception of a few carloads shipped for test. The width of the vein is 4 feet and will average $23 in gold per ton. There are twelve men employed. Sinking will be continued as soon as air connections are made.——The Good Hope claim is owned by F. Colton. It has a shaft 100 feet deep on the vein, and in sinking several carloads taken out were shipped which averaged $125 in gold.——F. Perew has a number of claims upon which 300 feet have been sunk.——E. J. Coleman is down 50 feet on three of his claims and has a good showing.——B. Macready is opening the Golden Treasure and Copper King.——On the Copper King a shaft is down 100 feet and a 50-foot shaft on the Golden Treasure. These claims are parallel. They are drifting on the vein to connect the two shafts. The vein is 18 feet wide. In running a crosscut 50 feet two veins were encountered, one 4 feet and one 18 inches wide, each averaging $30 in gold per ton. A whim has been put up and ten men are employed. So far ore is piled on the dump until the best method of treatment is determined.——On the Goodenough and Rajah claims, owned by Boller and Lovey, two shafts have been sunk to a depth of 70 feet and both show ore.—— The Hopkins group of six claims is in charge of F. W. Dunn. The owners of this group are also part owners of the Copper King and New Years Gift. On the Pope there is a perpendicular shaft 100 feet deep which cuts four veins, the smallest of which is 14 inches, the largest 4 feet; from the bottom of this shaft a crosscut has been run to tap seven parallel veins which crop on the surface. On the Columbia a 50-foot shaft has been sunk and 30-foot drifts run on the vein. This vein, as well as other veins, runs northeast and southwest. The Columbia veins dip to the southeast, the Pope and Boston to the northwest. On the Columbia a double-compartment shaft is down 75 feet, timbered. Sinking will be continued. On the Boston a shaft on the vein has been sunk 220 feet, and at the 100-foot station drifts both ways have been run 300 feet, and at the 150-foot station drifts each way 125 feet. At 205 feet water was encountered and at this point a drift has been started to make connection with the double-compartment shaft, a distance of 150 feet. The crosscut is now in 80 feet and in this distance three veins have been passed through.

NEW MEXICO.

Santa Fe *New Mexican*: W. R. Doran and W. W. Fitzpatrick have opened a 4-foot vein

of fine looking copper ore in Lincoln county. ——Work at the Malaga coal mines has been suspended and the force removed to the Salado mines.——The claim holders of the Jicarilla mining district will put a stop to the illegal cutting of timber.——The Colorado Fuel & Iron Co. employs forty mules and sixty horses hauling ore from Hanover to Santa Rita.——H. C. Meyers made a gold discovery at Gold hill, near Lordsburg. Assays of the paystreak run six to fifteen ounces in gold. ——After two years of work the Catherine management has struck the rich Snake vein in Sierra county.——W. H. H. Llewellyn has given orders to resume work on the tunnel in Animas peak.——All the men on the Timber Peak mine and mill, with the exception of three, were laid off and work will not be resumed until the return of Mgr. R. H. Sanders from Philadelphia, where he is attending a meeting of the stockholders.——A gasoline engine and hoist have been put up at the Excelsior mine, Organ.——The Mormon mine near Organ has been bonded to Enock & Jewel of Kansas City.——J. C. Greenway of Pittsburg, Pa., has taken a bond and lease on a group of copper claims in the San Andreas mountains. He will put a force of men at work under T. Jones.——A 10-inch lead of galena has been struck on the left fork of Red river.——A. R. Manby of Taos has located a number of gold and copper claims in the Rio Arriba copper country.——The Abbott Bros., working the iron placers on Placer creek, are taking out gold in paying quantities.——Development work has commenced on the Grand View on the Columbine. The property carries lead and gold.——The Whale mine, recently sold to Montana parties, is shipping gold and copper ore and prospectors are making new locations and starting development. ——The Mystic, on the west side of Baldy, in Colfax county, has been bonded to Indiana parties for $40,000.— Prospectors near Sweet Water have discovered a lead of quartz cropping near an inclined bed of copper-bearing shale.——J. G. Schuman of Santa Fe has bought one-half of the interest in the Texas Girl, near Bland, from T. B. Ward. He has also bought the Padre lode from M. Hill.—— Much of the ore taken from the Montoya mine, Santa Rita, runs 75% copper.——Burns & Spafford have leased the Romero Extension mine at Santa Rita, Grant county, and have sunk a 100-foot shaft. They employ fifteen men.——Bible, Halleck, Jay & Co. have sunk a new shaft which taps the old Spanish workings on the Carrasco mine at Santa Rita. They found a nugget of copper weighing 1500 pounds.——Bragaw & Potter are working the Modoc-McCarth group at Hanover, recently sold by A. W. Tenant of Santa Fe. On the Modoc a drift was started in the ore body. The returns at the smelter give 7% to 12% copper.

OREGON.

(Special Correspondence).—A number of mining men have been making an examination of the property of J. H. Searles, near Cornucopia. The property has a 20-stamp mill and comprises a group of fifty claims. The ore is concentrated and shipped to Tacoma. Concentrates are reported to run $225 per ton. The veins are from 2 to 10 feet wide.

The placer mines of J. Arthur are again being worked. The force will be increased as soon as the snow in a 30-inch sluice permits.

Cornucopia, June 4th, '99.

Sumpter *News*: Dr. J. J. Fisher and D. Copping of Sumpter have sold their Pine creek placer ground to H. E. Courtney and J. I. Sturgil of Baker City.——The Sloan & Haskell placers at Susanville are showing up well. As high as $85 to the pan has been taken out from bedrock, we are informed by Mr. Sloan.——J. M. Jones has sold his half interest in the Golden Treasure, the west extension of the Amazon, to S. Chapman of the Ibex for $4000. There are four parallel veins in the property, with a considerable development and necessary buildings. Assays will average $15, running as high as $40.——J. D. Young and P. G. Estes of Sumpter have sold their Gold Hill mine, an extension of the Mammoth, to J. A. Panting, Mgr. Burnt River M. Co. The consideration is $15,000, of which $5000 was paid down.——The Annalulu mine, situated on the same vein as the Mammoth and Amazon near Sumpter, was bonded by the owners—L. J. Hazlewood and Dr. G. W. Tape—to S. Chapman of the Ibex. The bond is for $15,000, payable in two years, with a cash payment of $1500. Dr. Tape purchased a one-fourth interest in the Annalulu last winter for $200.

Grant's Pass *Mining Journal*: The Channel hydraulic placer property and adjoining claims, comprising the Old Channel 60 acres, Booth 160 acres, Oregon 160 acres, Rialto 160 acres, Powelson 20 acres, Golden Link 60 acres and Rich gulch 40 acres, situated on Six Mile creek (a tributary of the Illinois river), thirty-two miles from Grant's Pass, has been sold to C. B. Beardsley, W. H. Thompson and others of Chicago. The owners were J. O. Booth, F. D. Burns and associates. It is an auriferous gravel deposit, occupying a high plateau 400 feet above the river, on which there is a frontage of more than two miles. The mine has been worked for years in a small way. The property will be equipped with modern hydraulic mining machinery, and Surveyors Wright and Perkins have made surveys for a ditch that will be 3½ miles long and give them a pressure of 300 to 350 feet with about 2000 inches of water.

SOUTH DAKOTA.

On the Dakota Maid M. Co.'s property of fifty-four acres large bodies of ore are opened up. The Dakota Maid has a 1000-foot tunnel and a 160-foot shaft with stopes at the bottom, besides numerous tunnels, pits and shallow workings on different parts of the location. When the west drift is extended 20 feet on the level of the 1000-foot tunnel it will tap the fissure at a vertical depth of 376 feet.

The Holy Smoke camp is two miles from Keystone. The Holy Smoke was located by J. A. Clark. The Golden Return M. Co., composed of H. F. Chipman, J. H. Duffie, H. Binswanger and E. G. Stevenson of Detroit and J. A. Clark, own the Holy Smoke and Vulcan, which originally included ten claims, to which have been added, by purchase, four adjoining claims. There are on the property five ledges, two of which have been opened. A shaft has been sunk on the Holy Smoke 150 feet and an ore body 40 feet wide encountered, assays from which return $3.10 to $24.80. It is free milling and concentrating ore. In the Vulcan shaft, 100 feet, ore was found a few feet from the surface and the shaft has continued in ore all the way down. The ore is copper and gold similar to the Holy Smoke and assays from $1.60 to $9 in free gold and $14 to $90 in concentrates. It is the intention of the company to equip the Vulcan shaft with a steam hoist, pumping plant and air compressors.

Deadwood *Independent*: Wolzmuth & Co., owners of the cyanide plant at Spearfish, and who have a lease on the Alameda property, near Portland, are shipping regularly to their plant in Spearfish.

UTAH.

The Jersey Blue group of mines at Bingham has been sold to Eastern people, it is reported, for $250,000. The purchasers include C. E. Graham and J. Kennedy of New Haven, Conn.; C. Burr of Middleton, Conn.; J. B. Collins of Chicago and I. S. Pine of Colorado. The vendors include Dr. J. K. W. Bracken, J. C. Dugan, C. H. Lashbrook, E. Rauch, J. Poudler and W. C. Hazelgrove of Bingham; F. L. Force of Charlotte, Mich., F. Pence of San Francisco; and O. Will of Salt Lake. The Jersey Blue group consists of the Jersey Blue claim, the I. X. L., Little Cottonwood, Big Giant, Elmore, Manila, Albatros, Harrison, Howard and Chandler, containing nearly 200 acres.

Salt Lake *Tribune*: At Castle Dale, from the work done, it is evident that the main body of mineral is confined to a blanket deposit, varying in width from a few inches to many feet, and extending from Green river to Hanksville on the east and from Castle Dale to the Fremont river on the west. In the center of this area is what is known as the San Rafael swell or reef. This reef is the result of volcanic disturbance, the formation being sandstone and lime. Porphyry has been injected into the overlying strata. The erosion of the crown of the uplift has left a jagged fringe of rock encircling the center of the disturbance. It is between the main body of the reef and what has been the overlying formation that the principal deposit of mineral-bearing rock is found, chiefly copper, carrying small quantities of gold and silver. The copper occurs in a layer of lime varying in thickness from a few feet to 24 feet, and encircling the reef a distance of 200 miles. The blanket, where it is exposed, dips from the reef at an angle of 45°, diminishing until it reaches its normal position of horizontal, where it attains an estimated depth of 3500 feet below the furface. Besides this blanket there are in the main reef fissures of more or less extent and width carrying values in copper and silver of a better grade than are found in the blanket.

WASHINGTON.

The Dear Trail No. 2 M. Co. paid a monthly dividend of $2500 June 15, making a total of $32,500 paid by the company from ore shipped in course of development, never exceeding four cars per month, and rarely more than two. The mine is in Cedar Canyon camp and produces high-grade silver ore.

J. Howard has located a group of copper bearing veins in the south half of the Colville reservation on Capital hill; he has a vein 10 feet wide carrying copper ore.

Galena and copper ore have been found in the Mable at Republic. The finding of galena ore is something new in Republic camp.

The mines of Republic camp are reported to have done development work during May which aggregates one mile of shaft and tunnel.

Spokesman-Review: The Morning Glory at Republic is to be developed to greater depth. A winze will be sunk from the tunnel on the ore shoot which was first opened in the shaft and later in the tunnel.——The North Star G. M. Co. has closed a deal for the purchase of a fractional claim which lies east of the North Star claim in Republic camp, which gives a tunnel site on the level of Granite creek, from which a tunnel can be run in 300 feet to tap the vein.

WYOMING.

T. F. Carroll of Fremont, Neb., is doing development work on the Shipper mine on Miner creek, four miles south of Grand Encampment.

FOREIGN.

AUSTRALIA.

Melbourne *Standard*: The Yankee Creek district, ten miles east of Bendigo, has for some time been prospected by private parties, and some promising shows have been opened. Slingo and party have had profitable results, a crushing going as high as four ounces to the load. The pioneer prospector, Mr. Greaves, sank a shaft 200 feet to water level and crushed stone which went 9½ dwt. per load. Twelve months ago another shaft was sunk, 270 yards south of the original workings and a reef was cut 6 feet from the surface. The stone was 16 inches thick and was followed down on the eastern underlie 75 feet, varying in thickness from a few inches to 5 feet, averaging 3 feet. From this reef twenty-one loads have been crushed for seventy-five ounces, 19 dwt. Slingo and party have been successful. They are driving on 3 feet of stone, in which fine gold can be seen at a depth of 70 feet. A small battery in the district is needed as the stone crushed has to be carted to Bendigo or Ellesmere. —— The Inverell Diamond Field, Ltd., have plenty of water for all purposes. One hundred men are employed in the mine. The washing turns out rich both in diamonds and tin.——Elliott's Soldier's Hill property is running. His diamond and tin saving machine is working satisfactorily.——The Old Malacca, idle for some time, is starting again.——Kenzie & McCartney have bottomed their new shaft on wash, and the prospects of diamonds, gold, and tin are better than any they have had previously.——On the Borah Creek silver field, J. Howell has put in two tunnels and sunk two shafts on a rich silver mine. The ore is is a clean galena, going 70% lead, and at the present price of silver each ton of ore is said to be worth £22. This lode is 2 feet to 5 feet thick.

BRITISH COLUMBIA.

The Canadian Pacific extension from Rossland to Penticton, via Greenwood camp, is being pushed rapidly.

The parties interested in the Old Ironsides and Knob Hill groups at Greenwood have commenced the construction of their smelting plant. On these properties are large ledges of low-grade copper sulphides and iron, carrying gold values. The vein matter contains considerable lime. This camp is seven miles north of the Washington line.

Since the snow has about disappeared in Burnt Basin district there has been a renewal of activity in that section. The ores at first found were of the free milling sort, but more recent exploration has developed large deposits of sulphide ores. The Mother Lode is being developed. One vein of free milling ore on this property has been stripped for 200 feet and another of high-grade ore, 5 feet in width, has been uncovered. Another, showing 13% copper, has been stripped 1000 feet. The management will tap these ledges by running a 300-foot tunnel.

The Pleasure of Hope, owned by the St. George M. & D. Co., T. G. Elgie of Rossland Mgr., is being worked and the shaft is said to be in solid ore.

J. Hamill of Armstrong, B. C., and D. Graham visited the Basin to have some claims surveyed. They, with others, own the Barrow, Copper Farm and other properties. One of them was recently bonded for $20,000.

The Jackstraw, 1500 feet from the Mother Lode, owned by Hunter & Sharp of Rossland, has been worked and a ledge of free milling quartz uncovered. Free gold is visible to the naked eye in samples.

Willarson & Johnson have given a thirty-day option on the Big Chief group to a Montreal syndicate. These adjoin the Mystery group and have the same general formation.

Cowan & Hickman have commenced work on the Lucky Four, a group of claims situated on Boulder creek, seven miles from Trout lake.

J. W. Westfall, Supt. for the Old Gold & Primrose M. Co., will commence work on two of the company's properties with an increased force.

Morrison, McCord & Johnson have given an option for thirty days on the John L. group to J. Dixon of Vancouver. The value placed on the property is $20,000.

The Silver Belt group on Brown's creek, west of the south fork of Lardo river, on the Silver Cup ledge, will be worked this summer. The owners, H. H. Johnson and M. H. Dobie of Rossland and G. K. Morton, St. Thomas, Ont., will be associated with Eastern capitalists.

A strike has been made on the Merchant Townsend group, also known as the Downs group, above the Sunset property on Trout creek, near Index.

On the Capella group, Goat mountain, near New Denver, work is still in progress and high-grade ore is being taken out. A shipment of ninety sacks is being packed to the wharf.

Work is being pushed on the Hartney, Merrimac, Marion, Convention and Home Run, on Silver mountain, on all of which ore is showing.

Kaslo *Kootenaian*: A find was made last week by H. Mathews three miles from Duncan City on Howser lake. The formation is lime, believed to be a continuation of the lime formation on which the Bannockburn, Wagner, Gertrude and other claims are located. This is the first important discovery on the peninsula. Mathews states that the ore is $30 galena.

SOUTH AFRICA.

South African *Mining Journal*: The Schuller diamond mines are developing their No. 2 mine, ninety claims in extent. There are 20,000 loads of yellow ground on the floors, which will be ready for washing at the beginning of the month. There are 600 loads of blue on the floors weathering. The manager is sinking an incline to prove the northern boundary of the pipe. The opinion is held that these pipes, which occur in the Magaliesberg sandstone, will go down straight, and not like the pipes of other parts which crop out through shale and are funnel-shaped, tapering off to forty claims at 1000 feet depth. ——At the Wilgespruit, 660 feet to the north of the new reef, are found the Hospital Hill shales, much contorted, but unmistakable; the intervening space is occupied by beds of quartzite, with small bands of shale. On the footwall of the reef there is a thick bed of quartzite, and a thin band of shale separates this from the reef proper. This shale contains only a small quantity of gold. The reef itself is 3 feet in thickness and consists of altered quartzite. There are evidences of stratification, and the opinion is that the reef is one of the sedimentary beds of the Witwatersrand series. On the hanging wall of the reef there are 6 feet of quartzite and then shale; some distance south is another quartzite leader which pans gold on the outcrop. South of this are quartzites and shales, the latter predominating. Assays show at 22 feet, 3 feet of reef, 24 ozs. 17 dwts.; at 30 feet, 33 ozs. 6 dwts.; at 35 feet, 28 ozs. 4 dwts. The crosscut is in some distance, and has not reached the reef; it may be broken and have to be found underneath. A fault having been met with in the crosscut indicates the latter probability. At the surface where the principal shaft is located the outcrop 8 feet gave 15 dwts.; 190 feet west another shaft is being sunk in shales north of the reef, and 300 feet farther west is another. On Weltevreden the outcrop has been located at two places, and in both instances the reef shows well. To the east, on Waterval, the reef has been located in the same relative position to the Hospital Hill shales and pannings obtained. The old reef worked ten years ago on Sayman's portion of Weltevreden lies half a mile to the south of the new line, and the prospectors claim that their strike is a new one, no systematic work ever having been done on it before.

Personal.

A. A. BLOW, M. E., was in Denver, Colo., on the 9th inst.

J. P. EVANS, of the Colorado Iron Works, is on a trip through the East.

W. B. WILSON, Supt. Elkton mine, at Cripple Creek, Colo., has returned from Scotland.

E. E. CHASE, M. E., Denver, Colo., was recently in Butte, Mont., on professional business.

C. D. LANE, Woodson Garrard and party, of Angels, Cal., left for Alaska in the yacht Townsend.

J. M. HANAUER, Mgr. Hanauer Smelter at Salt Lake City, Utah, was in Denver, Colo., on the 8th inst.

R. H. CHANNING JR. has taken charge of the Highland Boy at Bingham, Utah, in the capacity of Mgr.

A. E. LINDROOTH, Denver, Colo., representative of the Link-Belt Machinery Co., Chicago, Ill., recently made a trip to Arizona.

HORACE F. BROWN, who recently furnished the plans for the mill for the Economic Gold Extraction Co. at Victor, Colo., has gone to Chicago, Ill.

R. J. WALTER, Mgr. B. & M. mine at Ward, Boulder Co., Colo., recently made mine examinations in the Black Hills and Bradshaw mountains, Ariz.

F. G. FARISH has resigned his position with the Grand Central M. Co., Ltd., of Minas Prietas, Sonora, Mexico, to take charge of the Humboldt mine at Ouray, Colo.

N. MANSFIELD, who for nine years has been Supt. Smuggler-Union mine, at Telluride, Colo., has resigned his position, being succeeded by C. W. Miller, formerly of Aspen, Colo.

Recent Mining Incorporations.

Manhattan G. M. Co., San Francisco; capital stock, $250,000—subscribed; C. E. Hegard, C. A. Kroch, C. V. Hegard, H. Boldt, G. E. Dangle.

Royal Oil Co. of Coalinga, Fresno, Cal.; capital stock, $500,000; subscribed, $25,000; C. A. Canfield, J. A. Chanslor, W. Easton, G. D. Easton, L. Phipps.

Black Hill Oil Co., Fresno; capital stock, $250,000; subscribed $100,000; L. S. Chittenden, A. L. Hobbs, H. J. Pfluger, H. Nathan, W. B. Holland, A. B. Smith, F. J. H. Manning.

Stanislaus Dredging Co., San Francisco; capital stock, $25,000; subscribed $12,700; N. M. Stover, C. H. Shorey, Sonora; C. H. Cornell, F. P. Bull, San Francisco; S. Goodenough, Oakland.

The Turner Oil Co., Los Angeles; capital stock $30,000, subscribed $8000; M. W. Turner, H. C. Turner, F. C. Turner, G. W. Brookins, J. T. Kirkwood.

Hanford & Oleander Oil and Mineral Co., Hanford; capital stock $320,000, subscribed $160,000; R. J. Wilson, W. J. Wilson, C. A. Lauder, H. C. Lauder, B. L. Barney.

Dolly Varden M. Co., San Francisco; capital stock $1,000,000, subscribed $5000; P. W. Johnson, E. A. Barber, W. A. Sabin, A. L. Black, H. S. Wilson.

Commercial Paragraphs.

THE Colorado Iron Works reports a strong demand and large sale of Bartlett concentrators.

THE Dillon Iron Works of Denver are making several of the Woodbury Imperial concentrators for Colorado trade.

THE Jeanesville, Pa., Iron Works Co. have received an order from British Columbia for three of their compound mining pumps.

SKINNER & SETHMAN, Denver, Colo., agents for the Gates Iron Works, recently sent a Tremain stamp mill to a mine in Chihuahua, Mexico.

J. GEO. LEYNER, manufacturer of mining machinery, Denver, Colo., will soon move into his new shops at Thirty-sixth and Wazee streets, and into city offices in the Albany Hotel building.

THE Denver Engineering Works reports a heavy demand for Cammett concentrators, manufactured by them at the rate of thirty per month. Tables of this make were recently shipped to Breckinridge for the Mountain Pride mine and the Ault-Wilborg Co. They are building three 150 H. P. double drum electric hoists for the Le Roi mine at Rossland, B. C., and report fourteen sets of rolls in process of construction; also the building of a double 12x18 steam hoist, twenty-four special ore cars, six electric mine blowers and three electric incline hoists for points in State of Durango, Mexico. They have built a Loder pyritic smelter to be erected at Kokomo, Colo., and are building one of the same type, having a 200-ton furnace, for parties near Atlanta, Georgia. This kind of furnace, it is claimed, effects a great saving in fuel. They recently filled orders for three cars of water jackets for Colorado smelters.

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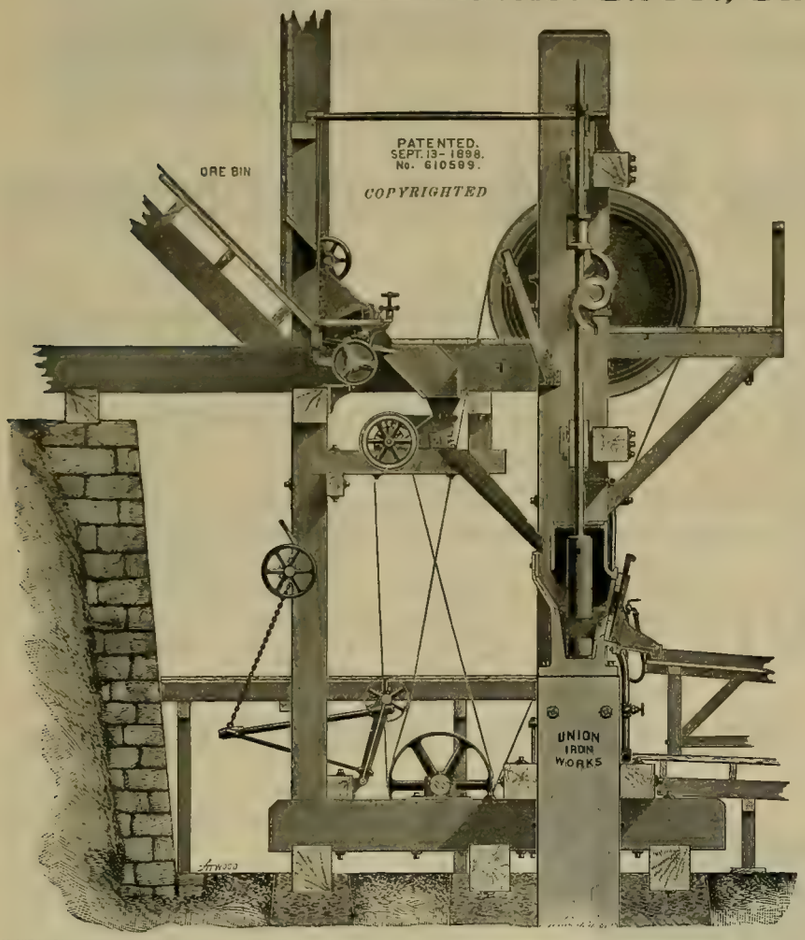

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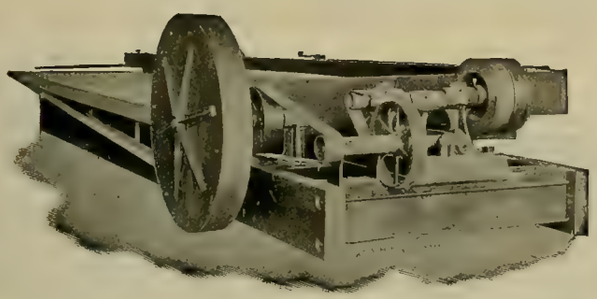

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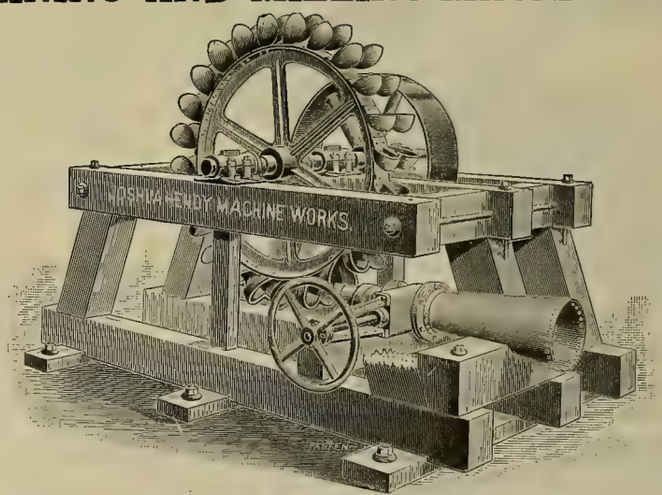

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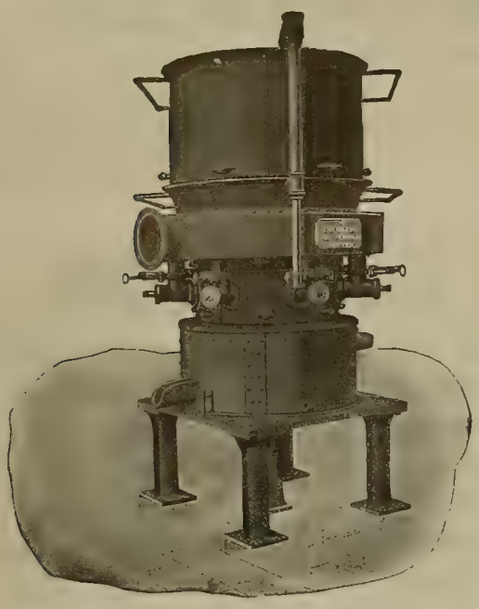

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(SEE PAGE 648.)

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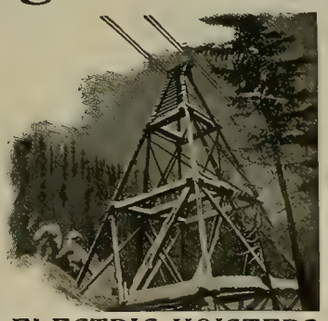

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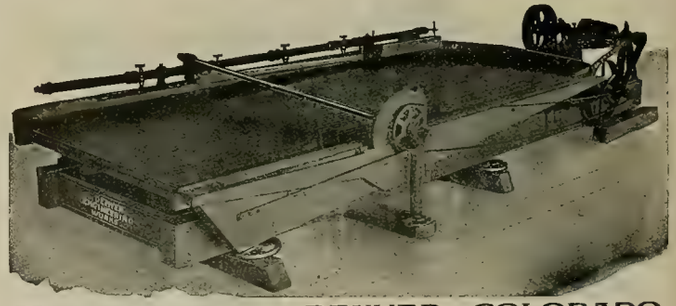

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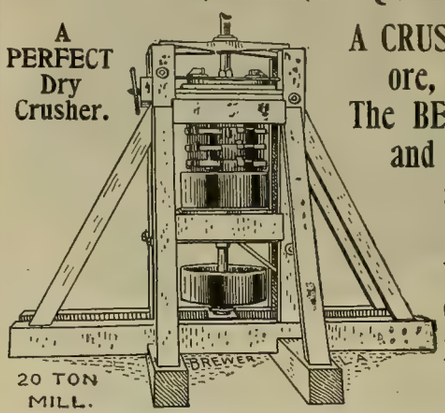

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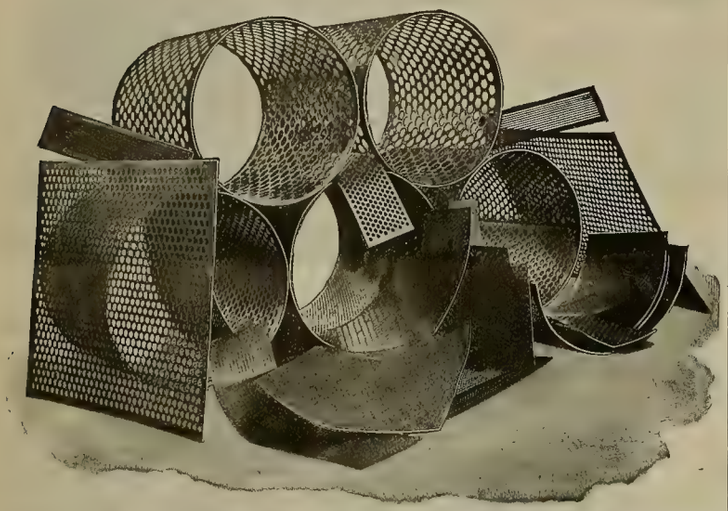

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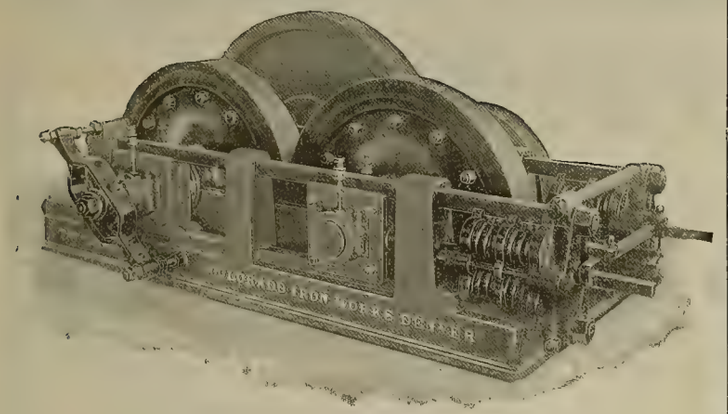

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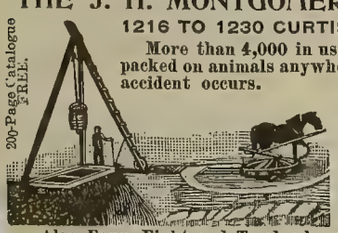

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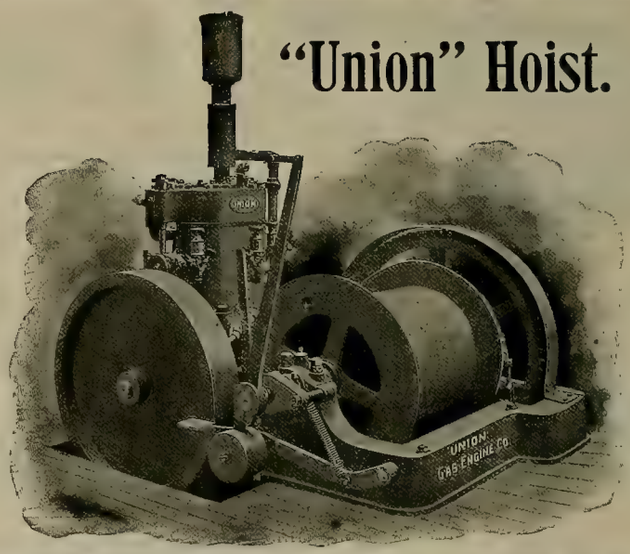

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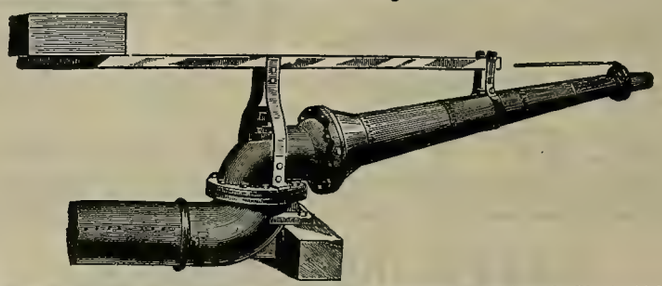

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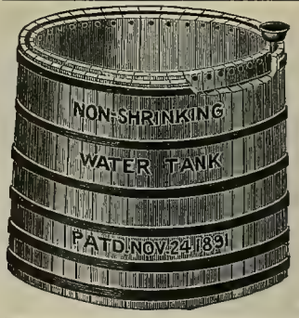

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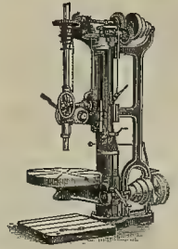

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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JUNE 6, 1899.

626,474.—HAND BRACE DRILL.—W. H. Ames, Watsonville, Cal.
626,452.—WAVE POWER PUMP—J. E. & W. Armstrong, Santa Cruz, Cal.
626,360.—DIGGER—D. M. Baldwin, Griffin, Cal.
626,453.—GANG PLOW SEEDER—J. E. Beach, Routier, Cal.
626,317.—STOPPING HORSES—A. B. J. Brown, San Jose, Cal.
626,269.—GATE—E. G. Cameron, Corvallis, Or.
626,487.—FILTER—Cook & Cohoon, Sacramento, Cal.
626,506.—HOSE NOZZLE—B. C. Crane, Montesano, Wash.
626,461.—CONCENTRATING BELT—G. Gates, Jackson, Cal.
626,423.—EDUCATIONAL APPLIANCE—J. H. Hargens, S. F.
626,465.—HEATING FURNACE—A. Johnson, S. F.
626,431.—GANG EDGER—S. B. Kentfield, S. F.
626,326.—ORE CRUSHER—J. F. Keyton, Baker City, Or.
626,434.—HAY RAKE—A. F. Martin, Chester, Cal.
626,626.—LEMON SQUEEZER—E. A. Middlekauff, S. F.
626,627.—BICYCLE LAMP—E. A. Middlekauff, S. F.
626,280.—PIE PLATE LIFTER—W. P. Murphy, Willowglen, Cal.
626,293.—SAW GUIDE—C. Palmleaf, Woolley, Wash.
626,338.—LOCK—B. Phelps, Seattle, Wash.
626,339.—LOCK—B. Phelps, Seattle, Wash.
626,340.—LOCK—B. Phelps, Seattle, Wash.
626,341.—LOCK—B. Phelps, Seattle, Wash.
626,342.—LOCK—B. Phelps, Seattle, Wash.
626,343.—LOCK—B. Phelps, Seattle, Wash.
626,344.—LOCK—B. Phelps, Seattle, Wash.
626,468.—ICE CREAM MOLD—F. E. Schmits, Oakland, Cal.
626,346.—FLUSHING DEVICE—D. O. Seaman, Seattle, Wash.
626,446.—TIRE BOLT WRENCH—T. E. Stockford, Leesville, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

HAY RAKE ATTACHMENT.—A. F. Martin, Chester, Cal. No. 626,434. Dated June 6, 1899. This invention is designed as an improvement upon spring tooth hay rakes and consists of one or more wire guards extending across the arc of the outer teeth of the rake which act to prevent the hay at the ends from falling or being dragged out. These wires have a certain portion of their length made elastic, and there are connections on the exterior teeth of the rake which form attachments for the ends of the wires, these connections being so disposed that the wires extend in an approximately vertical position from the upper part of the tooth to points adjacent to the ends. The spring of the teeth is thus not interfered with, but the wires prevent the hay from falling out at the ends.

TIRE BOLT WRENCH.—Thomas E. Stockford, Leesville, Cal.; one-half assigned to Chas. E. Stockford of Sulphur Creek. No. 626,446. Dated June 6, 1899. This invention is for the purpose of securing and removing the nuts upon tire and similar bolts. The nuts are screwed on very tightly after being driven through the tire and felly, and it is difficult to remove them when it is necessary to take off the tire. This wrench has a hollow head adapted to fit over the inner end of the bolt, an arm swiveled to the head carrying a screw at the outer end and turnable to adjust the screw in the line of direction with the bolt. The screw is adapted to press against the head of the bolt and lock it in place. A nut wrench is turnable within the hollow head and has a socket fitting the nut, the shaft of the socket being in line therewith, and a means for turning the shaft so as to transmit its motion to the nut wrench. These means consist of ratchet wheels fixed upon the shaft, pivoted pawls, the points of which engage with opposite sides of the ratchet, and a spring which engages the pawls with the ratchet. A transversely movable screw is so disposed as to alternately engage one of the pawls and lift the other out of engagement with the ratchet so that the apparatus will work equally well to turn the nuts on or off of the bolts.

SEEDER ATTACHMENT FOR GANG PLOWS.—James E. Beach, Routier, Cal. No. 626,453. Dated June 6, 1899. The object of this invention is to provide an attachment for gang plows which serves to deposit the seed after the plow has passed. It consists of a braced bar fixed to the plow frame and extending rearwardly therefrom. The seed box is supported upon the rear end of this bar and has connections by which it may be tilted thereon. The feed for the seed is driven by contact wheels which may be made to engage or disengage as may be desired, by the tilting of the seed box so as to bring these wheels into or out of contact.

WAVE POWER PUMPING APPARATUS.—J. E. and W. Armstrong, Santa Cruz, Cal. No. 626,452. Dated June 6, 1899. By means of this apparatus the force of the rising and falling water or swell acts to operate a pump or pumps. The arrangement consists of independent vertical wells, one of which has a direct connection with the sea, and within it is a guided float adapted to rise and fall by the action of the waves. A pump is fixed in the other well and connections are made between the float in the outer well and the pump plunger of the inner one. A supply pipe or passage connects the two chambers at a point above the bottom, and is provided with an inwardly opening valve which supplies water to the inner chamber and prevents its escaping again. At the bottom of the chamber is another passage having an outwardly opening valve, and controlling gates so that the water which is contained in the inner well may at any time be used to flush out and clean it by opening the lower passages. The action of the waves upon the float in the outer chamber will cause it to rise and fall and the connection between it and the pump in the inner chamber will constantly actuate the latter and cause it to throw a steady stream of water which is conducted to any desired point by suitable pipes. The water thus stored may be used for power or other purposes.

HAND BRACE DRILL ATTACHMENT.—W. H. Ames, Watsonville, Cal. No. 626,474. Dated June 6, 1899. This invention relates to an attachment for the ordinary wood-boring, bit-holding stock or brace by which it is made capable of use in connection with a metal-boring bit. The boring brace has a drill clamp at the lower end, a screw-threaded sleeve enclosing the upper part of the clamp, and an interiorly screw-threaded extension fitting and movable upon the sleeve to increase or decrease its length. A flexible connection is made between the part to be drilled, and the attachment upon this extension by which the length of the flexible connection is adjusted. A ball-bearing casing fits in the upper part of the sleeve, one part bearing upon the upper end of the drill clamp and the other being supported within the sleeve and turnable therewith. A lever is fulcrumed to the brace in such a manner that it can be moved into line with arms which radiate from the upper end of the sleeve so that by contact of these arms with the lever the sleeve may be turned in unison with the movements of the brace and the yoke thus advanced.

FILTER.—E. R. Cook and S. L. Cohoon, Sacramento, Cal.; one-third assigned to Thomas Scott, same place. No. 626,487. Dated June 6, 1899. The object of this invention is to provide an automatically self-cleaning filter, and means by which it is thus cleaned whenever water is drawn through the apparatus. It comprises an inner hollow filtering cylinder with a discharge opening, an outer casing with supply passages to admit the water to be filtered between itself and the filter, brushes adapted to contact with the surface of the filter having swiveled arms by which they adjust themselves as they move about it, and a driving mechanism actuated whenever the faucet is opened to cause these brushes to rotate and thus brush off the outer face of the filter to prevent any gathering of sediment or deposit thereon. The mechanism for driving the brushes may be a bucketed wheel loosely turnable and so connected as to carry the brushes with it. Jet tubes discharge water into the buckets of the wheel whenever the faucet is opened and thus cause it to operate.

ICE CREAM MOLD AND MEASURE.—F. E. Schmits, Oakland, Cal. No. 626,468. Dated June 6, 1899. This invention relates to a device for measuring and molding ice cream, water ice and similar condiments, and a means by which the material thus molded is afterwards loosened and discharged from the mold. The mold and measure may be of any suitable or desired shape, and preferably as scrapers pivoted and turnable within it. A polygonal stem to which the scrapers are fixed extends axially outward through the end of the mold, a pinion journaled in line therewith has a socket with which the steam engages and other pinions engaging it are actuated by a movable handle so that when turned the scrapers move around the inside of the mold and attach the contents which can thus be discharged. One of the handles for holding the device is stationary, while the other which is fixed so as to turn the train of gearing, is movable and may be operated by one hand. A suitable clutch mechanism causes it to engage and rotate the scraper arms when the handles are pressed together, and they are allowed to remain stationary when the handles are separated by a spring which acts for that purpose. The device can thus be operated with one hand, leaving the other free for other purposes.

HEATING FURNACES.—A. Johnson, San Francisco, Cal.; assignor to the Oil Fuel Saving Co. of same place. No. 626,465. Dated June 6, 1899. This invention is especially designed to be used in conjunction with furnaces where heat is required, either for making steam, or for roasting or smelting ores, or any other uses where heat and perfect combustion are required. It consists of a main combustion chamber, a communicating primary combustion chamber below the front portion thereof, a discharge pipe, oil and air supply pipes, connections between these and a transverse pipe so that the air admitted through the air pipes will be delivered into the discharge pipe, mixing and delivering with the oil which is delivered therefrom.

CONCENTRATOR BELT.—George Gates, Jackson, Cal. No. 626,461. Dated June 6, 1899. The object of this invention is to provide an endless traveling belt with a surface upon which a separation and concentration of heavy, valuable substances can be accomplished and such separation made more closely than with the concentrators now in use. It consists of an endless, longitudinally inclined belt having a series of wide, longitudinally inclined surfaces with shallow, vertically connecting offsets; drums upon which the belt is movable, these drums being so disposed that the belt surfaces have a slight backward inclination toward the foot of the preceding offset or step so that extended surfaces are formed for the settling of the sulphurets upon the tables while the lighter pulp will flow over the surface of the sulphurets and discharge onto the next table, each table thus retaining a bed of sulphurets which are eventually carried up by the travel of the belt and delivered in the usual way over the upper end.

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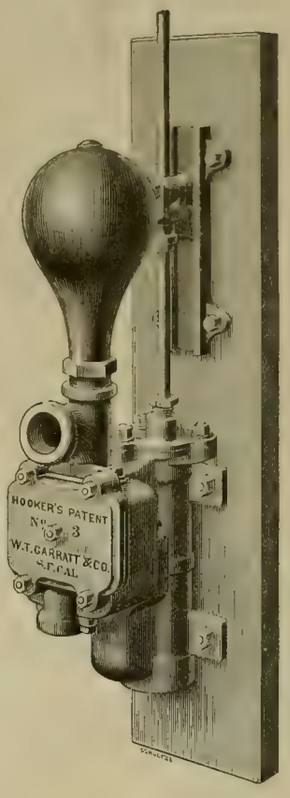

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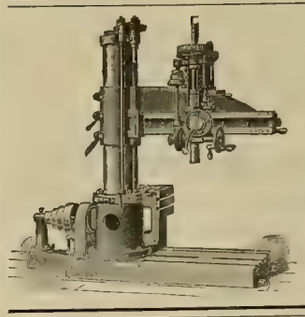

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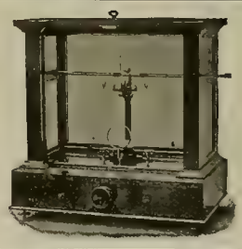

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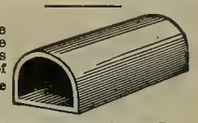

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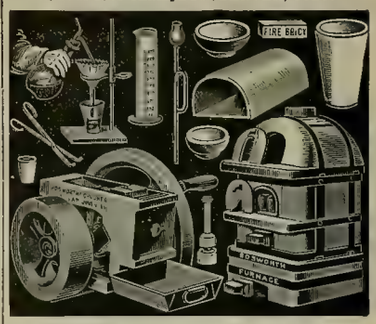

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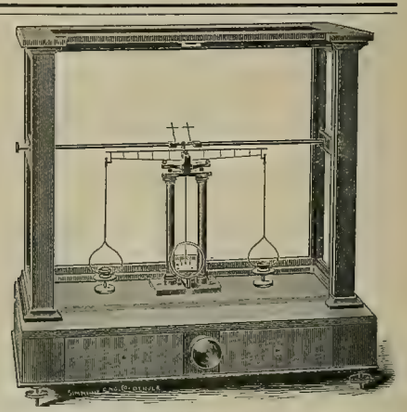

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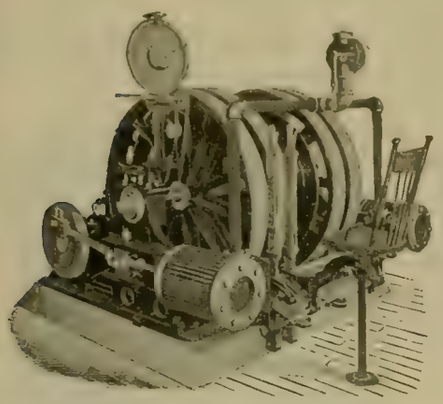

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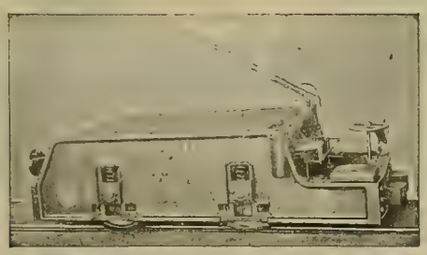

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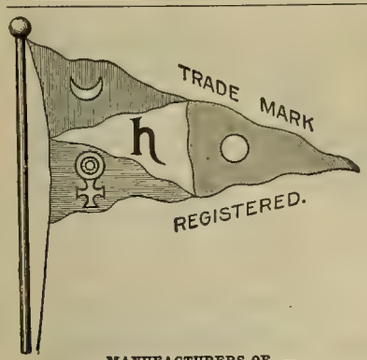

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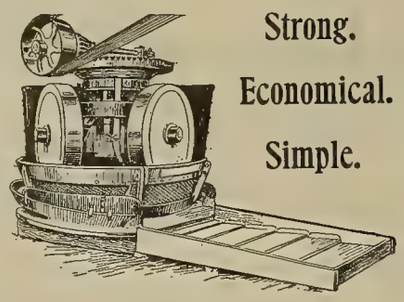

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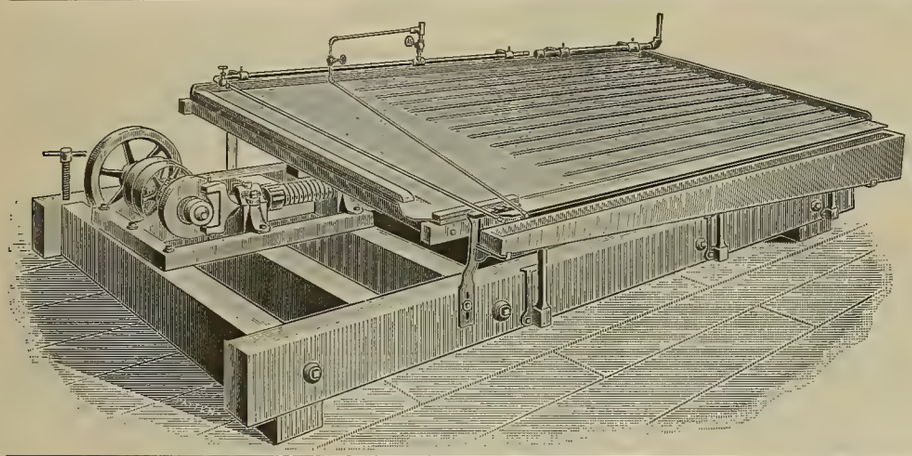

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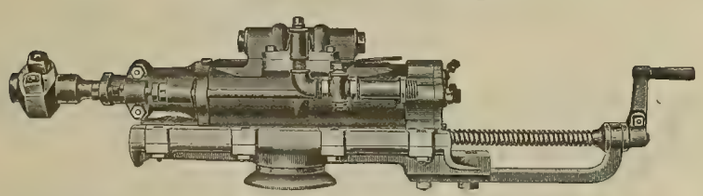

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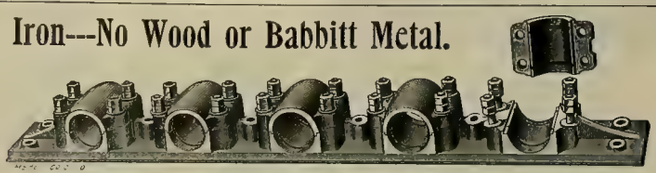

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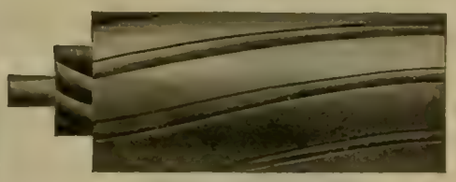
Locked-Coil  Track Cable

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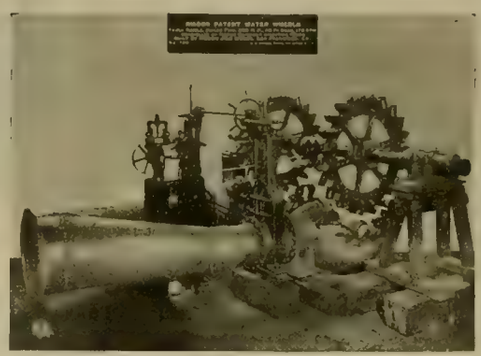

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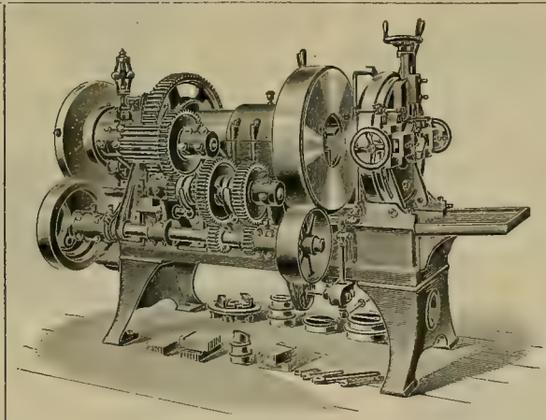

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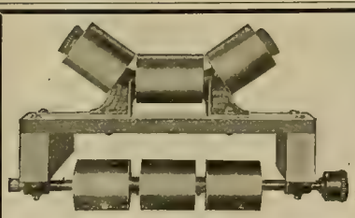

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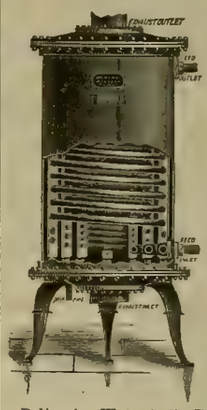

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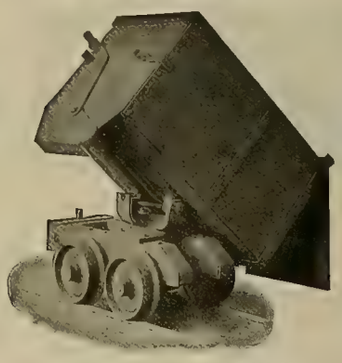
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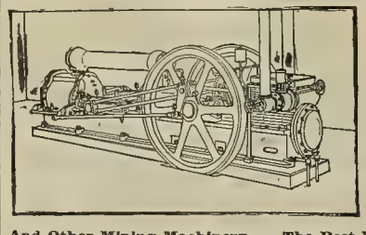
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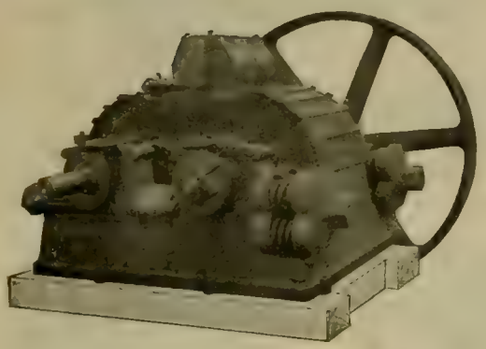

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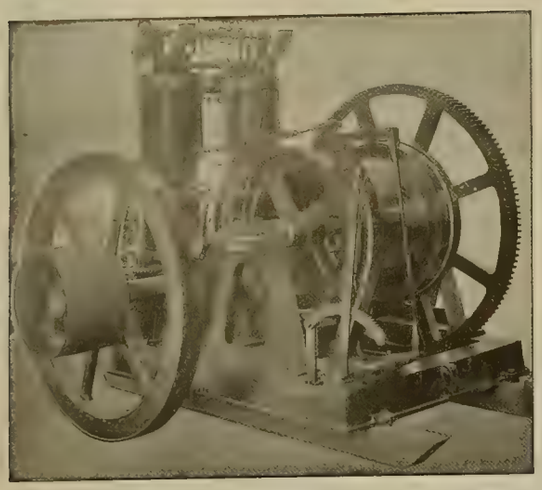

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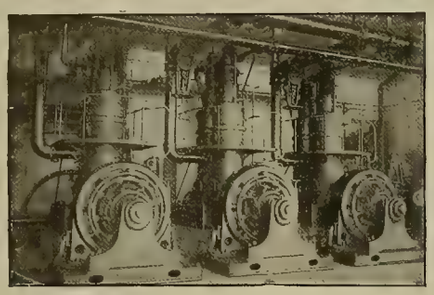

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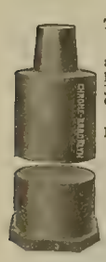

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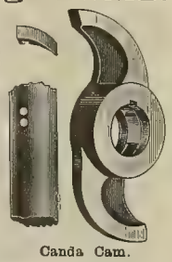

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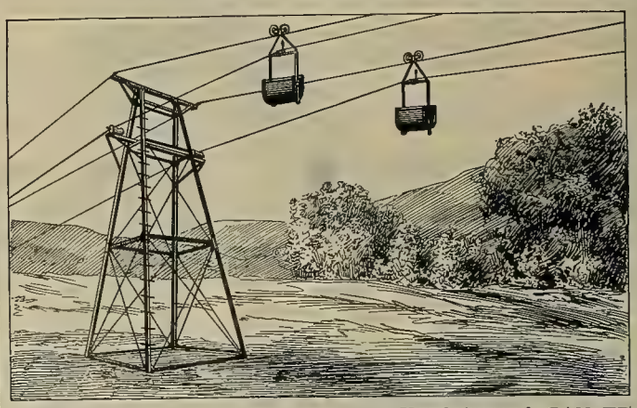

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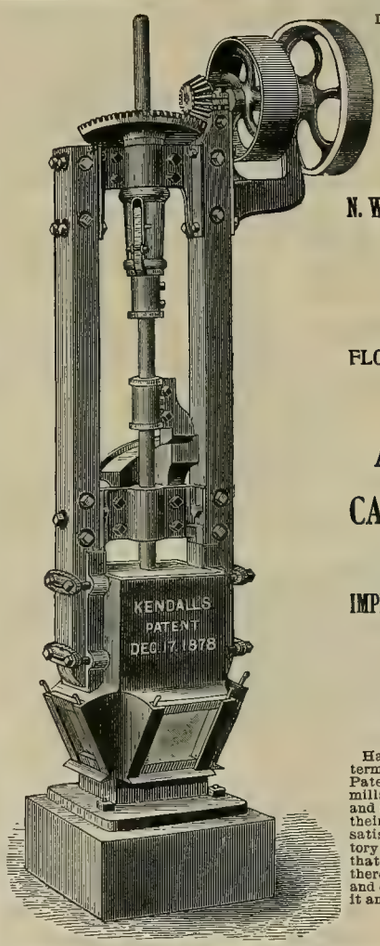

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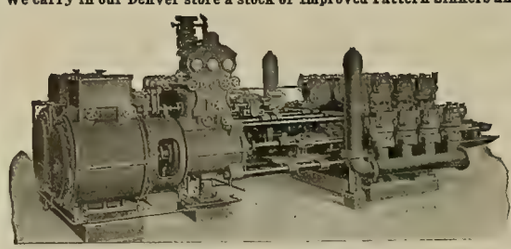

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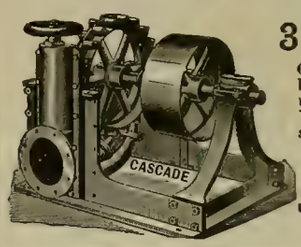

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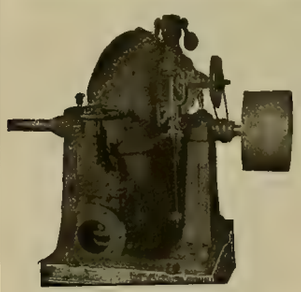

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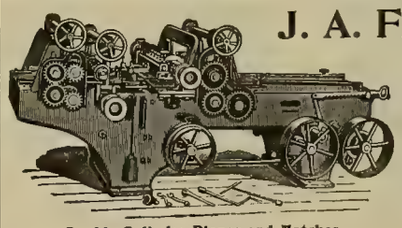

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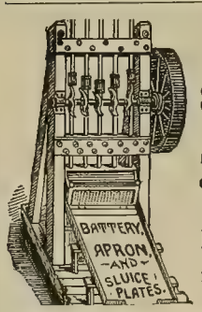

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Market Reports.

SAN FRANCISCO, June 15, 1899.

SILVER.—London, 27 11-16d; New York, 60¼; San Francisco, 61¼; Mexican Dollars, 49¾@50¼; New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.—New York reports firmer, $4.45 bid, $4.50 asked; brokers' price, $4.25.
Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6½c; bar, 6.50c.

COPPER.—New York reports Lake dull at $18.25 bid, $18.50 asked; brokers' price, $18.50; mill copper plates, 23½c.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Dull, $25.60 bid, $25.70 asked; pig, 31c per lb.; Bar, 35c. New York weak, $23.35 bid, $25.50 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $43; export, $39.00 @39.50; carload lots, special rates.

PLATINUM.—London, 63½s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17¾c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32 @ 33c per lb.; carloads, 30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2¾c per lb.; blue vitriol, 5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 47c; cs., 52c; raw, bbl., 45c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16¾c; Astral, 16½c; Star, 16½c; Eocene, 18½c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 52c; cs., 57c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	9¼	9¾
12-thread (⅜ dia	9¾	10¼
6 and 9 thread (¼ and 5-16 dia.)	10¼	10¾
Bale Rope (3 and 4 strand)	9¼	9¾
Bale Rope (2, 6 and 8 strand)	9¾	10¼

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 15, 1899.

9:30 A. M. SESSION.

200 Belcher	48c	600 Ophir	$1 05
300 Caledonia	76c	200 Overman	20c
75 Confidence	$1 00	200 Potosi	37c
100 Gould & Curry	26c	200 Sierra Nevada	68c
100 Hale & Norc's	34c		

2:30 P. M. SESSION.

200 Ophir	$1 00	200 Belcher	39c
200 Best & Belcher	46c	200 Sierra Nevada	70c
300 Con. Cal. & Va.	$1 60	100 Justice	18c
100 Potosi	38c	100 Union Con	40c
200 Hale & Norcross	34c	600 Julia	02c
50 Yellow Jacket	41c		

Recently Declared Mining Dividends.

Isabella M. Co., Cripple Creek, Colo., $45,000; payable June 26.

Deer Trail No. 2, Washington, $2500; June 15. Total, $35,000.

Bullion-Beck, Utah, $10,000; June 15.

Centennial-Eureka, Utah, $15,000; June 15.

Utah Mining Districts.

Bingham, Tintic, Park City, Mercur, Marysvale, Gold Mountain, Deep Creek, La Sal, described and illustrated in a sixty-four-page pamphlet, together with a prospector's map of Utah, and claim (grouped) maps of Bingham, Tintic and Mercur, ready for delivery June 20th Send six cents in postage for this, the most complete and reliable write-up of the mineral resources of Utah ever published. F. A. WADLEIGH, General Passenger and Ticket Agent. Salt Lake City, Utah.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.
Cable address Edbre Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. **U. S. A.**

Slocan, Rossland and Republic
Mining Stocks
BOUGHT and SOLD.
For reliable information, write to
JOHN HAWLEY, - Vancouver, B. C.
Codes used: Clough's and Moring & Neal.

Quicksilver
FOR SALE IN LOTS TO SUIT.
Agents for Redington Quicksilver Mine.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Mining and Mechanical Engineer of twenty years' experience desires engagement, for family reasons, in locality below an altitude of 6500 feet. Mining and concentration a specialty. Address "Concentrator," care Mining and Scientific Press.

AN ACCOUNTANT
Of seven years' experience with mining company desires a position in any country. Good references. Address C. G., this office.

OPEN FOR ENGAGEMENT.
A Mining Engineer, Geologist and Metallurgist; associate of the Royal School of Mines, London; first-class Government certificated mine manager, England, (39) is open to an engagement with responsible gold or copper-producing company as General Manager or Superintendent. Has had 21 years' practical experience in all branches of mining work and held the position of Manager at some of the largest and most important mines both in Europe and this country. Highest testimonials and references. Address "QUARTZ," care of Mining and Scientific Press, San Francisco.

WANTED,
TO BUY ASSAY BUTTON BALANCE OR GOOD ASSAY OFFICE.
Must be cheap. C. B., 429 San Pablo Ave., Oakland, Cal.

WANTED—Stamp Mill Tailings.
Will buy or work on shares. State quantity, value, character and terms. Address C. R. P., care Mining and Scientific Press.

FOR SALE.
One 150 H. P. Corliss engine, in first-class condition; size of cylinder, 18x48. Also, one Buckley condenser. For particulars, apply O. N. B. & C., P. O. Box 2096, San Francisco.

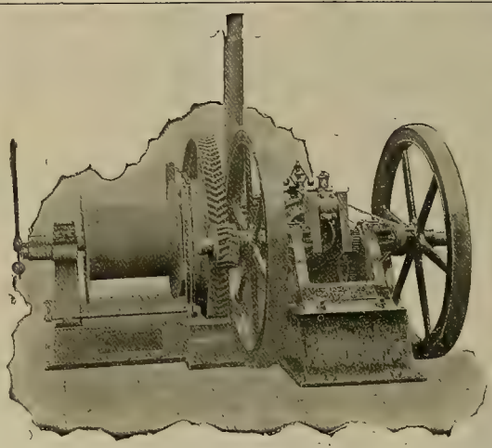
..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,
100 tons daily capacity; in first-class condition to handle Cripple Creek ores.
Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

Group of Gold and Silver Mines for Sale.
For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

Stockholders' Meeting.

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines.—In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated mines, a meeting of the stockholders of this company will be held at 11 o'clock in the forenoon on WEDNESDAY, the 12th day of July, 1899, at its principal office, 330 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Hundred Thousand ($200,000.00) Dollars in 200,000 shares at the par value of One Dollar each.
Dated: San Francisco, May 25th, 1899.
JOSEPH H. MOOSER, Secretary.

DOBLE ROCK DRILLS AND AIR COMPRESSORS.
SIMPLEST. **BEST.**
Write for Catalogue. **Miners, Investigate!**
ABNER DOBLE COMPANY, S. W. COR. FREMONT & HOWARD STS SAN FRANCISCO, CAL.



FRESNO, June 25, 1898.

Hercules Gas Engine Works, San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,
305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,
MANUFACTURERS OF DIRECT CURRENT MACHINERY
For Power and Lighting Purposes.
SPECIALTY
Direct Connected Electric Elevators.
Estimates Given on All Kinds of Mining Apparatus,
ALSO REPAIR AND JOB WORK OF ANY KIND.
Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.
509-511 Howard St., - San Francisco.

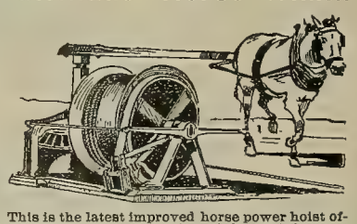
W. PELLEW HARVEY, F. C. S.
The Vancouver Assay Office and Ore Testing Works.
MINING ENGINEER, METALLURGIST AND ASSAYER.
Working Tests by Amalgamation and Cyanidation. Ores Purchased. Assays and Analyses.
Representative for:
Vivian & Sons, Swansea; The Elliott's Metal Co., Wales; The MacArthur-Forrest Process (Cyanide).
OFFICES: VANCOUVER AND VICTORIA B. C.

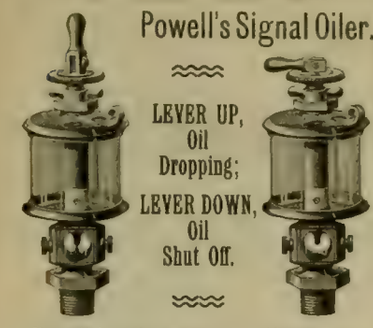
FOWLER'S AIR SPACE and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
G. C. Fowler, 656-58 Howard St., S. F.

MINING PROPERTIES.
Capital wanted to continue development on partially developed, promising mine. Will give an interest or bond, with option for purchase. Near good ore market. Also a group of six claims, developed, ready for mill. Likewise a partially developed prospect containing eight ledges, smelting character, near ore market.
J. N. ROSA, BOX 5,.....SHASTA, CAL.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.
GRAHAM, GARRETT & CO.,
211-212 Peyton Block, SPOKANE, WASH.
MINE PROMOTERS AND BROKERS.
Make a specialty of promoting, operating and developing mines. We handle all standard stocks. Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

TUBBS CORDAGE CO.
(A CORPORATION.)
Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. Extra sizes and lengths made to order on short notice
611 and 613 Front St., San Francisco, Cal.

EL PASO
Automatic Horse Whim.

This is the latest improved horse power hoist offered prospectors, possessing all the best features of other styles with improvements added. The end thrust is entirely done away with, thus increasing the efficiency and saving considerable wear. **The Automatic Safety Brake** is so arranged that accident is impossible, being in position until held out by operator to lower bucket. ::::: It is made entirely of iron and steel. Weight, about 1400 pounds
THE HASSELL IRON WORKS CO.,
COLORADO SPRINGS, COLO.



Powell's Signal Oiler.

LEVER UP, Oil Dropping;
LEVER DOWN, Oil Shut Off.

Doesn't interfere with the adjustment.
Most perfect Oiler in the world.
Haven't you need for such an Oiler?

In stock by all Jobbing Supply Houses.

Manufactured only by
THE WM. POWELL CO.,
Cincinnati, O.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, · 426 CALIFORNIA STREET,
SAN FRANCISCO.

Assessment Notices.

EUREKA CONSOLIDATED DRIFT MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of June, 1899, an assessment (No. 19) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels' Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 29th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—No. 1209 Claus Spreckels' Building, San Francisco, Cal.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of May, 1899, an assessment (No. 12) of two cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3d day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary.

Office—Room 9, 320 Sansome street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of June, 1899, an assessment (No. 7) of five (5) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of May, 1899, an assessment (No. 2) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

BOULDER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1899, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 27th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of June, 1899, an assessment (No. 21) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 8th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Mines and Machinery for Sale at Public Auction.

The Harqua Hala (Arizona) Gold Mining Company will on Monday, August 14th, 1899, at 12 o'clock noon of that day, at the Court House door at Yuma, Arizona, offer for sale to the highest bidder all its mines, mill site, pumping plant, 40-stamp mill, cyanide plant, engines, boilers, machinery (fixed and movable), and stock of merchandise situated at Harqua Hala, Yuma Co., Arizona. Inventories and information may be obtained from C. Dallman, agent at Harqua Hala, or Lindley & Eickhoff, attorneys, 530 California St., San Francisco. Terms of sale: Cash, U. S. gold coin, payable twenty per cent on acceptance of bids, balance on delivery of possession. Title to mines U. S. patents. By order of the Board of Directors.

DEWEY, STRONG & CO'S PATENT AGENCY.

Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & CO.'S Patent Agency will have the benefit of a description in the *Mining and Scientific Press*. We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

DEWEY, STRONG & CO.,
PATENT AGENTS,
330 Market Street, San Francisco, Cal.

DELINQUENT SALE NOTICE.

HEAD CENTRE CONSOLIDATED MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. B. Parsons, Trustee	108	100	$20 00
H. B. Parsons, Trustee	112	100	20 00
H. B. Parsons, Trustee	116	100	20 00
H. B. Parsons, Trustee	145	100	20 00
H. B. Parsons, Trustee	152	100	20 00
J. W. Pew, Trustee	348	500	100 00
S. B. Wakefield	361	3	60
J. W. Pew, Trustee	384	100	20 00
J. W. Pew, Trustee	389	100	20 00
J. W. Pew, Trustee	390	50	10 00
J. W. Pew, Trustee	463	100	20 00
J. W. Pew, Trustee	504	5	1 00
J. W. Pew, Trustee	536	50	10 00
G. B. Root, Trustee	564	20	4 00
G. B. Bagley, Trustee	674	50	10 00
J. W. Pew, Trustee	710	100	20 00
J. W. Pew, Trustee	711	100	20 00
J. W. Pew, Trustee	712	100	20 00
E. B. Deane, Trustee	717	100	20 00
S. Iglauer, Trustee	820	100	20 00
H. H. Shinn, Trustee	873	700	140 00
F. A. Benjamin	875	5	1 00
W. Steele, Trustee	890	500	100 00
J. W. Pew, Trustee	898	50	10 00
J. W. Pew, Trustee	905	100	20 00
H. W. Hasselgren	908	100	20 00
H. W. Hasselgren	909	100	20 00
Peter Lane	910	650	126 00
M. Rehfisch, Trustee	917	1,250	250 00
M. Rehfisch, Trustee	918	1,250	250 00
M. Rehfisch, Trustee	922	300	60 00
M. Rehfisch, Trustee	923	200	40 00
M. Rehfisch, Trustee	924	400	80 00
J. W. Pew	946	1,333	266 60
John Sinclair	953	500	100 00
A. W. Foster	957	8,000	160 00
A. W. Foster	958	4,000	80 00
Rehfisch & Co., Trustees	960	100	20 00
Jas. Rolph, Trustee	968	500	100 00
S. B. Wakefield & Co., Trust's	969	1,500	300 00
S. B. Wakefield & Co., Trust's	971	3,833	766 60
J. W. Pew, Trustee	975	400	80 00
J. W. Pew, Trustee	989	40	8 00
A. W. Foster	1010	3,000	600 00

And in accordance with law, and an order of the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

POSTPONEMENT.

The day of sale of the delinquent stock of the above named company is hereby postponed to MONDAY, June 12th, 1899, at the same time and place. By order of the Board of Directors.

J. W. PEW, Secretary.

POSTPONEMENT.

The day of sale of the delinquent stock of the above named company is hereby postponed to MONDAY, June 26th, 1899, at the same time and place. By order of the Board of Directors.

J. W. PEW, Secretary.

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DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 19) levied on the 13th day of May, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
G. A. Hinckelbein	2	10	50
G. A. Hinckelbein, Trustee	9	1000	50 00
G. A. Hinckelbein, Trustee	10	1000	50 00
G. A. Hinckelbein, Trustee	11	1000	50 00
G. A. Hinckelbein, Trustee	12	1000	50 00
G. A. Hinckelbein, Trustee	13	80	4 00
G. A. Hinckelbein, Trustee	20	500	25 00
G. A. Hinckelbein, Trustee	21	500	25 00
G. A. Hinckelbein, Trustee	22	500	25 00
G. A. Hinckelbein, Trustee	23	500	25 00
G. A. Hinckelbein, Trustee	24	200	10 00
G. A. Hinckelbein, Trustee	25	200	10 00
G. A. Hinckelbein, Trustee	26	200	10 00
G. A. Hinckelbein, Trustee	27	200	10 00
G. A. Hinckelbein, Trustee	28	200	10 00
G. A. Hinckelbein, Trustee	29	200	10 00
G. A. Hinckelbein, Trustee	30	200	10 00
G. A. Hinckelbein, Trustee	31	200	10 00
G. A. Hinckelbein, Trustee	32	200	10 00
G. A. Hinckelbein, Trustee	33	200	10 00
G. A. Hinckelbein, Trustee	44	100	5 00
G. A. Hinckelbein, Trustee	45	100	5 00
G. A. Hinckelbein, Trustee	46	100	5 00
G. A. Hinckelbein, Trustee	47	100	5 00
G. A. Hinckelbein, Trustee	48	100	5 00
G. A. Hinckelbein, Trustee	49	100	5 00
G. A. Hinckelbein, Trustee	50	100	5 00
G. A. Hinckelbein, Trustee	51	100	5 00
G. A. Hinckelbein, Trustee	52	100	5 00
P. A. Wagner	55	10	50
P. A. Wagner, Trustee	89	980	49 00
P. A. Wagner, Trustee	91	1000	50 00
P. A. Wagner, Trustee	92	1000	50 00
P. A. Wagner, Trustee	93	1000	50 00
F. X. La Bonte	75	10	50
Louis Audet	89	10	50

And in accordance with law, and an order from the Board of Directors, made on the 13th day of May, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 3rd day of July, 1899, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHARLES BOVONE, Secretary

Office—217 Sacramento street, San Francisco, California.

RUPTURE AND PILES.

For May and June, 1899, only, **Drs. Mansfield & Porterfield, at 838 Market St., San Francisco,** are issuing certificates entitling the holder to free examination for **Rupture or Piles,** with treatment till cured, for $30. Send for one.

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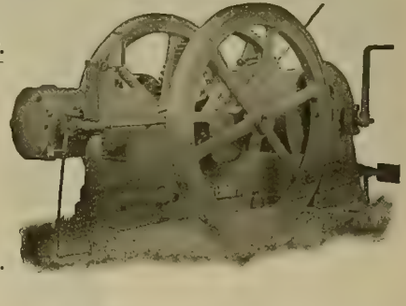

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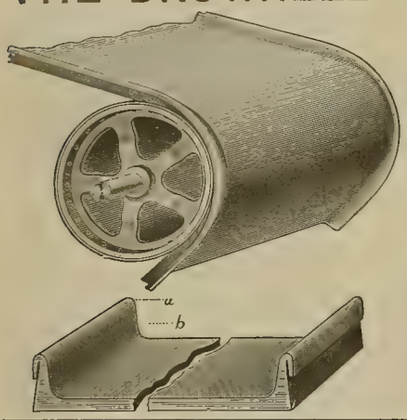

It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

SUPT. OFFICE WILDMAN GOLD MINING COMPANY,
SUTTER CREEK, AMADOR CO., CAL., Feb 22, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: Replying to your favor of the 18th inst., will say that in the two mills operated by this company we have nineteen of your Patent Lip flange concentrator belts in use; some of them have been in constant use for the past two years and have given entire satisfaction. I know of no better flange for a side shake machine.

Yours truly, JOHN ROSS JR., Superintdenent.

MEXICAN MILL. EMPIRE, NEV., March 28, 1897.

MR. J. S. BROWNELL, San Francisco, Cal.—DEAR SIR: For some years we have used three different styles of belts on our Frue vanner at the Mexican mill, and for smooth working and endurance the Brownell Patent Lip flange belt has proved its superiority over all others, and I unhesitatingly recommend it to all who are using Frue machines.

Yours truly, EUGENE MAY, Foreman.

For any information regarding Frue Vanner or Belts, call on or address

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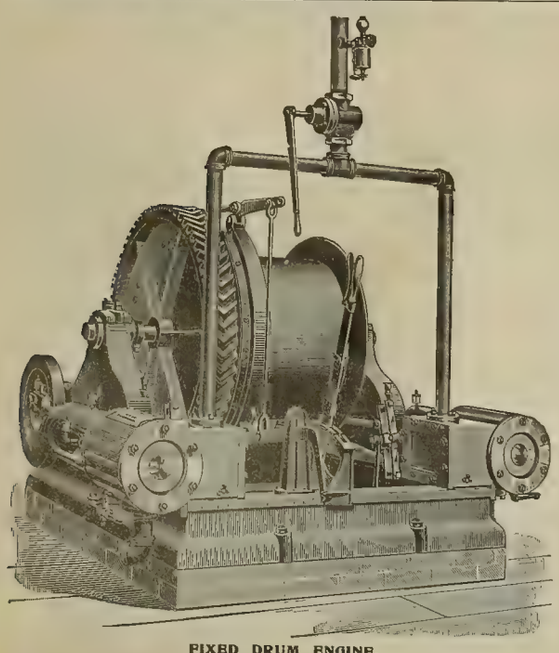

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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2033.—VOLUME LXXVIII. Number 25. SAN FRANCISCO, SATURDAY, JUNE 24, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

An Auxiliary Pneumatic Hoist.

In accordance with its usual custom of illustrating any new device that appears to be of practical value to miners, the MINING AND SCIENTIFIC PRESS herewith illustrates and describes a new pneumatic hoist, built for the Gwin mine, Calaveras county, Cal., by E. A. Rix of San Francisco, Cal. It has many novel features. The primary idea was to construct a hoist that would not be excessive in weight; that would handle from 700 to 1000 pounds readily; that was protected from water and dirt and that had no great amount of inside operating devices such as levers, ratchets, etc., and small enough in dimensions so that it could readily be run through the drift on a flat car.

This hoist has an 18" drum with capacity to carry several hundred feet of ½-inch flexible steel rope. The drum is turned and nicely balanced so that it will run easily. It is loose on the main shaft and is connected thereto by a clutch mechanism which operates through the center of the shaft, a small hand wheel fastened to the center of the shaft being used for throwing this clutch in and out, the hand wheel turning with the shaft whenever the mechanism is in operation. By using this device there are no clutch-throwing mechanisms required. The clutch is never thrown in and out excepting when the gipsy is required for pulling timbers and ordinary hemp rope can be used.

The brakes are maple blocks clamped between wrought iron bars, and the operating mechanism for these brakes has a left and right hand 1½" screw with the hand wheel as shown. A very slight motion of this hand wheel is entirely sufficient to clamp the brakes in position and hold them there, no ratchets nor levers being at all necessary.

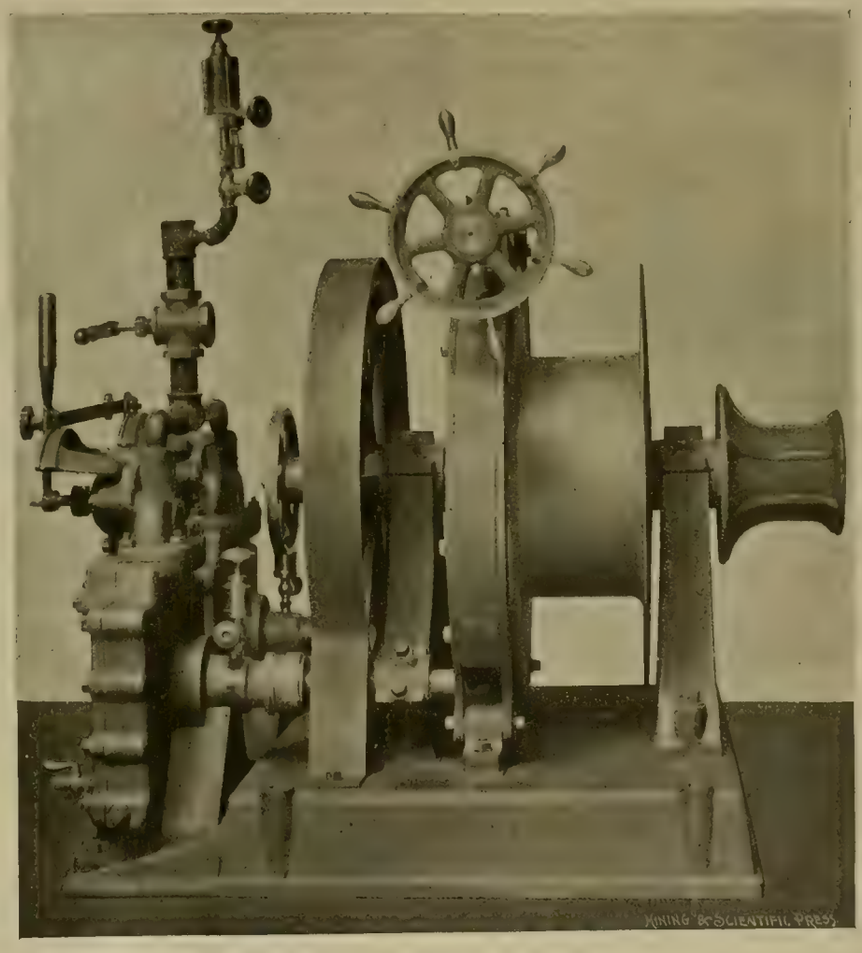
The main driving wheel is a spur gear about 30" in diameter with cut teeth. This gear has meshed into it two cut-steel pinions, which are fastened independently to two Dake engines of 7 H. P. each. These engines are of the enclosed type, as shown in the illustration. It is not a rotary but a reciprocating engine, the same as any other engine, with the exception that the pistons are doubled within the case, there being one horizontal and one vertical piston attached to the crank pin. It takes air on one side of each of these pistons during half of the revolution and on the other side of the pistons during the other half, thus there are no centers on either of the engines, and there being eight impulses on one revolution delivered by both of these engines the pressure on the gear is well divided and it runs easily and smoothly.

There being two points of application on the main gear wheel the strain on the teeth of the wheel is reduced one-half and there is no position at any time when the hoist cannot easily pick up the load as steadily as when in full speed.

Reversing is accomplished by the moving of the small lever on the extreme left of the illustration. There are no operating mechanical devices on the reverse, it being simply a change of ports. The gear wheel is boxed in with a wrought iron cover and the rim also.

The pair of engines shown in the engraving are simple engines. They can be made compound for larger hoists of the same description. A larger hoist recently furnished for the North Star mine, Grass Valley, Cal., to operate their manway, is made after the same plan, with the exception that there are four of these engines, one used for the initial cylinder and the other three for compounding, the air being reheated before passing into the initial cylinder and also before going into the compound cylinders.

This small hoist does not need to be accurately set for its operation but can be left on a flat car and held in position by a jack screw to the roof of the drift.



PNEUMATIC HOIST IN USE ON THE 1400 LEVEL OF THE GWIN MINE, CALAVERAS COUNTY, CAL.

The usefulness of auxiliary hoisting engines in the lower levels of mines can scarcely be overestimated. In the history of every large mine a time comes when sinking in the main shaft is discontinued, and, as time passes, the upper levels, already opened, are stoped, and the hoisting machinery, being already taxed to its fullest capacity, or near it, a renewal of sinking operations is delayed, for the reason that it cannot be continued without interfering seriously with operations above. The cages or skips are required in hoisting ore, waste and refuse of all kinds. Quantities of timber and supplies are required in the mine and must be lowered through the shaft. This condition of affairs, under some management, continues in the hope, perhaps, that large bodies of ore may be opened, which will afford sufficient material to keep the mill supplied without doing deadwork, and a skip can then be spared to resume sinking. Often this much desired condition does not materialize, and the time eventually arrives when sinking must be resumed or the mine shut down. Too often the necessary precaution of keeping exploratory work well in advance of exploitation is neglected so long, that the mill must be closed down and miners laid off while the shaft is being sunk another hundred feet or so and a new level opened. The introduction of such an auxiliary hoist as that at the Gwin mine, Calaveras Co., Cal., obviates such stoppage of work, and, if the step be taken in time, the mine may be operated regularly and the mill kept supplied constantly with ore.

When the auxiliary hoist is installed it is placed opposite one compartment of the shaft, that compartment being bulkheaded above for the purpose of safety, and in that compartment no hoisting is done from a point lower than the next level above the auxiliary.

Sinking is resumed, and all rock hoisted by the auxiliary is dumped into the ore pocket cut beneath the station in which it stands, from which it is reloaded into the skip from the surface, running in the adjoining compartment. When sufficient progress has been made in sinking, this compartment may be bulkheaded below the loading chute, and miners can then work in safety, so far as the falling of rocks from above is concerned. If the shaft has three compartments, the third compartment, containing the water column and other pump and ventilating pipes, is carried down at the same time and in no way need interfere with hoisting operations either from the surface or at the auxiliary. It may also be employed in sinking winzes and in underhand stoping operations on any level.

MINING AND SCIENTIFIC PRESS.

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San Francisco, June 24, 1899.

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COLORADO courts will pass upon the constitutionality of the eight-hour law. When this is done the mining industry will receive renewed impetus in that State.

AS MIGHT have been anticipated, many of the copper stocks which a few weeks ago soared to figures higher than they had ever before touched, have subsided to a much lower though still high price. The promised 25% premium on amalgamated copper stock has dwindled to a 15% discount.

PRICES of iron and steel are still advancing with every probability that they will go higher, as the demand is showing no decrease. It is reported several English ships are expected to arrive at Philadelphia within a few days all loaded with iron ore from Turkish ports, the mines being near the Black Sea.

SO LONG as war continues and the rumors of war multiply, there is little likelihood of a fall in the price of copper. It is reported that England has discontinued the manufacture of cartridges for the present, but it is still a large industry in the United States, and, as it looks now, is more than likely to soon become again an important industry in England.

THE danger arising from carelessness in handling nitro powder and in keeping it in places unsuited to it was exemplified a few days since at the Greenhorn mine in Siskiyou Co., Cal., when a fifty-pound box of powder which had been left in the changing room, where the sun would shine upon it, exploded. Powder should be kept in an underground or stone magazine where the temperature is normal and has but little range. Those interested would do well to read the article, "How to Store Powder," on page 261 of the issue of Sept. 10, '98, in which an expert on that subject gives full directions concerning this important matter.

EACH steamer arriving at Puget Sound ports is reported to carry hundreds of thousands of dollars' worth of gold nuggets from Klondike and other Alaskan gold fields. It will be remembered that the past two years the same stories were given wide circulation, but official returns have shown how grossly the gold production of Alaska and the Northwest Territory has been exaggerated by those interested. While these stories of gold are being freely circulated by the newspapers, the same papers contain pitiful tales of the privation, hardship and sickness endured by many in that northern land whose quest for gold has been fruitless.

Liquid Air Sensationally Treated.

Much is popularly claimed for liquid air that can not be scientifically considered. This is usually the case with all new things in science. The sincerity of those who make many unwarranted assertions is not questioned, but the inaccuracy of such statements is manifest. Hasty conclusions formed from insufficient knowledge of the subject are extensively published, and all sorts of extravagant assumptions announced. Mining, particularly, is to be simplified; power to be produced more cheaply than ever, and the atmosphere is to be the simple source of supply. Pseudo-scientific articles in popular magazines and Sunday newspapers have it all figured out how one gallon of liquid air will make in a proper machine three gallons, and these three will make nine by due manipulation, and thus, one can get enough power for 20 cents to run a 10,000-ton steamship across the Pacific to the Philippines.

Such chimeras are interesting, and, when well told, sell the publication in which they appear. That seems to be the intent; anyhow it is the result. The facts, however, are not parallel with the statements.

Air has been cooled, compressed and liquefied; that has long been an accomplished fact; when warmed and evaporated such liquefied air, of course, produces enormous pressure which is a source of power, expansion being converted into mechanical energy, and, if economic conditions can be made favorable the commercial value of this correlation of forces will be considerable. That is all there is to it.

But to assume that a liquid air engine can draw its power from the surrounding atmosphere, or that air can be liquefied at trifling primary expense and the process be made a self-acting and continuous one, is merely talking in ignorance or defiance of the first principles of science.

If mere amusement or the display of a fanciful imagination be the motive, there is little harm in the ridiculous articles and pictures now appearing treating of liquid air and its possibilities. But no scientific good can accrue from the publication of the current absurdities, nor is it likely that any mining or scientific reader will "take any stock" therein.

Secret of the Swansea Process.

A Seattle, Wash., correspondent writes:

"Some time ago we were informed that there was at the present time a class of twenty young men from this country at Swansea, Wales, learning the secret process by which they have been treating ores at that place for years. Our informant stated that the parties owning the secret had made all the money out of it they desired, and, as they were getting old, thought it too bad to have the secret die with them, and had therefore decided to make the process of treatment public for the use of future generations."

It is not in the least improbable that there are twenty or more American students at Swansea, Wales, studying the treatment of ore as practiced in those works; but that they have a secret process which has so long been zealously guarded is improbable. In recent years metallurgy has made such rapid progress throughout the world that it is unlikely that the Swansea reduction works have at this time a process superior to that used in other large establishments of similar character elsewhere. The secret of their success lies in part, perhaps, in their possibly having anticipated some features of modern practice in America, but more largely, no doubt, in the close attention given to detail and in cheaper labor and fuel. It is also very unlikely that, had they a secret process, so long valued, even at this late day they would care to make the secret public, for fear that their death would deprive the world of its benefits.

THAT the strained condition of affairs existing between England and the South African Republic are daily becoming more serious is plainly apparent. Should war be declared, the strife would probably be long and serious, involving great loss of life and an enormous expense to England, owing to the climatic conditions and the fact that the Transvaal is an interior country, difficult of approach, and thousands of miles from the base of supplies. That the difficulties will be peacefully adjusted without war there now seems to be little hope.

The Cause of Failure.

When a mine fails to pay there are always numerous excuses to offer for such failure. One most commonly heard is that the "old rattletrap of a mill" would not save the gold. It is a well known fact that some of the simplest and most primitive mechanisms save free gold closely when properly manipulated, and an old rattletrap of a mill can still be made to do good work if there are no holes in the bottom or sides of the mortar, though it may not have as high an efficiency as a more modern mill. The fault usually lies either with the men running the mill or in the ore being too poor to pay, unless it be unsuited to free milling process, when the finest milling machinery will do no better. Another excuse for failure is bad management. It is undoubtedly true that many good mines have been ruined or at any rate temporarily shut down by reason of bad management, but a really good mine will stand considerable bad management. It is the poor mines which will not pay under any management that are grossly mismanaged and large sums of money extravagantly expended.

ON pages 686, 687 and 688 appears the index of the preceding six months, Volume LXVIII, which closes with this issue. Like its 77 predecessors, it is of great value to the thousands who file their copies, and who want to find some information without the tedious process of hunting through the 688 pages of the volume. These three pages deserve a few lines of reference. They are a directory to much that is worthy of note concerning progress in mining, the latest in metallurgy, and everything that is of direct or indirect interest to mining men anywhere and everywhere. The miner, electrician, machinist, manufacturer or merchant; the assayer and chemist, or mining engineer; the superintendent, mill man or foreman; the prospector, mine owner, mine seller or mine buyer; the geologist, official or public incumbent, all find much of practical value made more readily accessible by means of the index. The volume is, as usual, a mirror and summary of what is worth knowing in the mining world during the past six months, and the index is a ready means of finding whatever is wanted therein at a minimum expenditure of effort.

OUR special Colorado correspondent in this issue states the existing conditions of the present serious industrial problem in that State. As was anticipated, the wiser counsels appear to have prevailed to a great extent, and what threatened to become a very serious matter is now in a fair way for a speedy and satisfactory adjustment. The present scarcity of lead ores is being felt by the smelters, and even when the labor troubles are adjusted it may be some time before all the smelters can operate to their full capacity. The Cœur d'Alene region has for some time past supplied a large amount of lead ore, but the labor troubles in that section have deprived the reduction works of the customary supply. Some of the mines are starting up again, however, and the much needed fluxing ore will probably soon be obtainable.

THE city of San Francisco proposes to manufacture hydrants for municipal use. That is, certainly, the way to build up manufacturing industries. Give monopolies perpetual right to charge high prices for prime requisites, heavily assess manufacturing sites and plants, and then when local concerns employing labor, which is the life of a city, bid on local work, find a way to "save" some valuable cents by turning the work over to a ring-ruled government employing men not for their skill or fitness, but because of their "pull," with the usual result—inferior work at an ultimate cost in excess of that charged by those in the regular business.

GOV. MURPHY of Arizona has not transcended his authority or jurisdiction in issuing an official warning to investors against fraudulent mining companies operating in that Territory. It is part of the duties of a territorial executive to aid in the development of the country's resources, and in attempting to check fraud and injury to the Territory's advancement, his recent action is worthy of approval by everyone in Arizona who feels an interest in the proper advancement of that great mineral region.

Concentrates.

TOWNSITE authorities cannot interfere with placer mining on public lands.

A SITE for pumping works in connection with a mine may be taken up as a mill site.

A LIEN may be taken by workmen on a mine not located on an agricultural patent or on a Spanish or Mexican grant.

AN official survey of a mining claim must be made in accordance with the location notice upon which the survey is ordered.

VALUABLE mineral must actually be found on land before its mineral character will be recognized by the land department.

ABOUT 150 are expected to attend the September meeting of the American Institute of Mining Engineers in San Francisco.

DEPOSITS of slate on land in California not valuable for agriculture should be entered under the timber and stone law, not under the general mining law.

CYANIDE OPERATORS should be careful to secure the best and highest grade of potassium cyanide, as it is cheaper than lower grades which sell at a lesser price.

GOLD as it comes from the zinc boxes is sometimes mixed with copper and smelted, the two metals forming an alloy. Separation is effected later by electrolytic process.

THE paid-up capital of the American Smelting Co. is $54,795,000. Of this $47,090,000 represents money paid for the several properties in the combine and $7,705,000 cash paid in.

WITHIN the limits of the city of San Francisco, Cal., occurs a high grade manganese ore, cinnabar, hematite and gold, but none of these have as yet been found in payable quantity.

MISSOURI and Kansas lead miners are now employed in the Cœur d'Alenes, Idaho. Others are expected from Keswick, Cal.

WHERE a water right has been previously located and maintained the subsequent location of a mining or agricultural claim on the land by others does not deprive the original water locator of his right.

"EXPERIMENTER" will have an unsatisfactory experience with any admixture or contact of quicksilver and aluminum. The former metal will disintegrate the latter and dissolve it into fine, feathery powder.

TOWNSITES may be located on mineral lands. The question of relative legal rights of townsite and mineral claimants as to occupation or possessory title to surface must be determined by courts of competent jurisdiction.

IF an ore body lie upon top of the ground or has no other covering than superficial deposit of debris, it is not a lode or vein in the meaning of the law and the deposit cannot be followed outside of the lines bounding the claim.

A LOS ANGELES, Cal., miners' committee has issued an invitation to miners and others interested in the mining industry to meet there July 13th, to consider the question of forming a miners' association for southern California.

WHEN tailings are allowed to flow where gravity carries them without attempt at restraint or obstructions to confine them to proper limit it is considered an abandonment. Tailings thus disposed of may be appropriated by whomsoever claims them.

THE right to purchase mineral lands is restricted to citizens of the United States or those who have declared their intention to become such. A citizen of the United States cannot make a mineral location for the benefit of an alien corporation.

THE next session of the International Mining Congress (which met at Salt Lake City, Utah, last July) is billed for Milwaukee, Wis., August 16th–20th, '99, but it is not thought that the number of attending delegates will tax the capacity of the hall.

THE law requires that mining claims shall be staked so that its boundaries can be readily traced on the surface. A placer claim located in such a manner as to conform to the subdivisions of government survey for precautionary reasons should be staked.

UNDER such conditions as those portrayed by "Exeter," writing from Phœnix, Arizona, a gasoline engine would be satisfactory. These engines are now made to supply power at one-tenth of a gallon of gasoline per horse power per hour, and are valuable in regions where water is scarce.

WORK done on a ditch outside of a placer claim previous to the location of said claim cannot be claimed as expenditure to apply on patent, nor can the expense of preliminary survey for a ditch be claimed as required expense unless the ditch be actually constructed after location of the claim.

THE ore deposits of Leadville, Colo., are presumed to have been formed at a depth of 10,000 feet, the present position at and near the surface having been brought about by erosion largely through the agency of glaciers, remnants of which still remain. The town of Leadville is largely built on a glacial lake bed.

AN unpatented mining claim located on the public domain is not taxable, though the improvements in the way of buildings, machinery, etc., are. A claim on patented agricultural land is taxable in proportion to its area, being assessed at the same rate as agricultural land, the improvements being also taxable.

ACCORDING to the De Lamar, Nev., *Lode*, the "terrible mill dust" at the De Lamar mill, which is credited with causing considerable fatality, is now satisfactorily disposed of. The writer visited a chlorination mill at Florence, Colo., about a month ago, where some such contrivance as that at the De Lamar mill is badly needed.

LIQUID HYDROGEN has been successfully and repeatedly produced. Prof. Dewar of London is the most prominent in this connection. The matter is of little present commercial importance, but is of great scientific import, as it was the first element that had for many years defied all efforts at liquefaction. The temperature of liquid hydrogen is inconceivably cold—about as low as the assumed temperature of vacuity of space.

WHERE cyanide plants are operated in cold climates and difficulty is experienced with the freezing of solutions in pipes, vats, etc., exhaust steam if applied will remedy the difficulty. If steam is not used for power a small boiler might be installed for the purpose of making steam for this purpose, and would in most cases prove a paying investment.

NO ARBITRARY percentage of copper in ore can be fixed as the point at which such ore can be profitably mined and treated. As in gold and silver mining, the economic conditions surrounding the mine, the size of the ore body and the facility with which it may be reached and worked, are important considerations, as well as distance to market for the ore, transportation, etc.

AS FORESHADOWED earlier in the year, the Daly associated holdings in the Anaconda, Montana, interests have been sold to a Standard Oil syndicate for $23,000,000. Daly gets $6,000,000, Haggin & Tevis of San Francisco $17,000,000. A London concern owns a part of the stock, for which they paid $7,000,000 in '97. Daly is credited with intention to make his future residence in Colorado.

ALMOST any hard, dense rock in a thin slab will give out a ringing sound when struck, but this fact alone will not establish the rock as being phonolite. Eruptive rocks vary greatly in composition and graduate from one kind to another. The typical rocks which contain only the essential ingredients, as described in the textbooks, are rare. Phonolites is allied to trachyte, but is still a distinct class of rock.

THE Seattle, Wash., allegations of the arrival of Klondike gold should be seriously discounted by intending pilgrims to the Yukon region. So much has been said in these columns on that subject that it need only be necessary to point out the fact that the Seattle newspapers and the transportation companies are directly interested in keeping up the excitement, and it sometimes looks as though the Associated Press was in the plot.

THE latest authentic statement concerning the operations of the California Debris Commission appeared in an illustrated article in the issue of Oct. 22nd, '98. Nothing has since transpired to change the conditions expressed therein. Preliminary work has, however, been vigorously prosecuted, and the Commission expects this summer to announce definite plans regarding the site and mode of construction of barrier work.

NO PLACER mine location can be made by a single individual which shall exceed twenty acres in area, and no claim shall be taken by any association of persons greater than 160 acres, and such association shall not consist of less than eight individuals, who must be bona fide locators. No local laws or regulations of mining districts can restrict the size of placer locations to less than twenty acres, although the locator is not compelled to take that much.

TO PRINT the questions to which many of these "Concentrates" are answers would often take up more space than the answers themselves. Hence, usually, the answer alone, and that in briefest form, is given, the answer indicating of itself the nature and purport of the question, and serving as information and reply to many others who often have the same general question in their minds as that asked by the inquirer whose question is thus concisely answered.

THE $25,000 fountain to be placed in front of the MINING AND SCIENTIFIC PRESS office in San Francisco is the gift of the late J. M. Donahue, and is to commemorate his father, Peter Donahoe, who was the first foundryman, ship and railroad builder on the Pacific coast. The fountain will have a 40-foot granite base, 6 feet high. There will be five bronze figures, each 8 feet high, and a punching machine, 21 feet high, in bronze, the group being emblematic of the early days of California's mechanical industry.

WHERE A, B and C jointly own a quartz lode location, and A in doing assessment work finds a cross lode, he together with his partners owns this lode jointly to the side line of the claim. To make a separate, individual location upon this cross vein, a discovery must be made outside of the lines of the claim already located and a new claim located on this new discovery, but A. cannot claim separately and individually any portion of the vein lying within the lines of the original claim. His individual right ceases at the side line of the original claim, and is defined by a vertical plane along such side line.

A, LIVING in San Francisco, Cal., may give a power of attorney to B to locate, buy or sell mines or mining property in Alaska, and B may locate claims for A without power of attorney. A may go to Alaska and locate additional claims for himself. Should B return the power of attorney to A, A may continue to hold claims located for him by B, but as a precautionary measure it might be well to relocate. A placer claim need not be square, but cannot exceed twenty acres in size. Where the land has been previously surveyed by the Government, the claim must conform as nearly as possible to the subdivisions of the survey. No surveyed tract can be taken less than ten acres in extent.

FELSITE is an eruptive, intrusive rock, but is not known to be effusive. The statement that a large ore body exists in the crater of a felsite eruption at White Rock, Australia, is probably the result of mistaken judgment. It is more probable that the central portion of the felsite mass, where the ore occurs, having become fractured and crushed by dynamic force, afforded a condition for the deposition of ore from mineral solutions from below. These same solutions probably had a decomposing effect on the felsite, rendering it more easily subject to erosion, and this inner portion of the felsite mass having from this cause been eroded more rapidly than the outer portion resulted in the formation of a basin-like depression now mistaken for the crater of a volcano.

IN the manufacture of salt in Alameda county, Cal., numerous natural advantages assist in the process. The water is taken from the upper portion of San Francisco bay, where the percentage of salt is said to be somewhat higher than that of the ocean, probably due to evaporation and to the fact that no large fresh water stream enters at that end of the bay. At high tide the water is admitted to reservoirs through gates which are closed at flood tide. When settled and clear, the water is pumped by numerous windmills located on the dykes dividing the tract of land into several reservoirs. Evaporation rapidly raises the percentage of salt in the solution, and the windmills pump it from one reservoir to another until it becomes a saturated solution from which the salt crystallizes, and is raked up by workmen, refined and marketed.

IT is cheerfully argued by the Leadville *Miner* that the lockout of the smelter men in the State of Colorado and the consequent laying off of many miners is not an unmixed evil, as many of the men are now out in the hills and gulches doing their annual assessment work or work for patent. Much prospecting will also be done. The workingman is unlike the so-called capitalist, who when a period of depression comes along sits down and talks "calamity" and discusses the "intimidating of capital," but he generally hunts up a lease or goes out and locates a mine for himself. Successful mining men have not stopped any new development work, and will start work in contemplation notwithstanding all calamity talk, as they appreciate the fact that the present state of affairs has no bearing on new work, and that when they get ready to ship ore there will be a place to sell it.

THE Clark-Campbell mining stock litigation, previously referred to, has been decided against Clark. A. G. Campbell of Utah gave W. A. Clark of Montana an option on a controlling interest in the Ophir Hill M. Co. for $75,000. The stock was in escrow, the conditions being that if Clark or his agent paid for it on or before Nov. 24th, '98, it was to be delivered. On Nov. 22d, '98, a $19,000 dividend was paid to Campbell on this stock. On the 24th, two days after, Clark's agent made the option good, paid the $75,000, got the stock and demanded the $19,000 paid on it to Campbell while it was in escrow. This was refused, suit was brought, and last Saturday a Salt Lake City judge decided that Clark was not entitled to the $19,000 dividend, and that Campbell could retain it, on the ground that the title to the stock vested in Campbell till Clark made good his option and paid the agreed price when the stock was his, and not before.

THE Plattner chlorination process consists briefly in roasting sulphide ores with salt in a reverberatory furnace, from which it is withdrawn, cooled, dampened slightly and charged into a large circular tank provided with a false bottom. A cover is placed over the tank and chlorine gas is introduced from below. After twenty-four to forty-eight hours this is discontinued and the ter-chloride of gold washed out with water. The water containing the gold in solution is drawn off in another vat, in which the gold is precipitated by the introduction of iron sulphate in solution. This process costs in California, where it is the only chlorination process in use, from $5.50 to $10 per ton of ore treated, according to capacity of plant and cost of labor and supplies. When good work is being done, over 90% of the gold values are recovered. The largest plant in California is at the Utica-Stickle mines, at Angels, Calaveras county, where there are seven furnaces.

THE copper-bearing deposits of the Lake Superior region are of two classes, bedded deposits and veins. The former includes all of those occurrences in which conglomerates, sandstones, amygdaloids, and veins or beds containing much epidote, are copper bearing. The other class includes those fissures which traverse the bedded formations at or near a right angle. It is notable that no copper has ever been found associated with acid eruptives in this region, nor have any deposits sufficiently rich to pay ever been found in the massive non-vesicular diabase beds, excepting where directly connected with amygdaloid deposits or epidote courses. The conglomerate and sandstone deposits are of ordinary type similar to sandstones and conglomerates elsewhere, except that they are copper bearing. In the conglomerates and sandstones the copper occurs as a cementing material and as replacing certain portions of the beds which have been removed. The copper is of secondary origin and has been deposited in these fragmental rocks by deposition from copper-bearing solutions. The copper-bearing amygdaloids are much altered, copper-saturated upper vesicular portions of old lava flows, and are not independent beds.

WHEN a prospector locates a claim he should take particular care to ascertain, as nearly as possible, the direction of strike, that the side lines may be made parallel to the vein. The passage of the vein across the side line of a claim is disappointing to the owner of the claim and is also a fruitful source of litigation. The likelihood of making a mistake of this kind is greater in a region where ore deposits occur in a sedimentary formation that lies at low angles, as at Leadville, Colo., and in the Black Hills of South Dakota, where silver-lead and gold ores occur in quartzite and limestone in nearly flat sheets. The ore shoots are usually larger in one direction than in another and the larger axis may be presumed to represent the strike or trend of the ore body and in this direction the claim should have its greatest length. At least one famous law suit was indirectly the outcome of an error of this kind—the case of Dugan vs. Davy in South Dakota. The locator made a discovery on the side of a hill above an abrupt precipice. He considered the quartzite to be the vein and located his claim in the direction of its exposure or outcrop, taking one-half of its width on the quartzite and the other half on the steep slope and talus at its base. The ore shoot lay in this quartzite layer, but its trend was almost directly across the length of the claim, so the locator only had 150 feet on the shoot where he might have claimed and held 1500 feet.

THAT nuggets grow there is no reason to believe. All the so-called evidence to that effect is theoretical. When a nugget is released from the rock matrix in which it was formed, whether quartz, talc, or whatever it may have been, it begins to diminish in size by the attrition of rocks as it moves along and mingles with the detritus on the surface. It has taken ages in most cases for a nugget to move down a hill side from a vein where it was formed, but having reached the gulch and mingling with the gravel and boulders of the stream, every freshet which has volume enough to move the rocks, gravel and grit causes the nugget to be scoured and finally worn smooth. Its sharp corners and edges are blunted and any projections are pounded out of shape and sometimes turned back upon the main mass. In time the entire appearance of the mass of gold is changed from that of a rough mass of irregular shape, having sharp edges and possibly many crystal faces, is beaten and worn until it becomes a smooth rounded mass of still irregular shape. This may be accomplished without the nugget having moved along the bed of the stream at all, the attrition being due to passing rocks and gravel carried onward by the swift current of the mountain stream. In a gulch producing nuggets of gold as well as fine gold, it will be found that the gold always grows smoother and pieces average smaller as distance from its source increases.

Some Experiences of a Working Miner.

NUMBER XXI.

Written for the MINING AND SCIENTIFIC PRESS.

Two brothers, prospecting, one lucky day discovered the croppings of what is now the A—— L—— mine. They had little means and could not do much toward the development of a mine such as theirs—a great vein of low-grade gold ore. They worked vigorously, however, and soon attracted attention to their prospect. One day a stranger happened in the vicinity, and, hearing of the A—— L——, made an examination and finally bought the property—two claims—for $15,000. A corporation was organized and an Eastern gentleman was sent out to take charge; and he was a gentleman, too, and a most excellent dentist. The doctor was well liked by everybody; even the miners liked him, for he never troubled them in their work and was as well pleased when they drilled 18 inches on a shift as when they put in 8 feet. The first step was a first-class 40-stamp mill. The mine was not opened yet, it was true; but that was all right; there was plenty of ore, so it was believed, and the matter of development was a secondary consideration, which could be attended to any day when ore was wanted. In ninety days the mill was completed, and when a long tramway connecting the mill with the workings on the hill, was completed, too, mining commenced; but, somehow, it seemed hard to get down enough ore to keep the mill running steadily. The stamps were hung up, and in a few days the bins of the mill were full and the chutes at the mine were overflowing. Then a fresh start would be made; but this ore crushed rapidly, and the forty stamps ground up and sluiced out nearly 200 tons in twenty-four hours; so that, after a run of a day or two, the hang-up period came around again. It cost 75 cents to mine and deliver the ore in the mill and $1.25 to mill the ore. The clean-up showed about this amount in the ore. It was evident that the superficial excavation up on top of the hill would never make a mine, and the rock was low grade, anyway. It was a well known fact that mines grow larger and richer as they went down, and the Doctor started a tunnel. It was driven 1400 feet into the hill, and had it continued a little farther would have come out on the opposite side. One peculiar feature of this tunnel was that at no point along its line was it more than 60 feet below the surface, and the face of the tunnel had entered the alluvial deposit on the slope of the hill on the opposite side of the ridge when they quit.

This sort of thing could not last forever. The A—— L—— mine was declared no good, work was stopped, the mill was shut down and a few years later was moved away to another property. This was fifteen years ago. A few years later a miner took the property and started to work it in a small way—first with an arrastra and later with a rotary mill—and he has made money every day, and now he is preparing to build a larger mill. The tailings from the mill built by the corporation yield more than they got from the ore, and there is not a freer milling rock anywhere; but it would be hard to find a better dentist than Mine Superintendent M—— was.

* * *

M—— was a good miner and he thought he was a good mineralogist, too, but he wasn't. He had been in camp so long that he was looked upon as authority on any matter concerning the camp. One day M—— took a stroll up on the hills back of town and came across a stranger digging away as for dear life.

"Howdy, stranger," said M—— as he walked up, and stooping picked up a piece of the rock the stranger was carefully laying on a canvas.

"Howaryer," briefly responded the perspiring stranger.

"What are you going to do with this rock?" inquired M—— who was noted for his inquisitiveness.

"Ship it," was the reply.

"I wouldn't," said M——.

"Why not," inquired the stranger.

"It'll put you in the hole," said M——. "There's nothing in it—why that's only birdseye and never carries anything here.

"Bet yer it does," said the brief stranger.

"Oh," said M——, "it might carry a trace, but it won't go three ounces."

"Bet yer it'll go over thirty," said the stranger.

The wager was made. It was a thirsty country and it is not necessary to say what the wager was, but M—— lost both the wager and his prestige as an oracle. The "birdseye" milled nearly 300 ounces per ton. This simply goes to show how dangerous it is to presume to know it all even in your own camp.

* * *

One of the liveliest and most prosperous mining camps in the West was at C—— in its palmy days. C—— was built on a narrow strip of ground between two gulches, the sides of which were precipitous. Building room was scarce. Back of the town arose a steep, rugged mass of red rocks to a height of more than 1000 feet. No houses could be built there without an expensive grade. Many miners owned their cabins and "kept house" for themselves. One of them who had grown tired of boarding-house fare and Chinese cooking took a notion to build, but he was too poor to pay $150 for a lot. Noticing a pile of rugged rocks at the side of the street, at the upper end of the single village street, he thought it might be made a suitable place for a house with a little labor. He applied to the company owning the ground for permission to build, which was granted. He worked at his grade in the evening and early morning before going on shift, and was soon prepared to build his cabin. Being an observing fellow, he took more than passing notice of the rock in which he was excavating and finally concluded to test some of it. This he did in a simple way, and, becoming satisfied that there was pay in sight, asked for a lease. The company gave him the desired lease and agreed to mill all the ore he could get out. The leaser made a fortune right there, and the company enlarged its mill to accommodate the increased tonnage offered. The cabin site is a big hole in the ground, and all is still there now.

* * *

When the K—— mine was running in C—— a tunnel was driven 200 feet along the vein. The ore was at first good, but got poorer, and the vein finally pinched altogether, work was discontinued and the claim abandoned. Later it was relocated and some new exploratory work undertaken. A crosscut was run a short distance and a rich vein found. It is now known that the tunnel was run parallel with the main vein, and the original owners lost a valuable mine from neglect to crosscut.

* * *

The J—— Portland Cement Co. was organized and a deposit of material suitable for the manufacture of a first-class article was opened. Machinery was built and buildings for all purposes provided. That the product of the works was all that could be desired was abundantly proven, but the cost of taking the product from the lonely camp in the hills to market cost more than it did to make and transport the product of rival concerns and the enterprise was abandoned, after $80,000 had been expended on it.

MINER.

Operating to Great Depth by Relays.

Written for the MINING AND SCIENTIFIC PRESS.

A propostion to work mines to a depth of 8000 feet is now being considered in South Africa. That this can be accomplished by the establishment of relay winding stations at distances of 2500 to 3000 feet, and of pumping stations at half this distance, is manifest. Electricity must become an important factor in the development and operation of mines to great depth. It is the most rational and least expensive method of overcoming the problems of deep mining. An important question will be that of ventilation, but the introduction of electric fans is going to do something for ventilation also.

That the cost will be greater when operating by relays to the depth of 8000 to 10,000 feet than from a depth of 5000 feet—already an accomplished fact—goes without saying, but a single operation can be carried on to a depth of 10,000 feet at a cost considerably below that of operating two mines to a depth of 5000 feet each. A shaft started with the idea of deep mining should be large and provided with a sufficient number of compartments to afford large capacity. Having reached the depth of the first relay winding station—at say 3000 feet—it would be necessary to excavate a large chamber and support it by such means as would render it safe, dry and permanent. In this must be installed the first auxiliary hoisting machine, for hoisting from the level of the next relay station. If only one relay station is to be established, compressed air could be employed to advantage, but for all purposes—ventilation, pumping, hoisting, haulage, etc.—electricity would probably be the best, and in the event of more than one relay station it is undoubtedly the best.

When sinking shall commence below the level of the first relay station the shaft should be offset a distance sufficient to allow a space of not less than 5 feet between the two shafts. This partly as a precaution against accident to men on the station level and partly to avoid danger of a breach in the wall between the sump of the upper shaft and the relay shaft. Cars hoisted on the cages in the relay shaft could then be run onto the cages going to the surface, and hoisting continued without dumping or any further rehandling.

When the level of the second relay station has been reached a second chamber should be cut out and equipped in the same manner as the first, and the shaft again continued on an offset as above, being located either directly under the first section of the shaft or still farther over in the direction of the first offset. The character of the formation on the level would perhaps determine this.

This idea contemplates a vertical shaft which is sunk through barren rock to an ore bed or vein, as at the Lake Superior copper mines, or the mines of the Witwatersrand, in South Africa, though equally applicable to a vein having many levels. The same plan could be applied to inclined shafts sunk upon or parallel with the dip of a vein. The idea is susceptible of more or less change in the detail, as for instance where skips are in use instead of cages. In such case the skips would be dumped at the relay stations into bins on the level, or into pockets cut out under the floor of the level from which skips operating in the next section above would be loaded. Where extensive operations are contemplated, cages would prove the more economical whether in inclined shaft or vertical, unless the dip of the shaft be too low to admit of the use of cages such as are constructed for use in inclines.

The generating plant on the surface would have to be powerful enough to supply all the power required to operate all hoisting and pumping engines, ventilating devices, and should also do the hauling underground. The first cost of plant would be great, of course, but that the working expense would greatly exceed that at mines working from great depth by a single lift is improbable.

W. H. S.

The Situation in Colorado.

TO THE EDITOR:—The week ending June 17th was one of serious uncertainty in all circles associated with the mining industry, as a result of unsettled questions growing out of the operations of the eight-hour law, which became effective on the 15th. Within the week six smelting plants blew out their furnaces—the Globe and Omaha & Grant in Denver, the Pueblo and Colorado in Pueblo, and the Arkansas Valley and Bimetallic in Leadville, the one at Durango having ceased to operate the previous week. The Argo in Denver, known as the Hill smelter; and the Philadelphia in Pueblo, known as the Guggenheim plant, have virtually adjusted all differences with their employes and those two smelters have not ceased to operate. Their employes are working on the basis of three eight-hour shifts and it is my belief that when the plants now idle resume work it will also be on the eight-hour plan.

Mr. Guggenheim of the Philadelphia Smelting & Refining Co. offered the following schedule to his men on the 15th, which the latter accepted:

Front men, formerly $2.25 for twelve hours, $2 for eight hours.

Side men, formerly $2 for twelve hours, $1.80 for eight hours.

Charge wheelers, formerly $1.75 for twelve hours, $1.55 for eight hours.

Machine roasters, formerly $2.80 for twelve hours, $2.20 for eight hours.

Machine helpers, formerly $1.50 for twelve hours, $1.40 for eight hours.

The schedule offered by the Argo management does not differ materially from the above, and between the latter and their employes there appears to be amicable relations.

The issue between the six smelters of the American Smelting and Refining Co. and their employes is primarily a question as to whether the former shall recognize the spirit of the eight-hour law. At this writing a test case is being prepared, wherein it is designed to obtain a decision by the Supreme Court as speedily as possible as to the constitutionality of the law in question.

While all will be deeply interested in the interpretation sought from the courts, it nevertheless appears that the acceptance of the law by the two smelters that are now running and by most of the mills and mines of the State is having the effect of adjusting the mining industry generally to the eight-hour basis, which is likely to be adhered to, regardless of the fate of the statute involved. A system once established by mutual concessions on the part of employer and employe will need no statute to maintain it.

The concensus of expression among mine operators is that the eight-hour plan is not inimical to their industry; that by selecting men who are competent and faithful, and weeding out those who are not, the business will not suffer as a result.

At this date the attitude of the consolidated smelter management and their former employes toward each other is more conciliatory, and, through the mediation of disinterested committees of representative citizens, it seems probable that before the close of another week existing differences will be settled, with the result that the plants now shut down will resume work.

Meantime the output of the mines at Leadville, San Juan country, Creede and all other districts producing smelting ore and concentrates, is either greatly reduced or entirely stopped because of the interruption of smelting operations.

In Cripple Creek district many of the large mines, especially those which produce a high-grade smelting ore, greatly reduced their force the past week. Nevertheless, this district is more slightly affected by the disturbed conditions than any other in the State, because of the fact that there are five chlorination and cyanide mills, having an aggregate capacity of 28,000 tons of ore per month, all operating within and near the district, with a likelihood of one or two others being added to the list within two months. In fact the high saving effected by these plants and their adaptability to Cripple Creek ores is rapidly making them a controlling factor in the situation so far as that district is concerned.

Denver, Colo., June 17th, '99. WASCOTT.

Cyaniding Slimy Ores and Tailings.

Written for the MINING AND SCIENTIC PRESS by MATT. W. ALDERSON.

Part IV.—Precipitation.

The most delicate operation in cyanide work is recovering the gold from the solution. This is naturally more difficult in a decantation system than by percolation. In the latter the gold is concentrated. In other words, the amount of gold in a ton of solution will be greater than in a ton of the ore, the quantity of fluid used for any other wash being seldom in excess of half a ton to a ton of ore, and generally much less. With decantation, the reverse is true, the solutions must necessarily be dilute, as from two to three tons of fluid to each ton of ore are frequently used for each of the three successive washes.

The difficulties incident to the handling of such quantities of solution, containing oftentimes no more gold than solutions ordinarily contain after having passed an extractor, have been successfully overcome in South Africa by the Siemens & Halske process. This, at best, is expensive to install and expensive to keep up. Naturally a simpler method has been sought. Unquestionably a system requiring the use of chemicals would be preferable, even if for a few years it were more expensive. There would be the advantage of less cost for labor and for power and the prospect after a while of a reduction in cost of chemicals by virtue of increased demand, etc. I need not dwell on the difficulties incident to precipitation with zinc shavings; they have been described fully by able writers; but an experience at the Southern Cross mill, where the difficulties were due to different causes from those overcome two years previous at Iron Rod, led to such an important modification of my own practice that I have no doubt its recital may be of benefit to others.

Shortly after having started work at Southern Cross, I discovered I was meeting with the same difficulty other cyaniders had experienced before me: I was not making a good recovery of the gold obtained in solution. This was surprising, as the strong solution entered the extractor carrying four pounds of cyanide to the ton and the second solution never less than 2½ pounds. With such solutions I had never failed to do perfect work. Running a series of checks on the solution, I found the loss was not in the extractor but before the fluid entered it. Tests soon showed an appreciable quantity of alkaline sulphides in the solution, and to these was ascribed the reprecipitation. Attempts to keep them under control by the use of acetate of lead, the usual remedy in such cases, resulted in comparative failure. Recalling Prof. Christy's articles on precipitation by copper and its compounds (MINING AND SCIENTIFIC PRESS, Jan. 9th–16th, '97), I believed his scheme would lead me out of my difficulty. I had already given the articles a great deal of thought, believing they afforded a way of successfully handling dilute solutions, so I was eager for actual experience. Making a careful series of experiments, I soon determined that the gold could be dissolved from the tailings without difficulty from solutions not allowed to fall below half a pound of cyanide to the ton, and I ran charges with solutions of less than a pound to the ton. After a large number of experiments in the laboratory and in actual practice on vats containing eight to ten tons of solution, I was compelled to decide the scheme of precipitating by cuprous chloride, etc., at least so far as that particular solution was concerned, a failure. Prof. Christy says that by his own system and by that of Prof. de Wilde he had made numbers of experiments on solutions of various values and says: "I have found them both to remove the gold with a sharpness and completeness that is a great relief, after trying the other methods in use." In my experiments, I was unable in a single instance, by either method, to secure a perfect precipitation, the general average being in the neighborhood of 80%. Objection was made, when Prof. Christy's articles first appeared, that the expense for sulphuric acid would be prohibitive, but I did not find it so. Aside from imperfect work, as above, the scheme is practicable and not expensive, and I would not say that in more skilled hands or with solutions from other ores it might not be made to work.

There seemed to be no alternative but to return to the use of zinc shavings, and naturally the thought occurred: "Is there not some way in which precipitation can be secured with consumption of less cyanide?" The mill solutions could be used for about a week with comparative safety, after that the accumulation of alkaline sulphides was so great as to cause serious loss almost any time. Even if the ore was rich enough so one could afford it, he would not care to throw away every week solutions containing 50 to 100 pounds of cyanide. I was aware that some cyaniders in South Africa had succeeded in precipitating gold from solutions containing but a trace of cyanide on freshly turned zinc. (See "The Proceedings of the Chemical and Metallurgical Society of South Africa," Vol. I.) I was also aware that Alfred James held that satisfactory precipitation could be made from very dilute solutions under proper conditions. (See MINING AND SCIENTIFIC PRESS, March 13th, '97.) I was also familiar with the opinion of Radoe and later writers that accompanying imperfect precipitation is an incrustation on the zinc, consisting mainly of ferrocyanide of zinc (see "The Cyanide Process," Scheidel, page 50), and I knew that the principal object of using strong solutions was to keep this incrustation from forming. On a former occasion, when considerable copper showing was made on the zinc, an experienced cyanider had advanced the idea that my shavings were not fine enough, that the gold would attack the fine shavings and the copper the coarse. This was not a plausible theory; but to test it I took a number of the small zinc disks, left after the shavings had been turned off, and put them in different compartments of the extractor. Instead of getting a precipitation of copper on these disks, I soon surprised myself by finding I was getting gold. In the MINING AND SCIENTIFIC PRESS of Jan. 23rd, '97, is an account of attempts to precipitate gold on commercial sheet zinc brightly burnished. The writer says: "In no case was more than a trace of gold precipitated. In many cases, where the zinc was brightly burnished, not a trace of gold came down, and the strips weighed exactly the same to a hundredth of a milligramme before and after the test, and when dissolved in sulphuric acid left no trace of gold."

A number of times I have put disks of sheet zinc in my extractor, and if it was doing good work these disks would soon show the black coating that proves that gold is being precipitated. But my experience with these disks soon taught me something else. I found that the incrustation which formed on the filaments of zinc during imperfect precipitation showed plainly to the naked eye on these disks. They therefore serve as good indicators of the condition of the shavings. Again, I soon found by experiment that the usual theory that a strong cyanide solution dissolved this incrustation was not wholly true. If one will take an incrusted disk, presenting to the eye an appearance like the incrustation of lime on the inside of a kettle, and place it in strong cyanide solution, he will find that the incrustation is loosened and only partially dissolved; it rolls off the zinc in fine, granular particles. Many persons have taken this incrustation for lime, as it will effervesce when tested with hydrochloric acid, but further tests will show that it is not lime but principally zinc. As this granular substance assays about the same as the precipitate, the question naturally arises if it is not really such, and if the action of the strong solution is not so much to aid precipitation as to remove the precipitated gold from the zinc, leaving it in such condition that additional precipitation can take place.

In the light of these observations and reflections, I commenced an attempt to precipitate on zinc shavings from solutions containing one-half pound of cyanide to the ton, the zinc in the extractor being first allowed to stand for awhile in much stronger solution, to remove any incrustation which it might have on the surface. The venture was a success. Since then all my work has been done with solutions ranging in strength fron one-half pound to one pound, and as perfect work has been done in every way, both in getting the gold in solution and in precipitating it from the solution as when I was using solutions ranging in strength from five pounds to six pounds cyanide to the ton.

Fig. 6 is a cut of an extractor which handles successfully thirty tons of solution every twenty-four hours. It is 3 feet in width by 12 feet in length. The first four compartments are 18 inches by 18 inches, and the last three compartments are 12 inches by 18 inches. The tubs shown at the head of the extractor are settling tubs for the gold slimes, the principle of decantation being utilized for this as well as for other branches of the work.

Once every six hours about 1½ pounds of cyanide are placed in the entrance to the head compartment of this extractor. The fluid, passing slowly, is strong in cyanide for awhile, and any incrustation on the zinc is thus loosened. Where desirable to save in cyanide, about a pound of caustic soda is placed in the entrance to the head compartment in lieu of the cyanide. The action of this chemical on the zinc, as far as removing the incrustation is concerned, is practically the same as the cyanide, the object in using it being that it is much less expensive. While good work has been done in this way in runs of several weeks at a time, especially at the Southern Cross and Schmidt & Johns mills, by placing in the head of the extractor alternate doses of cyanide and caustic soda, with no objectionable features being detected, I prefer to use cyanide exclusively where it can be done economically, if for no other reason than to simplify matters and avoid any possible chance for undesirable chemical complications. If one is using a one-pound solution for agition and the consumption is from a quarter to a half of this, and the filling of the agitator after agitation is from the waste water vat, the gold solution may not carry half a pound of cyanide to the ton. As the cyanide is really more necessary in precipitating than in dissolving the gold, the solution would better be brought up to working strength, as many cyaniders do, before it enters the extractor, instead of afterwards. And it can be done with more satisfactory results in the way I have described than in any other with which I am familiar.

Scheidel says ("The Cyanide Process," page 35): "A white precipitate is constantly accompanying the reduction of bullion in the zinc boxes, undoubtedly the result of the action of alkali on the zinc and of the zinc-potassium oxide on the double cyanide of zinc and potassium, which is always present in the solution, forming the insoluble cyanide of zinc."

To my mind, the presence of this white precipitate is inseparably connected with defective precipitation. I know other cyaniders do not so view it, but if it were to show in one of my extractors I would say the zinc needed immediate attention. I have noticed that it forms on zinc left standing for some time in idle cyanide solution, an indirect proof that it comes from inactivity in one form or another. On its appearance I would see that the extractors were properly worked and no opportunity left for solution to pass without penetrating the entire zinc sponge. I might increase, temporarily, the amount of cyanide placed in the extractors. I would also test for alkaline sulphides and other possible interfering elements. Alkaline sulphides are present in many Montana tailings, and as an aid in counteracting their influence I would place three or four tablespoonfuls of acetate of lead in the head of the extractor three or four times a week. This will be found beneficial in any case where the precipitation is not as perfect as it should be.

The action of the gold solution on the zinc in the

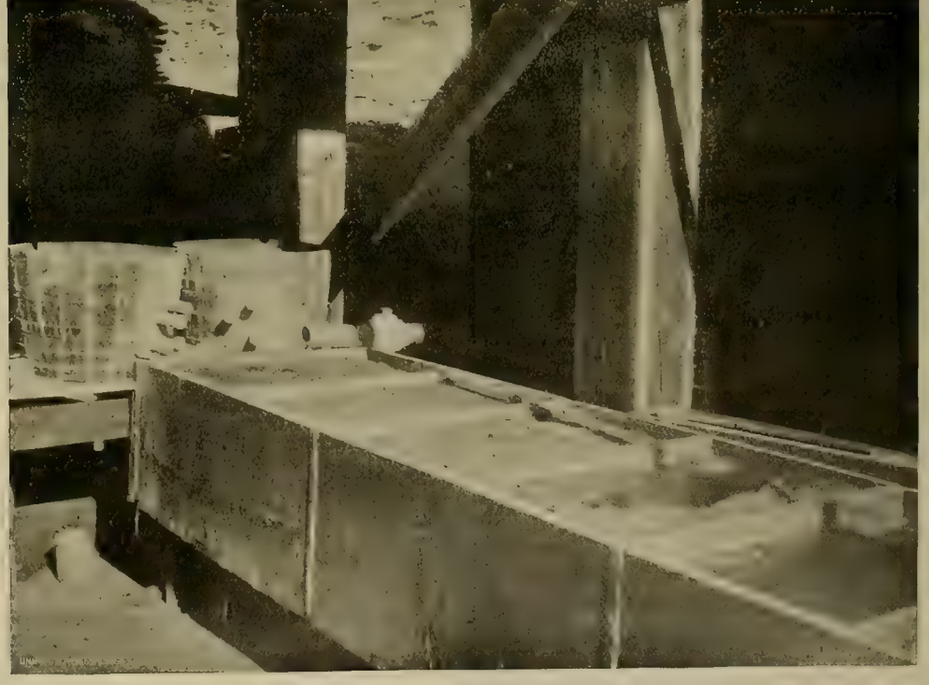


FIG. 6.—EXTRACTOR AT MOHEGAN MILL, MONTANA.

compartments of the extractor is such as to contract it, and in time, no matter how snugly it may fit when first put in, it will leave room for fluid to pass on all sides without passing through. At the same time the constant generation of hydrogen gas leaves bubbles under the zinc and it is lifted to the surface. That good work may continue, the extractor must have immediate attention. The surplus of hydrogen can be disposed of readily by stirring the zinc, but one cannot spread the zinc so it will fit the compartments without removing it and replacing it. All the zinc shavings, therefore, are taken from the compartments and carefully spread and packed in again once every twenty-four hours. If there are large matted rolls, they are shaken or pulled out and the zinc is made to fit evenly and snugly against the sides of the compartment, even to tucking it in. This obviates any tendency to polarization, gives assurance that no channels exist around the zinc, and also partially frees the zinc from any accumulated slimes. By this system as perfect a precipitation as anyone could ask has been secured from solutions carrying half a pound of cyanide to the ton, most of the assays of the sump solutions showing less than a weighable trace of gold in two assay tons. Under favorable conditions I have no doubt solutions of less strength could be handled successfully, but there is no object in making the attempt, for it is seldom one finds ores or tailings from which he would feel safe in attempting to dissolve the gold with less than this amount of cyanide.

(To be Continued.)

Methods of Testing and Sampling Placer Deposits.*

NUMBER II.—CONCLUDED.

By EDMUND B. KIRBY.

Sampling Gravel.—In practice, gravel for tests is conveniently washed either by the pan, the rocker, or by small sluices. In pan tests, at each point sampled, a number of pans of gravel are taken at uniform distances apart, down the exposed face of gravel. On account of the variations in the different layers, much judgment is necessary to do this properly. The bank may comprise stones of every size, and only the finer and richer material, filling the interstices between the larger stones, can be taken into the pan. The sample is therefore limited to material less than 3 or 4 inches in diameter. In most beds this pan size gravel ranges from 25% to 60% of the entire mass. This percentage should be estimated. It is not possible to calculate from it the value of this entire mass, because the larger stones are not barren. Much of the gold adheres to their surfaces, and fine gold seems to have a special tendency to do this. Hence, if a pan test shows 20 cents per cubic yard of fine material tested, and this represents only 50% of the mass, it is not correct to assume that the latter averages only 10 cents per yard. The test merely fixes an upper and a lower limit, and the real contents lie somewhere between the two; in this case between 10 and 20 cents.

Careful hand panning collects fine and scale gold perhaps more closely than any other practical method. It will be found best to wash down to the black sand, which is almost always barren, and then determine the gold by assay. One hundred and twenty pans are generally called a cubic yard, but the error of measurement in this way is very great. It is better to measure the sample in a small box made for the purpose. The swell of loose gravel above its original bulk in the bank is generally about one-fifth, so that 1 cubic yard in bank is equivalent to 1.20 cubic yards in the measuring box.

If the gold is not too fine, and many points are to be sampled, and a large quantity is to be handled from each point, it is better to wash in a rocker instead of in a pan.

On account of the difficulties mentioned, the only accurate tests are those in which the excavation of gravel is measured, and the sample taken is so large that it will include all workable sizes of stones standing in the bank. This requires the use of running water in a sluice. The latter may be 12 or 18 inches wide and, say, 36 to 48 feet long, with slat riffles arranged for easy removal. It is not necessary to use quicksilver unless the gold is very fine, and the quantity so small that a clean-up is difficult. The gravel from distant sample points may be hauled by wagon to the sluice. For gravel carrying fine gold, the writer has used an undercurrent attached to the sluice, but the additional saving has never exceeded 4½% of the total gold.

The following figures are taken from a certain case which is selected because it typifies a large class of the gravel deposits now remaining. It also illustrates the distribution of fine gold, and the comparative results of tests made by the methods above mentioned, and washing upon a large scale. The gravel was a heavy mass, with the gold so fine as to average only $\frac{1}{10}$ of a cent to a color. It was, therefore, very uniformly distributed through the mass. The tests were scattered over some 200 acres, and represent only the general mass of gravel, as the exposures had not developed any channel or other local concentration of coarse gold. The data from previous hydraulic washing, on 60,000 cubic yards, showed a recovery of 5.33 cents per cubic yard. Pan tests were made at some fifty points, each test including six to twenty pans. The face of gravel exposed at each point ranged from 6 to 30 feet in depth. A single test was as follows:

Vertical depth of gravel sampled	25.0	feet.
Number of pans taken	13	
Measured volume of sample, calculated to volume in bank	0.119	cubic yards.
Total gold saved (by assay)	1.145	cents.
Gold per cubic yard of sample	9.65	cents.
Estimated percentage of bank represented in sample	40.0	per cent.
Average contents of bank if large stones are barren	3.86	cents.

Actual average of bank lies between 9.65 and 3.86 cents.

Another series of tests was made by careful sluice washing with an undercurrent on quantities measured in place, and ranging from 30 to 80 cubic yards each. The face of gravel sampled in each case ranged from 25 to 35 feet deep. The results were as follows:

6.83	cents	per	cubic yard.
5.78	"	"	"
7.61	"	"	"
5.16	"	"	"
6.86	"	"	"

These tests were so distributed as to make the arithmetic mean of 6.45 cents a correct average. This figure represents the mass of gravel which had already yielded 5.33 cents by hydraulic washing. Hence, large scale work yielded 82.5% of the contents, as shown by small sluice tests. No doubt the difference is mainly accidental, because a few tests on such small quantities cannot check against the average contents of 60,000 cubic yards. The test sluice, however, had a slower current than the working sluice, and the undercurrent saved about 0.3 cent additional, so that a recovery somewhat higher was to be expected. A number of the pan tests were also taken from this particular ground, and these averaged 6.98 cents, as the upper limit, and 2.88 cents as the lower limit. This indicates, by calculation, that the large stones in the bank carried about 6.0 cents per yard, or almost as much gold as the pan size gravel.

Excavations may be measured by the usual method of cross sections. When a sample is cut down the face of a gravel bank, the writer has found it more convenient and accurate to use an artificial reference plane, made by stretching two wires from top to bottom of the bank. The cross-sections before and after excavation are measured from this plane.

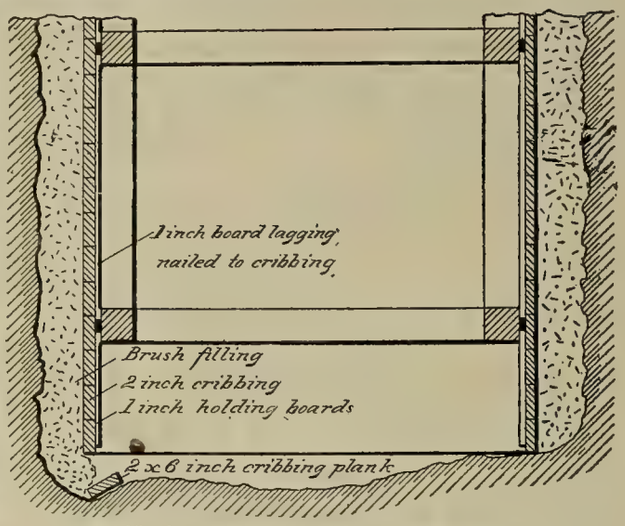
Notes on Test Workings in Water-Bearing Gravels.—Drop drill holes are valuable and generally necessary as a preliminary to the expensive work of shafts and drifts. They cannot, however, take the place of such work. Drill holes will furnish a cross-section profile of the bedrock, and thus indicate the most probable location of the channel. They will also show the presence of large stones and boulders in serious quantities, the existence of quicksand layers, etc. If gold is present, it will be brought up in the sand pump. A failure to find gold in the sand raised, may be evidence decisive enough to stop further operations, but the presence of gold, on the contrary, is not by any means decisive evidence. While drilling, the stones for a greater or less distance around the hole are churned and shaken. The finer and richer material in their interstices works loose, and flows into the bottom of the hole, so that the gold brought up by the sand pump is largely derived from this adjacent gravel. Hence, it is impossible to say what volume of gravel has yielded the gold recovered, and any figures of value per cubic yard, based upon drill hole results, is pure guesswork. Nothing could be more dangerous than to base a heavy investment upon such data.

The cost of drill holes in unknown gravel cannot be estimated closely. In favorable gravel, drilling is very rapid and cheap, but an abundance of large stones may make the work expensive, and cause the loss of many holes. The money thus spent, however, may accomplish its purpose in showing that the gravel bed is of such a character that it cannot be mined at a reasonable expense. Under average western conditions, the total contract cost of such work will generally range from $3 to $6 per foot of hole.

In these deposits there is no way to ascertain the structure of the pay gravel and its approximate contents, except by shafts and drifts. The depth of gravel does not usually exceed 40 to 70 feet, and much sand and small gravel must be raised with the water. A vertical centrifugal pump is therefore the best means of handling the flow. In one typical instance of quite open gravel, the flow reached a maximum of about 1800 gallons per minute, while sinking a 50-foot shaft. A few weeks of steady pumping, however, reduced this to 500 gallons. The extension of drifts increases the flow, but long continued draining has a remarkable effect in reducing it. A stream flowing over such a gravel bed seems to pack the interstices of its channel with fine silt, and it does not furnish water to the drained area as rapidly as might be expected.

Steam power will generally be found best, because of the temporary nature of the work, and the ease with which it may be moved from one shaft to another. Water power saves a serious daily expense, but requires a heavier first cost, and cannot be moved. It is also very difficult to adjust turbines to the increased power and speed required by the pump as the depth increases. The usual heavy cost of such work is almost invariably due to stoppages and breakdowns, and the most careful planning is necessary to reduce these to a minimum. The pump and stand pipe are best supported by an independent framework which can at any time be lifted out of the shaft. The pump shaft is driven by a quarter twist belt, governed by an idler pulley which will permit the shaft to be lowered 4 feet before shifting its pulley.

The two standard methods available for work of this kind are to sink by driving lagging, or to sink a caisson. With either method the shaft is apt to become distorted. Both are slow, and a caisson makes it very difficult to arrange the pumping plant. The method of driving lagging does not work well in coarse gravel, or where layers of large stones are present. Hence, in most cases, the following described plan, shown in the illustration, will be found best:



METHOD OF SHAFT SINKING IN WET GRAVEL.

The gravel along each wall of the shaft is excavated in the form of a small trench, and the space is packed with brush. A tilted cribbing plank, 2x6 inches, is used to hold the brush in place, and is finally forced into position so as to form a continuation of the outer cribbing. This is held temporarily by a few 1-inch boards, nailed on and braced, as required, until a depth of 4 feet is gained all around, and another set of regular shaft timbers can be placed. A lagging of 1-inch boards, extending between the two sets, is then nailed on the cribbing. A shaft was sunk in this way, by skilled workmen, 47 feet in twenty-nine shifts of ten hours each. The water flow was 500 to 800 gallons per minute, but no quicksand, and only a few large stones were encountered.

In drifting, it is necessary to use the standard methods, with driven lagging and breast boards. Two-inch lagging is generally used overhead and in the corners, and 1-inch boards at the sides and breast. This top lagging will often be found too light for the weight, and its bending causes delay and distortion of the work. In such cases, selected 3-inch lumber should be used.

In general, it may be said that, excluding stoppages, a shaft may be sunk at the rate of 1½ feet per ten-hour shift. Drifting should maintain an average of 1¾ feet per ten-hour shift. The main expense is due to stoppages, the cost of plant, and the cost of bringing in skilled workmen for a temporary job.

In work of this kind, the heavy water flow makes it almost impossible to take accurate measurements or samples. Most of the fine sand and gravel will pass out through the centrifugal pump, and may be put through the testing sluice. This, as well as the large stones, is apt to drop its gold on being loosened in the shaft bottom. The heavy water flow also washes out all fine gravel from the sides before it can be observed. It is therefore necessary to rely mainly upon panning and judgment during the progress of the work. After the ground has been drained for a while, it becomes possible to sample any special layers of the gravel.

THE increasing demand for aluminum as a substitute for copper in conducting electricity is a notable feature of the commercial situation. The Northwestern Elevated Road of Chicago has recently ordered 150,000 pounds of aluminum for feeders.

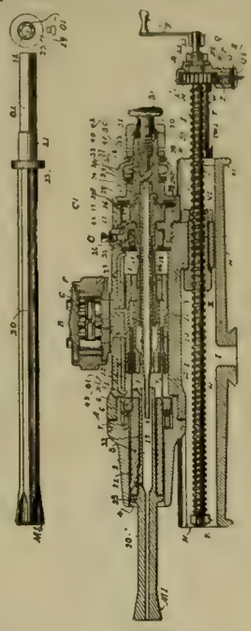
* Read before Colorado Scientific Society.

Latest Mining and Metallurgical Patents.

Patents Issued June 13, 1899.

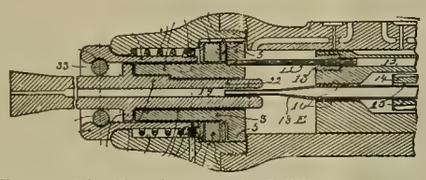
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ROCK DRILLING ENGINE.—No. 626,761; J. G. Leyner, Denver, Colo.



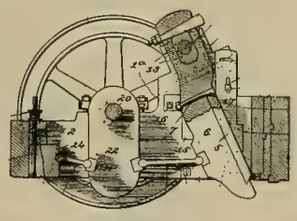
A rock drilling engine provided with a drill bit arranged to project into the cylinder of the drilling engine and arranged to be operatively struck upon its end by the reciprocal movements of the engine's piston and containing a passage or conduit from engine's cylinder to or adjacent to drill bit's cutting point and a water passage or tube or conduit and a suitable water supply through drilling engine to passage in drill bit whereby a commingled supply of the cylinder's actuating fluid and water is conveyed through said drill bits to their cutting points and to the bottom of holes while drilling them and the rock cuttings are thereby rejected.

DRILL HOLDING DEVICE FOR ROCK DRILLING ENGINES.—No. 626,762; J. G. Leyner, Denver, Colo.



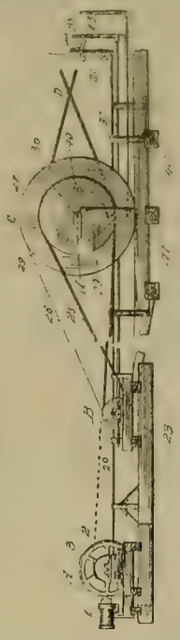
The combination in a rock drilling engine of the cylinder, the piston, the front cylinder head, with a water conveying tube projecting from the rear cylinder head with a drill holding sleeve, revolubly mounted in cylinder head; an axial bore through sleeve, a drill bit operatively supported by sleeve and arranged to be operatively rotated step by step by piston and sleeve, and having drill bit project into the reciprocal path of piston and arranged to be impinged by piston, a collet loosely mounted on sleeve, a spring arranged to hold collet in operative relation to sleeve and drill bit, an abutment on drill bit and a suitable pin or key removably secured in collet and arranged and adapted to be engaged by the abutment of drill bit, whereby drill bit is held in sleeve against accidental displacement.

ROCK OR ORE CRUSHER. — No. 626,955; G. W. Wright, Webb City, Mo.



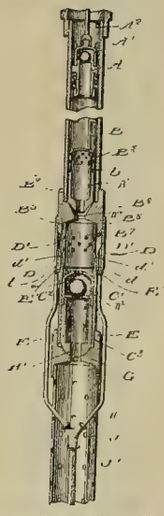
A rock or ore crusher comprising a crusher bed having a longitudinal compartment and inclined extensions, the adjustable boxes shiftable on the inclined extensions, the shaft mounted in the movable boxes, a bearing surrounding the shaft, a jaw bumper, keys extending through the bumper whereby the bearing is held in place on the shaft, an eccentric drive shaft, an eccentric bumper depending from the eccentric drive shaft, a toggle connecting the jaw bumper with the eccentric bumper, a wedge block, a toggle connecting the wedge block with the eccentric bumper, means for adjusting the wedge block, the side plates having forwardly and downwardly extending edges, and the outer reversible wear plates, and the adjustable intermediate wear plates having tenon-and-mortise connection.

APPARATUS FOR DRILLING WELLS.—No. 626,933; J. Reid, Oil City, Pa.



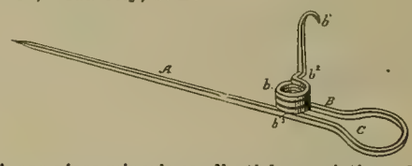
In combination with a well-drilling rig, a constantly running explosive engine, means whereby engine may be at will connected, disconnected or reversed in its connections with the drilling rig, a speed-controlling valve for regulating the admission of explosive material to the engine, whereby the speed of the engine may be regulated at will, a manually controlled and positively actuated lever and rod connection for controlling valve extending to the derrick floor, and means for controlling the connecting and reversing mechanism, also extending to points where they are simultaneously within reach of the operator. A drilling-rig shaft having independent pulleys and a brake wheel, a clutch shaft having loose pulleys and a clutch for connecting either of pulleys with the shaft, reverse connections between the clutch-shaft pulleys and the pulleys on the drilling-rig shaft, an explosive engine provided with a speed regulating valve and having driving connection with the clutch shaft and controlling levers connected respectively to the brake and the reversing clutch and to the speed regulating valve. The combination of the drilling-rig shaft 36 having the pulleys 27 and 29 and the brake wheel 40 provided with the brake band, the shaft 23 having independent pulleys 24, 25, loosely mounted thereon and respectively connected by straight belt 26 and cross belt 28 with the pulleys 27 and 29 on shaft 36, a constantly running explosive engine connected with the shaft 23, clutches whereby either of the pulleys 24, 25, may be made to rotate with the shaft 23, or both left loose thereon, and means whereby the brake band and the clutches are under control of the operator.

DEVICE FOR INCREASING FLOW IN OIL WELLS.—No. 626,949; J. R. Wheeler, Mannington, W. Va.



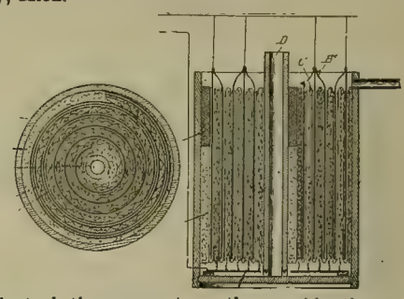
A device for clearing oil wells, the combination with the barrel and reciprocating valve therein, a cylindrical open ended strainer, a collar connecting the latter with the lower end of barrel, a communicating aperture between barrel and strainer, a union having connection with the lower end of strainer, and threaded connections with the union connecting the upper end of the strainer with barrel, a standing valve chamber connected to the lower end of strainer, a perforated barrel connected to the lower end of standing valve chamber, and communicating therewith, the external leader pipes having communication between the space D' about the circumference of said strainer B^7 and the interior of perforated barrel H, and the tube with which pipe connects and the jet pipe connected thereto and leading to the perforated barrel below. A device for clearing paraffine from oil-producing strata in oil wells, comprising in combination with the barrel B, the perforated tube B^7, the union D and connections between the latter and barrel B, the valve chamber within tube B^7, the perforated cylinder H and union connecting the latter with said valve chamber, the leader pipes communicating with ducts in the union D and passing through apertures in the wall of the perforated cylinder, the union connected to the lower ends of the leader pipes and the pipe J', the jet pipe K secured to the union connected to the leader pipes, the perforated cylinder N and union M connecting same with cylinder H, the open ended tube L' mounted in an aperture in the union M, the cylinder K^2 having connections with the jet pipe and open ended tube, and the plug R at the lower end of cylinder N.

MINER'S CANDLESTICK. — No. 626,817; A. W. Powell, Lead City, S. D.



A one piece miner's candlestick, consisting of the end pointed straight arm A, arm B bent to form socket b, hook b' and offset b^2, and the handle loop C, the said arm B being provided with a catch groove b^3.

ELECTROLYTIC APPARATUS FOR DEPOSITION OF METALS FROM SOLUTION.—No. 626,972; T. Craney, Bay City, Mich.



Electrolytic apparatus, the combination of an outer tank, an overflow pipe therefrom, an open-ended feed pipe centrally of the tank and extending above same, sheet electrodes separated by a porous medium coiled around pipe and forming in connection therewith a removable unit sealed within tank and an overflow pipe from top of tank. An electrolytic couple comprising an anode and a cathode, each composed of thin sheet metal or its equivalent, inclosed within folds of a cotton sheet or similar fabric, and a hollow core forming a central support upon which anode and cathode are jointly wound, core anode and cathode forming a removable unit of the apparatus conformable to the shape of tank and supported in position therein by walls of tank. The combination with tank of an anode and cathode composed of wire screen and lead foil respectively, each inclosed between cotton cloth with marginal projections extending oppositely therefrom and wound upon a hollow core into a tight roll conformable to interior of tank and sealed with tank. The combination of a series of electrolytic units, each composed of a tank, a hollow feed pipe centrally thereof, electrodes separated by a porous medium and filling in connection therewith interior space between feed pipes and tank, overflow pipes leading from one tank into feed pipe of next tank, and a supply pipe for electrolyte into one of the tanks, relative arrangement of tanks and their connection being such as to provide a continuous flow of electrolyte through all tanks of series.

Relative Cost of Mining.

TO THE EDITOR:—Referring to an editorial in the issue of the 10th inst., which concerns the cost of mining in the State of California, broaches a subject which receives too little treatment by technical writers and writers in general. This is a fact to be deplored, and the idea of the MINING AND SCIENTIFIC PRESS advocating a compilation of data dealing with costs of mining in different formations and under various conditions suggests itself to me as being commendable.

We have excellent and sufficient literature on the

cost of milling and milling processes; Rose's, Lewis' and Rickard's books serve their purpose, but if a mining engineer wishes to investigate the cost of mining a formation with which he is unfamiliar he has no literature on the subject, so his only reference is his notes. In developing and exploiting a new property, is not the cost of mining a more important question than the cost of milling? It is by far the less tangible to figure upon, unless actual mining is in progress. In milling, the extremes of cost per ton lie between small limits, whereas in mining the cost per ton may vary, even in the same district, from 30 cents to $10. In many cases, before exploration has begun it is necessary in determining the value of the property to make some calculation on the cost of mining, and the only guide an engineer has in doing this is his own experience. Is this not a good field to work in? SUBSCRIBER.

Washington, Cal., June 13th, '99.

The Lick School.

The California School of Mechanical Arts was founded by James Lick, who provided certain funds by deed of trust in 1875. Other funds to constitute an endowment were received at the end of a long litigation in 1895, the year in which the school actually opened. Its work thus far entitles it to attention, and interest in it is now doubled from the fact that the Wilmerding School of Industrial Arts is being erected upon an adjoining site and will open its doors to students during the coming year. The Wilmerding School is under the administration of the Regents of the State University. Though there can be no merging of one institution into the other, the two will divide the field of technical instruction, and thus complement each other and constitute a splendid agency for the advancement of industrial education.

CALIFORNIA SCHOOL OF MECHANICAL ARTS, FOUNDED BY JAMES LICK, SAN FRANCISCO, CAL.

The divisions of the field between the two institutions are interesting to mention. The curriculum of the Wilmerding School, already announced, will include a long list of building trades—carpentry, cabinet work, bricklaying, plastering, plumbing, stonecutting and architectural drawing. This will be a distinct benefit to the Lick School, which heretofore has been compelled to extend its efforts over a very wide field of instruction, in order to meet the average needs of a large clientage, representing all classes. Henceforth it will be the policy of the Lick School to expand along the line of the machine trades—pattern making, model making, forgework, molding, machine shop practice, electrical construction, etc.—leaving the field of the building trades to the Wilmerding School.

The engraving on this page gives a general view of the Lick School at San Francisco. There are two main buildings — the academic building and the shops. The former contains four recitation rooms, physical and chemical laboratories, drawing room, the modeling room and the domestic departments. Both are of stock brick, with trimmings of artificial stone. The shop building is made up of a two-story portion, a one-story portion, and an additional cupola shed built entirely of iron. A third building surrounds the brass furnaces, core oven and terra cotta kiln. This structure is of corrugated galvanized iron on wooden frame.

It is free of charge for tuition, and is open to any California boy or girl who has completed the eighth grade of the grammar schools, upon satisfactory recommendation from their former teachers, principals or school superintendent. Up to June 1st of each year places are reserved for qualified applicants. Applications received after June 1st are not acted upon until July 15th, and if the number of such applications exceeds the number of places remaining, then competitive examinations will be held for entrance. The expenses for books, tools, etc., average about $20 per year. During the last year 269 pupils were in attendance. A description of the school and its work is free to all who apply for it.

Diamond and Gold Mining in Minas Geraes, Brazil.

NUMBER II.

The third kind of diamond mining is from the "gupiaras," or deposits of gravel found on the slopes and sides of the valleys. The finding of these is largely a matter of chance. Some of them have proved wonderfully rich. From one, the "Gupiara da Lava-Pes," more than 160,000 carats were taken in one season. It covered an area of not more than six acres, and was probably the richest small deposit of diamonds ever found. Even this was not thoroughly worked over. Last year, two negroes doing a little casual washing on their own account one Sunday found twenty carats.

The fourth kind of mining is that in the conglomerates and beds of clayey rock which are found high up in the sierra. These beds are almost certainly the source of the alluvial diamonds, in just the same way that quartz veins are the source of placer gold. Contraband miners discovered that they were diamondiferous. These daring fellows, mining by stealth and in small parties in the little streams, followed them up to their sources. To their surprise, they continued to find diamonds clear up to the top of the sierra and finally in the country rock itself. The conglomerate or clay is, of course, far less rich than the alluvial gravel in which the gems have been concentrated by the action of water, but in compensation, the quantity is much greater. Much of it is hard and compact and difficult to work, but some is soft enough to wash away readily in running water. After the Brazilians had taken the diamonds out of the weathered surface, they proceeded to work the deeper deposits by the only method they knew:

They collected rain water in pools on the tops of the plateaus and led it by ditches to a favorable outcrop of the diamondiferous deposit, there cutting out great gullies in the soft rock. The action of the water separated the "formacao" from the bulk of the debris, and this was further treated in much the same way as the alluvial gravel. This method was slow and vexatious, because sufficient water for effectively washing away the masses of rock could only be collected a few days in each year. Ten working days is a good average for a twelvemonth, and whole seasons pass without a single day's washing. Nevertheless, fortunes have been made in this kind of mining, and some of these "chapada" mines, as they are called, have been continually worked for nearly a century.

A French corporation, the "Companhia de Boa Vista," has recently purchased a large tract of conglomerate-bearing plateau where mines already existed, worked as I have just described, eight miles from Diamantina, and has undertaken its exploitation on a large scale and by modern methods. A. Lavandeyra, an American citizen of Cuban birth, a graduate of the Troy Polytechnic School, and formerly one of the engineers of the Panama Canal, is the manager. Their conglomerate is found near the surface of the "chapada," or plateau, of Boa Vista at an elevation of 4300 feet above the sea. The installation now being completed consists of a reservoir on one of the higher levels of the plateau, the water from which is to be conducted by pipes wherever it is needed for washing. This reservoir is connected by a pipe 10 inches in diameter with another reservoir, half a mile away and 280 feet below the first. The latter is made by a dam across a small stream, which furnishes a constant supply of water sufficient for washing, but not large enough to run the pumps. These have a capacity of ninety liters a second and are operated by electric motors, which are connected by a wire running down the mountain side to a point 1040 feet lower. Here is the power station in the valley of a large stream, the Santa Maria. The dynamos are operated by a 500 H. P. Pelton wheel, and this in turn by a pipe 20 inches in diameter, a mile long, and with a fall of 340 feet. It is supplied from a dam built across a narrow gorge of the river. The machinery for separating the diamonds from the washed conglomerate is specially constructed and was built in Europe.

This is the first and, so far, the only noteworthy attempt to apply modern scientific methods to diamond mining in Brazil. The engineering and practical difficulties which Mr. Lavandeyra has successfully surmounted have been great. In engineering features, the plan is unique and original. The same conditions are to be encountered in no other kind of mining, and the methods of meeting them had to be thought out from the beginning. Even the diamond mining of South Africa affords no precedents. Skilled mechanics are unknown in the diamond district. Workmen have to be taught to use wheelbarrows or hammers and how to rivet pipes. There are no roads, and the miner must build his own. The difficulties of transporting heavy dynamos and castings on wooden-wheeled ox carts over mountain trails for more than 100 miles, are incredible. Ironworking, except horseshoeing, is unknown in that region, so repairs and changes are impossible to be made on the ground. The Boa Vista Company had the pipe cut in short sections and brought up on mule back. The native miners are very incredulous as to the success of the enterprise. They cannot understand how water can be carried in a little copper wire. Work was begun last March and is not yet finished. That the enterprise will be successful seems almost certain, unless the reasonable expectations of the company as to the amount of diamonds the conglomerates contain prove to be unfounded.

Should the Boa Vista mine be a success, it is sure to be followed by others, for there are many other diamond-bearing beds in the Diamantina district, and doubtless in the other districts as well. A large field for the sale of American machinery and for independent American enterprise would then be opened up. American miners are especially fitted for the work. The Boa Vista Company has, besides Mr. Lavandeyra, two American electricians engaged in the installation and operation of the electrical machinery.

Titles to diamond mines in Brazil are usually based upon discovery, registration, and the payment of a small fixed tax to the State. There is also a nominal requirement that a certain amount of work be done in the claim each year. Rights lapse upon failure to pay the tax or upon abandonment. Mining claims are very generally owned in the district. Nearly every man one meets has a claim which he is sure will make his fortune. The smaller miners roam almost at will over the country prospecting, and have the tacit encouragement of the owners. The latter, however, promptly assert their ownership if these are fortunate in making a good find, and unlucky enough not to be able to keep it secret. The owners get their claims prospected without expense.

The rough diamonds are usually sold by the small miners to buyers from Diamantina, who frequent the hamlets near the mines. Many are, however, brought directly to the city and sold to the general merchants. The prices of these rough diamonds vary largely with the fluctuations of the currency and with the quality and size of the stones and the necessities of the seller. Seventy milreis ($10) a carat is an approximate average. Practically all the stones which do not remain in Brazil are sent to Paris and London. Although the United States is the greatest diamond-consuming market in the world, taking about one-half of the South African product, very few Brazilian stones are imported directly. I am inclined to believe that a favorable opportunity exists for diamond buyers from the United States to enter this market, instead of competing for them in Europe. Besides, this would benefit the diamond-cutting industry in the States. Brazilian diamonds are worth, on an average, nearly 50% more than the Cape stones, being, as a rule, whiter. However, all colors are found, and the rose, wine colored, and blue varieties are much sought for and valued. From the appearance of a rough diamond, little can be told as to its luster and freedom from flaws after cutting.

(To be Continued.)

Personal.

ALFRED HANFORD has charge of the Folsom, Cal., dredge.

W. C. RALSTON has returned to San Francisco from the East.

J. C HADLEY is the new Supt. Gold Coin M. Co., Anaconda, Mont.

ROBT C. LUNDY of Ogden, Utah, is operating a mine at Idaho Springs, Colo.

JOS GRUSS has returned to Genessee, Cal., from an extended sojourn in Australia.

THOS. RICKARD, of the Parke & Lacy Co., San Francisco, is at present in Honolulu.

F. H. JOHNSON, of the Fulton Engineering and Shipbuilding Co. of San Francisco, is in Los Angeles, Cal.

MR. A. P. BRAYTON, SR., Pres Pelton Wheel Co., left San Francisco yesterday for a four months' trip to Europe.

E. H BENJAMIN, Sec'y California State Miners' Association, has returned to San Francisco from Plumas Co., Cal.

R. J. COLEMAN AND L. DUNHAM, of Denver, Colo., have been making examinations of mining property at Contact, Nevada.

H. F. BARTINE, Nevada's talented ex-Congressman, is now in charge of the mining department of the Anaconda, Montana, *Standard*.

P. H. CLINGAN of Florence, Colo., will superintend the construction of the new Golden Fleece mill at Lake City, that State.

M. BULKLEY, of the firm of Henshaw, Bulkley & Co., Fremont and Mission Sts, San Francisco, has returned from an Eastern business trip.

SAMUEL J. HENDY, Pres. and Gen. Mgr. Joshua Hendy Machine Works, San Francisco, has returned from a business trip through Colorado.

B. I. WHEELER, now of Cornell University, has been elected president of the University of California at Berkeley, Cal., at an annual salary of $10,000.

ROSS E. BROWNE, who recently returned to San Francisco from a professional visit to London, England, is inspecting the Jumper mine, Tuolumne Co., Cal.

A. W. MCCUNE of Salt Lake City, Utah, has a thirty-day option on the control of the Mono and April Fool No. 2, DeLamar, Nev., for which he agrees to pay $50,000.

LEE COCHRANE, Salt Lake City, Utah, representative Mine & Smelter Supply Co., Denver, Colo., is on a business trip through Idaho, Montana, Oregon and Washington.

H. L. BALDWIN has twenty men making a U. S. geological survey of the Uintah, Utah, forest reservation. He says miners will be allowed to cut necessary timbers therein.

WM. MORGAN, who has spent several years in the Yukon basin and other Alaska mining districts, has returned from the North and gone to southern California on a prospecting trip.

NOEL MONEY, connected with the London Exploration Co., and who has been equipping Siberian placer mines for that corporation, is making an inspection tour of California gold mines.

MARCUS DALY, who got $6,000,000 for his share of Anaconda, Montana, stock, will continue as manager for a year at a salary of $25,000 and then give up mining as a business for a while.

F. W. PECK, U. S. Commissioner-General to the Paris Exposition, is in Chicago and expects to visit Denver and San Francisco next month in the interests of the mining display at Paris next year.

MR. AXEL EKSTROM, representing the General Electric Co. of Schenectady, N. Y., who has been visiting in San Francisco, Cal., for some weeks, has left for Salt Lake City, Utah, and Denver, Colo.

A. G. SMITH, who for years was mill foreman of the Golden Star and Highland 120-stamp mills at Lead City, South Dakota, has gone to Bluefields, Nicaragua, where he will build and operate a stamp mill.

FRANK ROBB, who has been foreman of the Daly-West mill at Park City, Utah, for some time, has accepted a position as foreman of the Bellevue mill, near Baker City, Oregon. Mr. Robb has been succeeded by Mr. E. Buckley at the Daly-West.

R. H NORTON, former inspector of mines for the State of Washington, now representing the S. F. & S. J. Coal Co., is at McAdoo, Tenn., in consultation with Thos. A. Edison as to the feasibility of making the California coal into briquettes by electrical process.

W. L. FISK, Major U. S. Engineer Corps, has been transferred from Portland, Or., to Duluth. Capt. W. C. Langfitt has been relieved from temporary duty in the office of the Chief of Engineers, U. S. A., and takes station at Portland to relieve Major Fisk.

AT the third annual session in San Francisco of the Pacific Coast Electric Transmission Society, on the 20th and 21st inst., A. Poniatowski of San Francisco was elected Pres., A. G. Lamson of Salt Lake City, Utah, Vice-Pres., and Wm. Angus of San Francisco Treas.

PROF. F. W. MCNAIR has been unanimously elected president of the Michigan College of Mines at Houghton, Mich. The board of control and the friends of the institution express great confidence in his ability to maintain the college in the front rank of monotechnic schools.

Recently Declared Mining Dividends.

Isabella, Cripple Creek, Colo., dividend 2 cents per share, $45,000; payable June 26.

Gwin Mine Development Co., Calaveras Co., Cal., dividend No. 7, 25 cents per share, $5000; payable June 15. Total to date $35,000. At a recent meeting of the stockholders the capital stock was increased from 20,000 to 100,000 shares.

Ætna quicksilver mine, Napa Co., Cal., quarterly dividend, 10 cents per share; payable July 1.

Napa Con. quicksilver, Napa Co., Cal., regular quarterly dividend 10 cents per share, extra 10 cents; payable July 1.

New Idria, quicksilver, San Benito Co., Cal., regular quarterly dividend, 10 cents per share, extra 10 cents per share; payable July 1.

El Dorado M. Co., El Dorado Co., Cal., dividend 10 cents per share; payable July 20.

American Zinc, Lead & Smelter Co., dividend No. 1, $20,000; payable July 1.

Argonaut mine, Amador Co., Cal., $20,000; payable June 26.

Gold Coin mine, Colorado, $10,000; payable June 26.

Modoc mine, Colorado, $10,000; June 24.

St. Joseph Lead M. Co. of St. Louis, Mo., $37,500; May 25; total, $2,359,500.

Homestake M. Co., South Dakota, regular monthly dividend, 25 cents per share, $62,500, extra 25 cents per share, $62,500; payable June 26.

Industrial Notes.

—Coalinga, Cal., is shipping increased quantities of oil.

—At Atlin, Alaska, are reported 2000 idle, disappointed men.

—California soil is found favorable to the growth of cork oak.

—Pennsylvania coal miners will increase the Tesla, Cal., coal output to 800 tons daily.

—At Stockton, Cal., last Saturday, a machine cut, threshed and sacked 1600 sacks of barley.

—The Sierra Railway Co. proposes to build a branch of its line from Jamestown to Angels, Cal.

—United States government engineers do not favor the project of a boat railway at The Dalles, on the Columbia river, Oregon.

—P. P. Shelby, Gen. Mgr. Pacific & Idaho Northern Railway, is laying a mile of track a day from Weiser, Idaho, into the Seven Devils country.

—The plant of the U. S. Smokeless Powder Co., at San Rafael, Cal., was totally destroyed last Saturday by an explosion in which five men lost their lives.

—The Florence & Cripple Creek, Colo., Railroad proposes to build a spur to Canyon City, Colo. The Moffatt people talk of erecting a smelter and refinery at that point.

—For the ten months ending April 30th, '99, the gross earnings of the Oregon Short Line Railroad were $6,175,912 37, an increase of $1,014,469.85 over the same ten months of '98.

—The Brice Syndicate exhibits renewed interest in the Chinese railroad concession recently referred to at considerable length, and construction of the road will probably begin in 1900.

—The stern-wheel steamer Hassalo, on the Columbia river, Oregon, has a speed of twenty-six miles per hour. She is 186 feet long, has a tubed boiler 8 feet diameter, and 3000 H. P. compound engines.

—The Wyoming Southern Railroad has incorporated at Cheyenne, Wyoming, to build a line from Fort Steel to Grand Encampment, seventy miles, where copper and gold exist in paying quantities.

—"Chunks of virgin gold" are the latest discoveries on the Yukon, Alaska—made by newspaper correspondents and the agents of transportation companies, who lure believers in such stories to hardship and death in Arctic wilds.

—The president of the Mexican Central Railway estimates that Mexico will probably produce $12,000,000 worth of gold this year, and predicts that when the richer mines are reached by railways Mexico's gold production will rise to $25,000,000 or $30,000,000 annually.

—A. G. Wilber of Boston, who is interested in mining enterprises in the State of Jalisco, Mexico, reports large recent investments of American capital in mines in the western part of Jalisco and much mining machinery going in over the Mexican Central's western extension. English capitalists have representatives there looking for copper.

—An agreement has been reached between the Colorado Midland and Busk Tunnel bondholders. The Tunnel bonds, aggregating $1,250,000, are to be exchanged for Colorado Midland 2-3 4s, bond for bond. The Tunnel bondholders are also to receive in cash 4% interest, less legal expenses, for the period of the receivership estimated at $140 to $150 per bond. This latter payment is in settlement of the judgment for $176,000 obtained by the Tunnel Co. against the Midland for rental. The money has been held by the Trust Co. pending negotiations, and under the settlement just reached about $91,000, representing 4% interest, goes to the Tunnel bondholders, and the remaining $85,000 will be returned to the Midland treasury.

Obituary.

E. C. UREN, an old and respected resident of Placer Co., Cal., and a pioneer miner in that section, died at Auburn, Cal., on the 14th inst., in the 73rd year of his age.

N. A. CONE, one of the best-known mine operators in Colorado, and manager of what were known as the Smith-Moffatt interests in Cripple Creek, died on the 16th inst. in Denver.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING JUNE 3, 1899

626,882 —FLUSHING TANK—E. B. Badlam, S. F.
626,922 —HANGER FOR GRINDSTONES—F. M. Bird, Wenatchee, Wash.
626,805 —RATE CABINET AND INDEXER—F. E. Coates, Montpelier Cal
626,966 —WEED PULLER—J. Conzett, Ferndale, Cal.
626,958 —CIGAR HOLDER—H. H. Coote, Bisbee, Ariz.
626,753 —PORTABLE BOOTH—J. W. Ernest, Los Angeles, Cal
626,682 —GATE—A Field, Portland, Or.
627,076 —MAGAZINE BINDER—G. S Glover, S. F.
626,807 —GYRATING PENDULUM—F. Gundorph, S. F.
627,061 —SMOKE CONSUMER—A. Herberer, Alameda, Cal
626,809 —TELEPHONE REGISTER—Hock & Happersberger, S. F.
627,081 —COPYING PRESS—B. Phelps, Seattle, Wash
627,082 —BENCH STOP—B Phelps, Seattle, Wash.
626,777 —FISHING HOOK—H. Slotterbeck, Los Angeles, Cal.
627,025 —CAR THERMOMETER—W. Turner, Wenachee, Wash.
626,801 —VEHICLE ATTACHMENT—S. Wyatt, S. F.
627,037 —BURGLAR ALARM—Wybro & Danley, S. F.
32,005 —DESIGN, WRENCH—C. W. Cookson, Wilmington, Cal.
31,003 —DESIGN, SNAP HOOK—W. P. Murphy, San Jose, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

VEHICLE ATTACHMENT AND HOLDING DEVICES.—Samuel Wyatt, San Francisco, Cal. No. 626,801. Dated June 13, 1899. This invention relates to a device which is designed to hold the reins when a team is to be left, also to carry a lantern if desired at night. It consists of vertical standards having slots in the upper end for the attachment of the reins, and a means connected with the wheel hubs by which the shafts may be rotated if the vehicle is started, and thus wind up the reins and exert a sufficient pull to stop the horses. The upper end of the device may be provided with a suitable standard to receive a lantern or other appurtenance of the vehicle.

COIN-CONTROLLED TELEPHONE REGISTER.—T. S. Hock and E. Happersberger, San Francisco, Cal. No. 626,809. Dated June 13, 1899. This invention is intended to register the number of coins which are placed in a telephone or other apparatus of this description, and at the same time to indicate that a coin has been placed in the slot and registered for the purposes of communication. It comprises a series of registering disks, a pawl-carrying lever fulcrumed so that by its forward and backward movement it advances the disks to register the movements. A pawl and ratchet mechanism prevents the lever from returning until the forward motion is completed, and a latching lever retains the operating lever in its normal position when it has been returned thereto. The latching lever is disengaged when a coin is introduced into the apparatus. An electrical current is closed by a guard plate carried by the lever so that when the forward movement has been completed the central office will be notified of the fact and the registration will be completed.

RATE CABINET AND INDEXER.—F. E. Coates, Montpelier, Cal. No. 626,805. Dated June 13, 1899. This invention is designed to exhibit rate sheets, such as are used in railway offices for the purpose of giving freight, passenger or other rates between different stations, and other like purposes. These rate sheets are arranged alphabetically or otherwise so that the station agent may by examining them inform himself as the rates between various stations. In this invention these rate sheets are alphabetically arranged and the apparatus employed therewith is designed to throw up any sheet for inspection. It consists of a containing case with vertically guided counterbalanced tables containing the sheets, latches by which the tables are normally retained in the lower part of the case, disengaging devices connected with each of the tablets, consisting of correspondingly lettered or numbered depressible keys, connection between the shanks of the keys and the latches whereby the depression of a key disengages the corresponding catch and permits the tablet to be exposed for inspection. In connection with this are means for again depressing the tablets to their normal position after the necessity for their use has passed:

FLUSHING TANK FOR CLOSETS.—E. B. Badlam, San Francisco, Cal. No. 626,882. Dated June 13, 1899. This invention relates to an improvement in tanks connected with apparatus where it is desired to periodically discharge a definite body of water for the purpose of flushing the apparatus. It consists essentially of a siphon pipe having one end connecting with a discharge and the other terminating interior to the tank and near the bottom. Holes are made upon and above the bottom of the pipe, a cylinder having open connection with a jet nozzle which stands within the interior lug of the siphon, and a plunger is freely movable within the cylinder having connections by which it may be forced down to charge and start the siphon, a counterbalance weight of less power than the suction produced by the siphon retains the plunger at the bottom of the cylinder until the water in the tank is low enough to expose the openings above the bottom of the siphon leg, when the siphon will be broken and the tank will be allowed to refill the apparatus, thus working automatically after it has been started by the movement of the piston within the cylinder.

TREE AND VINE PULLER.—E. P. Boden, Santa Clara, Cal. Reissue 11,474. Dated June 13, 1899. The object of this invention is to provide an apparatus by which the stumps of all small trees, vines, bushes, etc., may be removed with ease and rapidity. It consists essentially of a frame mounted upon wheels adapted to be moved over the ground, a truck or traveler movable longitudinally upon the frame having means connecting it with the stump and means whereby an upward pull from the traveler is applied to lift the pump when the main frame is moved longitudinally along the ground with relation to the traveler and the stump.

Commercial Paragraphs.

THE Weber Gas & Gasoline Engine Co., Kansas City, Mo., has issued a booklet of facsimile testimonials from mining men who have used Weber hoists.

MR. O. G. SMITH is the Colorado representative of the Stillwell-Bierce & Smith-Vaile Co. of Dayton, O., with offices at 731 Seventeenth street, Denver, Colo.

BEGINNING July 1st, F. C. C. Scherling assumes the proprietorship of the West Coast Wire & Iron Works, with office and headquarters at 9 Fremont St., San Francisco.

THE Fortune Exploration Co., of which H. A. Clapp of Colorado is manager, have just shipped a carload of machinery to the southern part of Sonora, Mexico, to be installed in placer work.

THE Joshua Hendy Machine Works, San Francisco, Cal., has closed a contract with the Smuggler-Union M. Co., at Telluride, Colo., for thirty-two 5-foot Triumph concentrators, and has an order for the Carribeau M. Co. for four 5-foot Triumph concentrators.

AT Pocatello, Idaho, is a 130,000-pound steam shovel, the scoop having a capacity of three cubic yards of gravel. It was built by the Bucyrus Co., South Milwaukee, Wis., for the Oregon Short Line. The huge machine is finely adjusted and is doing effective work.

ON July 1st the California Wire Works, A. S. Hallidie proprietor, will remove from the present location, 330 Market St., San Francisco, to the old headquarters of the company 9 Fremont St., San Francisco, which were occupied by Mr. Hallidie and his associates for so many years.

At the new chlorination works building at Florence, Colo., twelve Wilfley tables are installed on the double-deck plan. The Mine & Smelter Supply Co. of Denver, Colo., last week got an order for ten more Wilfley concentrators for the Anaconda M. Co., making eighty-nine Wilfleys in Butte, Montana.

JNO. TAYLOR & CO, San Francisco, Cal., have issued a finely illustrated catalogue and price list of chemicals, assayers' supplies and apparatus that is worthy of that old established firm. Everything that the assayer or chemist ordinarily needs or uses is mentioned and illustrated in its 234 pages, which besides contain information of much practical value.

THE firm of Henshaw, Bulkley & Co., Fremont and Mission Sts., San Francisco, will in future have charge of the California and Hawaiian Islands interests of E. P. Allis Co., Milwaukee, Wis. The branch office at 9 Fremont St., San Francisco, which has been under the supervision of Mr. N. A. Root, will be moved to the establishment of Henshaw, Bulkley & Co., July 1st, Mr. Root continuing in charge of that department.

THE most recent catalogue issues of the Westinghouse Electric and Mfg. Co., Pittsburg, Pa, are Nos. 222, 223, 225, 226 and 228, treating of direct connected railway generators, lightning arresters, A. C. fan motors, D. C. fan motors, and polyphase motors, respectively. The Westinghouse Electric & Mfg. Co. have a contract to supply a large electrical equipment, consisting of two generators of 1000 H. P. each, and two exciters of 460 H. P. each, with a travelling crane, to be erected in the power house for handling the machinery of the Hartford Electric Light Co. on the Farmington river, near Tariffville, Conn., and a power station will be constructed containing the necessary turbines, governors, feeder, waste gates and racks. The plant calls for a concrete dam about 35 feet high, with a power station of concrete, steel and brick.

Recent Mining Incorporations.

Mammoth Copper M. Co., Sacramento, Cal.; capital stock $200,000, subscribed $20,250; C. E. Waite, D. M. Cooper, G. Faig, J. M. Crabbe, J. B. Atwood.

Northwest M. Co., San Francisco; capital stock, $500,000; B. Henley, C. A. Macomber, E. R. Stevens, M. F. Macomber, D. W. McNeil, T. K. Statler.

California G. M. & D. Co., San Francisco; capital stock, $1,000,000; B. Morgan, F. Egon, J. F. Myers, A. C. Zeig, A. A. Quellmalz.

Stephens Process Co., Los Angeles; capital stock, $1,000,000; A. G. Stephens, A. F. Levitt, I. S. Smith, B. Grimes.

Black Oak South Extension M. Co., San Francisco; capital stock $100,000, subscribed $500; W. E. Miles, R. S. Moore, D. J. Staples, J. J. Mason.

Illinois & Josephine Gravel M. Co., San Francisco; capital stock $100,000, subscribed, $125; B. F. Gilman, J. J. Scrivner, H. A. Griffin, D. B. Richards, J. C. Sullivan.

Mining Summary.

ALASKA.

(Special Correspondence). — The veins of Ketchikan district are in metamorphic rocks traversed by dykes of diorite and range in size from 2 to 7 feet. At the surface they show the characteristic gossan of iron-copper bearing veins. Several shafts have been sunk 40 to 60 feet, showing carbonate of copper ores and at the greater depths sulphides of copper and iron. The ores also contain gold. A tunnel has been driven 122 feet on the Prince of Wales vein under the direction of Mr. Lichstadster, Mgr. for a German syndicate. At the Sea Level camp below Kitchikan on Gravina island, fifteen men are employed at the Six-Point mine, R. L. Dunn, Mgr. No machinery has yet been placed on any of the mines, all work being in the nature of prospecting. The hills are not abrupt, and are covered with abundance of timber. The surface is covered with moss to the depth of 2 feet, more or less though some areas are bare. The prospectors search for veins by walking along the surface and thrusting a steel rod with a sharp point down through the moss to the rock surface beneath, the quartz being detected by its gritty feeling when struck by the point of the rod.

Ketchikan, May 15th, '99.

The Alaska Mexican mine for the thirty days ending June 9 reports 13,826 tons ore reduced with 120 stamps, value $21,546, and 270 tons sulphurets, value $10,820; total for the month, $32,366; the ore averaged $2.70 per ton. The month's expenses were $26,456.

The Alaska-United mine for the thirty-five days ending June 7, with 220 stamps, crushed 31,177 tons ore, value $34,480, and 517 tons sulphurets, value $19,530. The ore averaged $1.87 per ton.

ARIZONA.

The output of copper mines of Arizona has increased the past three months materially under the stimulus of high prices.

Needles *Eye*: R. J. Dyas of St. Louis, Mo., has taken the Gier Basin property, four miles below Bill Williams Fork, near the Colorado river, and will increase the force of men at work. T. R. Owen is in charge. Air compressors, drills and modern appliances will be used, it being the intention to sink 1000 feet. A smelter is but a question of time.

Prescott *Courier*: E. P. Holliday has struck $100 ore in the Gold Leaf mine, Hassayampa district, ten miles south of Prescott. J. Dougherty and J. I. Gardner are interested in this property.

Prescott *Journal-Miner*: W. H. Ferguson has shipped the second carload of ore from the Grand Canyon mine. He expects to ship two carloads per month.——The Bullion G. M. Co. are developing the Bordeaux mine. The shaft has been drained and is being retimbered. A tunnel is being driven and at 80 feet shows 5 feet of ore. —— A 20-ton cyanide plant has just been completed at Placerita near Antelope hill for Burkdall & Mahart. It will be used in treating tailings from the 10-stamp mill there.

Tucson *Star*: More mines have changed hands in Pima county during the last six months than during the ten years previous. ——F. Kuhne reports 2 to 3 feet of sulphide ore in the bottom of a 70-foot shaft on the Mark Twain, on Lynx creek, owned by himself and F. M. Murphy. Values run in gold, silver and lead.——Surveyor P. Contzen, with S. Brown has gone to the Grand Reef mine, in Graham county, for J. W. Mackay, who is developing that property. The workings of the Grand Reef are down over 500 feet.

Globe *Times*: Four miles north of Rye the gold properties on Tonto, owned by J. C. Mankins, have been worked by steam arrastra the past winter. The want of water is a drawback, but water can be developed. Six hundred and fifty feet of work has been done. North of these claims two and a half miles Voegel & Craig are operating a stamp mill, mostly on custom ore.

Kingman *Miner*: W. R. Askew has bonded Koshland & Co.'s half interest in the Greenwood mine, near Signal, and has put twenty men at work. The company recently purchased the other half of A. Grant. The Greenwood mine is a large vein of low grade gold ore. In early days a 10-stamp mill was put up on the Sandy six miles from the mine. The mill made but two runs.

CALIFORNIA.

Alameda.

The output of the Tesla coal mines is to be increased. Supt. R. H. Norton has employed forty experienced Eastern coal miners to work the mines according to Eastern methods. An effort will also be made to compress the fine screenings into coal briquettes.

Amador.

Amador *Ledger*: The Oneida shaft has reached the 1900-foot mark, and very close to that point the ledge was passed through. The ledge is 12 feet thick at the south end of the shaft and 10 feet at the north end; is good milling ore.

Amador *Republican*: The South Eureka mine, north of the Oneida, keeps a 20-stamp mill busy. Preparations are being made to sink the shaft deeper. The shaft is down 1600 feet. Sixty men are employed.——At the Ranlett copper mine the steam power has been doubled by putting in a large new boiler. A smelter has been brought to the mine and will be set up. The mine has been pumped out and ore is being hoisted. Twenty-two men are employed and the force will be raised to fifty.

Sutter Creek *Record*: Another strike is reported from the Shenandoah mine on the Easton claim, near Plymouth.——Supt. S. R. Porter of the Baliol mine at Sutter Creek, on behalf of himself and others, has purchased the Fernando ranch of sixty acres. It is mineral land. Several veins are in sight on the property. The company will be incorporated under the name of the Mutual Mining Co.——Supt. J. R. Tregloan is doing some retimbering in the 1400-foot shaft at the South Spring Hill mine and will commence taking out water. ——Supt. Porter was below last week and purchased for the Baliol mine a diamond drill capable of boring 1500 feet. It is the intention to drill east and west from the 300 level. There is a 40-foot vein uncovered in the mine and the mill is running steadily. Sinking is to be resumed at once.——Supt. W. R. Thomas reports the Central Eureka shaft down nearly 1400 feet. A contract has been let for running 500 feet of tunnel north on the 1350 level. Sinking will be continued and a new level will be opened at the 1600 level.

Calaveras.

The main shaft of the Melones Con., near Robinson's Ferry, is down to the 600 level. W. C. Ralston, Mgr., has returned from Boston, Mass. It is thought that the normal capacity of the 120-stamp mill now building will be 600 tons daily. The cost of mining and milling is estimated at $1.74 per ton.

At the regular meeting of the Gwin Mine Development Co., held in San Francisco, Cal., on the 15th inst., the capital stock of the company was increased from 20,000 shares to 100,000 shares. There was no increase in capitalization. The regular monthly dividend was declared, payable June 15th.

The Melones Con. M. Co. has purchased the mine owned by G. W. Cordes at Robinsons Ferry.

Twenty-five men are employed at the Bruner mine near Albany Flat.

It is reported that a rich strike has been made in the Lampbear mine on Spring Gulch, near Mokelumne Hill. The strike was made in the 300 level. The vein is 10 feet in width and the gold distributed throughout the rock.

Amador *Republican*: The Big Bar mine, owned and operated by S. H. Lucas and G. G. Gates, is situated on the south bank of the Mokelumne river, opposite the Blue Lakes power plant. It is in a grano-diorite area, between amphibolite schists on the west and slates of the Calaveras formation on the east. The working tunnel has been run into the hill 1000 feet. The ledge is 7 feet thick. The quartz is free from any admixture of country rock, is white and not hard. Mr. Lucas states that the ore being milled goes $4.50 per ton and can be mined and milled for $1 per ton. The mill contains ten stamps. Mr. Lucas has planned to build a 20-stamp mill on the south side of the river near the mine, and use the present mill building as a power-house in which to produce air pressure for the mill and mine.——Good ore has been struck in the north level of the Esperanza mine at a depth of 1000 feet. The ore carries free gold and galena. The vein has developed from a small stringer to 2 feet. They are preparing for the new hoist, additions to the mill and other improvements.——Operations have commenced on the Vorlander mine, near the Middle Bar bridge on the Mokelumne river, under the superintendence of C. M. Burleson. As soon as the hoist is completed sinking a shaft on the lead will begin.——A. Pellaton & Co., owners of the Shoestring gravel mine on the Calaveras river, have men at work. A tunnel was driven in on the mine some years ago, at the end of which a winze was sunk 45 feet to the channel. There is an upper and lower channel in the mine. The owners will work the lower channel only by drifting.

El Dorado.

Placerville *Republican*: A mining company has been organized in Placerville, with local capital, to prospect the Tipton Hill mine deep gravel deposit, to be worked by drifting. G. W. Kimble is Supt. and T. Swansborough foreman. Ten men will be employed. The property is bonded by Mrs. F. Irish.

Georgetown *Gazette*: It is reported that work is to be resumed on the Two Channel mine at Kentucky Flat.——Operations on the Ida Livingston mine in Kelsey district have been resumed, with J. Kelley as Supt.——In the work of unwatering the Darling mine, the 115-foot mark has been passed and sinking will be commenced. Ten men are employed.——McGraw & Roberts have struck good prospects on their claim in Kelsey district. They are having a crushing of fifty tons made at the Ranney & Smith mill. It is said to mill $8 to the ton.

Inyo.

The cyanide process is to be tried on the tailings at the Weaver mill.

The P. D. Q. Cyanide Co. extracted $8 per ton from tailings at the Montgomery mill in Pleasant canyon.

A rotary mill is to be built at the World Beater mine, near the head of Pleasant canyon.

Kern.

A strike of 8 feet of free milling ore is reported in the Stringer district, near Randsburg. The ore will be crushed at the Red Dog mill.

The Garfield mine is working, the ore going to the Black Hawk mill.

Bakersfield *Californian*: C. Koehn has begun milling 350 tons of ore from the Winnie dump at Randsburg and what he takes out of the mine at the Black Hawk mill.——D. A. Clements of Colorado Springs, Colo., is at Randsburg. He has made two trips to the Rademacher district.

Randsburg *Miner*: The Annex mine is showing up well. It is owned by Montgomery & Maginnis. A milling made recently at the Red Dog mill turned out well. The shaft is down 130 feet.

Nevada.

G. L. Loope and associates of Beasmer, Michigan, have bought the St. Patrick group of mines in Washington district from W. D. Pinkston of Auburn for $100,000, and will incorporate a company to be known as the Paris G. M. Co. They will build a 20-stamp mill. Mr. Pinkston retains a small interest in the property, and will be Gen. Mgr. This is a large low-grade mine.

A. Pugh is prospecting the Giant King mine. Two shifts are driving the tunnel on the ledge.

In a report to the directors of the Brunswick Con. M. Co. of Grass Valley, R. G. Brown, Mgr. of the Standard Con. M. Co. of Bodie, advised as follows: "Stop the mill; provide funds for the necessary shaft work, and then start up with a good shaft, full pumping and hoisting facilities and with ore ready to stope." Supt. Mallen believes he can hoist ore in the present shaft and meet the floating debt of the company. No change has yet been made in the method of working.

Nevada City *Herald*: The incline shaft at the Reward mine near Nevada City is to be sunk 300 feet deeper, and an assessment of 2½ cents per share has been levied on the capital stock of the company for that purpose.

Placer.

The Lost Camp mine at Blue Canyon has been closed down owing to shortage of water.

Auburn *Herald*: The Polar Star mine at Dutch Flat, owned and operated by W. Nicholls, Jr., has given employment to thirty men during the past season. From reports the mine has done well and preparations are being made for next season.——The Blue Lead M. Co. will erect a 10-stamp mill on their mine. S. L. Jordan is Supt.——The Gold Run Gravel M. Co., Limited, is running a mill. The gravel prospects well. The company's hydraulic mines will have water a few weeks longer. ——The Mayflower mine near Forest Hill has closed down.——A San Francisco company has leased R. Greenwood's mine at Bath and are preparing to prospect the ledge.——H. Davis has completed preparations for the summer's work at Mammoth Bar.——Julien, Reynolds & Co. are prospecting the bar on the Middle Fork at Long Canyon crossing. The company have machinery, pumps, etc., and expect to reach bedrock in a short time. The bar showed prospects in the preliminary work last year.——Paul Carrrero, who has been operating at Turkey Hill for a year, has located a claim on Middle Fork above the claim of Julien, Reynolds & Co.——M. Savage of Bald Mountain is prospecting on the Middle Fork, below Duncan Canyon.

Auburn *Republican-Argus*: At the Marguerite mine near Auburn drifting on the 500 level is in progress. Twelve men are employed.——The shaft at the Whisky Hill copper mine is down 135 feet. Cuts have opened up 1200 feet of the ledge. The rock yields 9% copper, $3 in silver and $5 per ton in gold.——J. McAninch, G. Cowan, E. B. Quigley and J. Shiels have bonded the Glen Consolidated mine in Duncan canyon to a Colorado company.

Plumas.

Quincy *National-Bulletin*: A group of claims two miles south of Clairville, on the Middle Fork of Feather river, is owned by L. F. White. The vein strikes northwest, and where exposed in a cut is 35 feet wide. It occurs at or near the contact of granite and slate. The footwall of the vein is exposed to a depth of 20 feet. Adjoining this on the west is porphyry, white and much decomposed, though lying to the west of this again are veins or stringers of quartz, heavily mineralized. The decomposed porphyry is said to carry gold. The quartz carries both gold and silver. One assay made in San Francisco returned 1 80 ounces in gold, and sixty pounds milled by Mr. Redstreake, at the Jamison mine, yielded $21.20 per ton.

Plumas *National-Bulletin*: Work on the Four Hills property will be carried on this season; 4800 feet of 12-inch iron pipe is arriving at Clairville and shipped by team from that point. This will convey water to a 200 H. P. electric plant to be located a mile and a half from the mine. Electricity will furnish power for operating an air compressor, with which the hoisting is to be done. Two Pelton wheels will be used under 900-foot head. The hoist will be 80 H. P. Electric power also will be used at the 10-stamp mill now on the mine. The mill is supplied with the new Gates crusher.

Riverside.

(Special Correspondence). — The Gavilan mines are on the San Jacinto Estate, seven miles west of Perris. The veins were worked years ago by Mexicans, who hauled the quartz to numerous arrastras in the neighboring gulches. The property was re-opened in 1892 by Riverside people but again closed down. More recently a second and more successful attempt has been made under the direction of H. B. Varcoe. The main shaft is down 250 feet and rich ore is being taken out. A 10-stamp mill is being run on the ore. The formation is granite cut by numerous veins of pegmatite. In this district some of the quartz containing black tourmaline carries gold. The veins dip to the westward, usually about 30°.

Perris, June 18th, '99.

In the Eagle Mountain district, thirty miles northeast of Walter Station on the Southern Pacific railroad, Adams & Pickering are running a 2-stamp mill on the Korn Springs mine.

At the Iron Chief a new vein has been discovered.

At the Gold Canyon mine, north of Salton, which was formerly owned by Mr. Fish of Banning, five stamps are running.

Santa Barbara.

The Sunset Oil Co. has been formed for the purpose of operating in the Summerland oil field. It has a paid-up capital of $50,000. The directors are J. C. Hassinger, F. A. Conant, H. W. Moore, S. W. Knapp and E. P. Stevens, each holding $10,000 worth of stock. The company has bought the Clark-Stevens interests and other property in Summerland, and will begin development in the beach section of that district. They already own sixteen producing wells.

Shasta.

The new scale of wages of the Mountain Copper Co. at Keswick is as follows: Yard men, 25 cents; matte and pot-pullers, 30 cents; tappers, 40 cents; skimmers, 50 cents; charge wheelers, 30 cents; feeders, 40 cents; firemen on reverberatory, 50 cents.

Redding *Searchlight*: A. J. Cook, A. J. Cook, Jr., and H. Cook own three copper claims on the Old Backbone, between Cow creek and Pitt river. It is probable that the North Cow Creek section will resume operations. The Enright estate, which owns the Peck and Afterthought copper mines, is negotiating for the property.

Redding *Democrat*: A shoot of free gold ore has been found in the Mt. Shasta mine. The company is working ninety men and shipping ore to Keswick.——The ledge on the property owned by Crabb & Swanberg, adjoining the Lees-Fowler-Meier property, has widened from a 6-inch vein to a 2½-foot ledge of sulphuret ore. The tunnel is in 175 feet, tapping the ledge at a depth of 150 feet.——The 50-foot tunnel on the Clear Creek mine, owned by Meier, Lees & Fowler, is showing up a body of ore.——In the Sonoma mine, owned by the Mountain Copper Co., a 2½-foot ledge was struck this week. It adjoins the Oro Vista, where Meier, Yoelden, Fowler & Russell are hard at work.——The Bully Hill mine is working and good results are obtained.——The Blowers-Drennon mines on Bully hill are working on a fine body of ore. These are known as the Ydalphia and North Star mines. ——The Ayes Co.'s mine at Copper City is running two shifts. A load of ore was shipped last week. The second crosscut is being made.——The Popejoy & Son, Randall & Crooks group of mines, southwest of Copper City, has stopped work for a short time. They have a body of copper, gold and silver ore.—— The new find of B. A. Graham and A. Smith is of copper ore. It is a large lode and they will start a crosscut.——At the new claims of Abbott & Fluke, near Copper City, the ore contains native copper.

Sierra.

Downieville *Messenger*: Supt. Copeland of the Gold Bluff mine has stationed his large pump at the No. 3 level and has put in a smaller one for sinking. When the shaft is unwatered sinking will be resumed.——The North Fork mine at Forest, recently closed down, has resumed operations, a new company headed by F. W. Page having taken the property. J. O. Jones is Supt.——The Ruby Co. are taking out good pay and have ten men employed.

Siskiyou.

Redding *Searchlight*: The King Solomon mine is in the Salmon river country, seven miles south of the Black Bear. It was discovered several years ago by J. H. Bowerman. A company was organized by F. N. Fletcher, a 6-stamp mill set up, and later a rotary mill. A 1200-foot gravity tramway was built and crushing of ore commenced. The work accomplished has made no great inroads on the pay body. The formation is a mixture of porphyry, quartz and surface earth, and covers a large area. The pay rock is quarried out. In May 1500 tons of it were crushed, the milling capacity being sixty tons per day. There is a limited water supply for the steam power and batteries.

Trinity.

Crafton & Frakes, owners of the Lucky May mine, near Trinity Center, have taken $10,000 out of a pocket in the mine. The gold is coarse. The mine is one-half mile northeast of Lady Slipper point on Coffee creek, ten miles from the mouth of the stream.

W. C. Rubling of Carrville has sold his one-fourth interest in the Kate Foley mine to C. F. Porter of Colorado. The mine is near Carrville. The other three-fourths of the property are owned by J. E. Ferris, A. L. Harrigan and J. Goodyear.

H. J. Wackenberger and brother of San Francisco have bought the Fortune placer mine in Halls gulch on the East Fork of the Trinity river, from C. Carter, the price being $4500. It covers forty acres.

Tuolumne.

Sonora *Magnet*: The Gold Ridge M. & M. Co. has been incorporated in Sonora. Directors, F. P. Otis, W. Jones, E. A. Jones, R. Inch, E. Twist; F. P. Otis, president; F. Sutton, secretary; W. Jones, treasurer and manager. The corporation has 500,000 shares, par value $1. The company owns six claims between the Jumper and Shawmut mines.—— Ores from the Jumper mine near Stent carry 3% sulphurets. Heretofore the values in the sulphurets have not been saved. The Jumper Co. will erect a concentrating plant of twenty-four tables, also a cyanide plant.—At the Rawhide mine the App Con. Co. are having a canvas plant erected with a capacity sufficient to handle slimes from the 40-stamp mill.——A strike in the Big Betsy mine, on the borders of Tuolumne and Mariposa counties, is reported. The vein is said to have increased in width and value.——H. Andrews has struck a good prospect on Five Mile creek, east of Columbia.——The strike made in the O'Hara pocket mine, Brown's Flat, has panned out $4000. Elsbree Bros. and O'Hara are lessees of the claim.——R. C. Woodruff has bonded the Hyahapoo mine, above Pine Log, on the south fork of the Stanislaus.——Reed & Day have recently struck a prospect close to the Hyahapoo.——The Hazel Dell mines, eight miles north of Soulsbyville, has made surface improvements, including a 4-stamp mill and bunk house. The mill will start up about July 1st. They have a supply of ore on the dumps. The property is owned by the Jubilee G. M. Co.

Carters *New Era*: A body of ore has been discovered in the Donella mine, near Arrastraville.——Concentrating and cyanide plants are to be placed at the Jumper mine, near Stent.——W. S. O'Brien is finding good prospects in his mine near Buchanan.——Smith & Brady, on Bald mountain, have struck a pocket of gold.——The Gold Ridge M. & M. Co. has been incorporated, with F. P. Otis, W. Jones, Mrs. E. A. Jones, R. Inch and E. Twist as directors.——The 5-stamp mill being repaired at the Rising Sun is nearly ready and will be running in ten days. Attention is being given to the new concentrators. An office is among the recent improvements.—— The Pearl mine, near Confidence, has been bought by M. Tait of Los Gatos and develop-

ing work is progressing. A mill will be erected on the property.

COLORADO.

BOULDER COUNTY.

Ward *Miner*: A. J. Gormley and associates are working the Hidden Treasure group at Bloomerville. The crosscut tunnel is in 400 feet. In driving the tunnel several leads have been struck that show good streaks of mineral.— The San Blas upraise has been driven in mineral all the way from the tunnel level and in places the pay streak widened into pockets of iron ore. The upraise is being made for a working shaft. Seventy feet more will open the shaft to the surface.——The B. & M. mine which shipped ore to the Globe smelter was instructed to cease further consignments until settlement of the difficulty. Work is confined to running the upraise 250 feet west of the main shaft and extends 450 up from the lower level; 200 more feet will bring it to surface.

CLEAR CREEK COUNTY.

(Special Correspondence).—A hoisting plant is to be installed on the Lord Byron and the 340-foot shaft is to be sunk 1000 feet deeper. It is stated the workings are now in a good grade of ore.

Georgetown, June 17th, '99.

Another strike in Onie Bell is reported. The quartz fills the face of the drift.

The eight-hour law did not affect Silver Plume materially. The miners employed by the Humphrey Spelter Co. now work eight hours at the same pay as was previously received for ten hours.

FREMONT COUNTY.

(Special Correspondence).—The chlorination works of the National Gold Extraction Co. at Florence are expected to start up by June 20th, to handle none but Cripple Creek ores. This company operates a crushing and sampling plant at Goldfield near Victor, where all the coarse crushing is done for the chlorination mill. The latter is well equipped, having some features that are new. In the roasters, crude oil from near-by wells is used for fuel, and coal is used for power. The solutions are forced to the barrel floor by compressed air. There are two chlorine barrels, 15x7 feet, holding eighteen tons each. The tailings from the barrels are conveyed to a separate building and there concentrated by six double-decked concentrators. Mgr. J. Q. McDonald states that the plant will be worked by three eight-hour shifts. It is learned that the Metallic Extraction Co. at Cyanide has worked on this plan since June 1st. WASCOTT.

Florence, Colo., June 14th, '99.

GILPIN COUNTY.

(Special Correspondence.) — The 2200-foot shaft of the California mine is being unwatered.

The Cook mine shipped 675 tons of concentrates and 133 tons of smelting ore for the month of May.

Blackhawk, June 17th, '99.

LAKE COUNTY.

Leadville mines are shipping large quantities of sulphide ores to the Philadelphia Smelter at Pueblo.

PITKIN COUNTY.

(Special Correspondence).—The merchants and business men of Aspen have incorporated the Home M. Co. to do prospecting and development work in Pitkin county.

Aspen, June 18th, '99.

SAN JUAN COUNTY.

Denver *Republican*: The leading mines of this county have nearly all closed, and most of the others will close within a day or two. The Porter coal mines, which have depended upon supplying coal and coke to smelter and mines, will close. There are employed 150 men.

SUMMIT COUNTY.

Denver *Republican*: C. L. Westerman of the Golden Crown placer, two miles south of Breckenridge, is putting in boxes and getting the Golden Crown in shape. This placer is familiarly known as the "Goose Pasture."——The Hamilton mines, operated by the Hamilton G. M. Co., located in Summit gulch, will start up in a few days, having been closed down for a month on account of the blockade. The past two weeks teams have been hauling concentrates which accumulated during the blockade of the railroad.

TELLER COUNTY.

(Special Correspondence).—The Modoc is developing extensively and blocking out high-grade ore.

Three sets of lessees on the Nightingale and Nighthawk, on Bull hill, are shipping $60 to $70 ore. It is announced that this group is about to be sold.

The Standard tunnel, which has progressed 3000 feet into Beacon hill, has ceased work, owing to an excess of water.

The nineteen months' lease on the La Conning mine, on Beacon hill, has been bought by the Pueblo G. M. Co. for $10,000. The property is in a rich body of ore.

The Flourine, on Copper mountain, has begun operations and are taking out $26 ore.

The Mahoning G. M. Co. of Youngstown, Ohio, is working two shifts developing their property on Rhyolite mountain.

E. E. Miller, who has 200 acres of placer ground in Bison park, at the foot of Cow mountain, made tests of black sand therefrom which ran $62 to $380 per ton.

A 13-foot vein of oxidized ore was encountered this week on the property of the Dillon G. M. Co. on Battle mountain. M. Finnerty of Denver is Mgr.

Parties in control of the New England & Cripple Creek G. M. Co., principally Boston people, purchased the Chesapeake group of eight and one-half acres on Battle mountain on the 13th inst., paying $100,000 cash therefor. The selling parties are the Bradburys of Canyon City, Colo. The deal was negotiated by C. D. Hall of Victor. E. A. Stevens is consulting engineer and Gen. Mgr. of the property, which will be equipped for sinking two shafts.

The Lucky Gus, under several sets of lessees, is shipping 100 tons of ore per month.

The Mary Jane, on Raven hill, has completed its 200-foot shaft and has let a contract for sinking 100 feet deeper and 50 feet of drifting. Mgr. H. A. Clapp says they are putting in a 15 H. P. electric hoist.

The Rex Investment Co., of which H. A. Clapp is Pres. and A. C. LaBrie is Sec'y, is to make some Cripple Creek mining investments.

The Thompson mine, on Raven hill, is shipping 1800 tons per month, most of which is milling ore. The mine is worked through a 485-foot shaft and is managed by G. M. Weeks.

The Gold Sovereign, on Bull hill, is being developed and worked by several lessees. The principal one, of which E. Snyder is Mgr., is worked through a 500-foot tunnel, at the breast of which a winze sinks 100 feet on the vein, from which high-grade ore is shipped. Some of it ran as high as thirty-two ounces gold.

The John A. Logan, on Bull hill, belongs to W. S. Strattou, and is developed and equipped. The three-compartment shaft has been sunk 1000 feet within the past year. Stations are cut at every 100 feet, from which levels are driven on the vein. The ore is being blocked out, and as yet none of it shipped. W. H. Hart is Supt. WASCOTT.

Victor, Colo., June 15th, '99.

(Special Correspondence).—The net earnings of the Elkton mine, Cripple Creek district, for the year ending June 10th, '99, were $170,000, of which $120,000 was paid to stockholders in dividends. The ore produced amounted to 22,252 tons, the gross average value of which was $28 per ton. The underground work is summed up in 193,000 cubic feet of stoping, 2311 feet of drifting, 726 feet of crosscutting and 780 feet of upraising.

Elkton, Colo., June 13th, '99.

The Last Dollar, on Bull hill, has put in a new 16x30 hoist, to be operated either by steam or electricity. It is the intention to sink the present 650-foot shaft 200 feet deeper.

The Raven G. M. Co. shipped 125 tons of ore from their Raven Hill mine on the 17th inst., which is claimed to have run from two to six ounces to the ton in gold.

Blickenstaff & Co., lessees on the Lucky Gus, have shipped 200 tons of ore from the tenth level of that mine, which ran from two to three ouncez to the ton.

Denver *Republican*: The shipments recently marketed from the Last Dollar at Cripple Creek were settled for at the rate of $1900 to the ton. There were ten tons in the lot. The extent of the new ore body has not been determined. The rich streak is in some places 18 inches wide. Alongside is a wider streak good for eighteen to twenty ounces to the ton. The shipments made were saved in running the drift on the ore.——The National Mining & Leasing Co., capitalized at $800,000, has been incorporated. Pres. G. B. Mechem, Sec. R. W. Griswold, F. T. F. Bonneau and C. H. White will be the directors. The properties of the company are the Hornet, Comet, Twilight, Xenia and May Day, about twenty-one acres on the north slope of Tenderfoot hill, running over on to Carbonate hill. They adjoin the Buckhorn.

IDAHO.

The Seven Devils M. & D. Co. has been chartered under the laws of New Jersey, to operate gold and copper mines in Idaho, Utah and Arizona, and intends to increase its capital, as occasion requires, up to $10,000,000. The directors are N. Appleton, S. L. Powers, W. L. Pratt, H. A. Gammon, Boston, Mass.; N. Treweek, Salt Lake City, Utah; L. Crandall, Globe, Ariz.; G. L. Shoup, H. F. Wild, G. A. Rahm, Boise City, Idaho.

The Checkmate mine at Willow Springs, owned by Salt Lake and Ogden parties, is shipping ore to Salt Lake. J. Young, agent of the company in Salt Lake, says plans for a mill are under consideration. The ore body has been opened 500 feet.

S. Wilson has discovered a vein of graphite and one of asbestos in the Seven Devils country, ten miles from the Peacock mine. A single location covers both veins.

Salt Lake *Tribune*: A strike is reported on Salmon river. The discovery is quartz, near Shorty's bar, four miles below the mouth of White Bird creek and sixteen miles from Grangeville. The discoverers are C. Davis and W. Cash, and out of fifty assays none went under $10 per ton in gold. The formation is porphyry and the ledges are large.

Spokesman-Review: At Wallace the Helena-Frisco, which is oparated under the management of J. McDonald, thirty men with machine drills are employed. It is expected that more will be added.——The Empire State at Wardner is working almost a full force of non-union men. A few more machine men could be employed, but there are plenty of laborers.——On Canyon creek the Helena-Frisco M. & M. Co. are reported to have bought the Black Bear mine and the Milwaukee M. Co.'s property. The Black Bear joins the Frisco on the north.

NEVADA.

The necessary repairs to hydraulic elevator No. 1 at the C. and C. shaft having been made by the Risdon Iron Works, San Francisco, Cal., the repaired section will soon be in place and the lowering of water below the 1950 level continued.

On the 1750 level of the Con. California & Virginia they are making preparations for stoping the ore found 94 feet south of the west crosscut. In a few days work on the 1800 level, through the winze leading from the 1750 level, will begin. Between the 1750 and 1850 levels, where work is going on, the ground is well drained. Elevator No. 2 is keeping the water below the 1850 level.

The Eureka Con. mine of Eureka district shipped 266,600 pounds of ore for the week ending June 16—the largest shipment from that mine in a long time. More men are at work in the property than at any time for five years. The other mines of Eureka district are producing and shipping ore to the smelters at Salt Lake City, Utah.

Winnemucca *Silver State*: F. Wendel, owner of the Sadores placer mines, eighteen miles north of Winnemucca, in what is known as Dutch Flat, has found gold-bearing quartz which he thinks is from the ledge from which the gold from the placers originally came. The placers have been worked four years and $30,000 taken out.

NEW MEXICO.

The Cochiti G. M. Co. will erect a large electric power plant at the Madrid coal mines near Cerrillos, thirty-five miles from Bland.

Elizabethtown *Miner*: The Confidence people are hauling ore from their property on Grouse gulch to the mill.——Machinery for the Edison mill is on the ground.——C. Wood, of La Junta, Colo., is at Hematite looking after the mining interests of the La Junta syndicate in that camp.——J. W. Slater of California has leased the Ponil placers from Mathews & Merry and has commenced work.——A. C. McLeod, who has been in the camp the last year superintending the erection of several mills, left a few days ago for Denver.——The Blue Bandana people have, at the 425 level, run a drift 65 feet.

OREGON.

Baker City *Democrat*: A strike has been made in the Imperial mine, one of the Grey Eagle group, at Cable Grove, the property of J. C. Young and Mr. Colbath. The vein is 8 to 20 inches wide, in a raise at the end of a 600-foot tunnel, where the ledge is 5 feet wide. The ore from this new find will go $200 to the ton. Mr. Young will commence shipping.

Baker City *Republican*: Since February the Ibex mine, near Baker City, has been under the management of S. Chapman, who has run a crosscut 200 feet, two drifts on the vein 400 feet each, and numerous crosscuts of the vein from wall to wall, showing an ore body from 8 to 15 feet. Two shoots of ore have been opened in the upper and lower levels. A working shaft has been started on one of these and steam hoists will be ordered for the sinking of two shafts 500 feet. No ore has been shipped and none taken out excepting that taken out in prospecting.

SOUTH DAKOTA.

The Alta-Lodi mine at Meyersville, operated in 1880 by an Eastern company and abandoned as worthless, is now being successfully worked by J. Cochrane who commenced operations with an arrastra and has later put in a rotary mill. The vein is 80 feet wide and is worked by an open cut.

The Uncle Sam shaft is being sunk to the level reached by the old incline sunk several years ago before the mine was shut down. This mine made its discoverers rich, who worked a rich pay streak in a small way; but when a 60-stamp mill was built on it and thousands of tons of waste rock were run through it, the pay fell off and a shut-down resulted.

UTAH.

The Bingham Placer Co. has been washing gravel for several days and the material has an average of about $5 per cubic yard.

Salt Lake *Tribune*: At the Star Consolidated at Tintic the management is loading for shipment eight or ten carloads taken from the 400 level, where the ore body increased and where the largest body of ore ever seen in the mine is exposed. The shaft has reached a depth of 600 feet, where a station is being cut.——It is reported at Park City a larger number of persons are employed than at any period in years.——Dubuque Gold M. Co., in Mercur district, will let a contract to continue the incline to a depth of 260 feet. The manager is J. McNamee.——The Wautuaka group of claims in Big Cottonwood is to be the basis of the Germania G. & S. M. Co. by Chicago and St. Louis men. Felix J. Stark is promoting the organization.——J. R. De Lamar has purchased 108 acres of ground of the Rover M. Co. at Mercur for $175,000. The Rover ground is accessible through the workings of the Golden Gate, and could be reached by extending a drift from them.——M. Beamer and W. Wilt have sold to the De Lamar interests the W. J. Bryan and Frank J. Cannon, it is said, for $75,000.——In the Northern Light mine at Zion Hill a rich streak carries ore running 400 to 500 ozs. silver. A carload of second-class ore recently returned 190 ozs. silver, $5.10 gold and 5 % lead.——At the Hercules Mgr. Mitchener has a body of high grade ore different from anything seen in the camp.——The owners of La Plata mine in the Logan district, southern Utah, have refused a proposition to bond their property.

Mercur *Miner*: The Helvetia has made connection between their north and south shafts through the 400 level. They are in a body of milling ore and are considering the erection of a mill. Thirty-five men are employed.——Work is to be commenced by the new owners of the Golden Gate Extension property. Bids are being asked for the timbering of 200 feet of the old shaft of the Golden Gate Extension.——A. P. Baldwin of Akron, O., has taken an option on Mr. Veitch's interest in the Mollie claim in Ophir district. Mr. Baldwin has arranged with Mr. Veitch to do development work on the property.

Tintic *Miner*: A 5-inch streak of galena ore which samples 12% lead and thirteen ounces silver has been cut in a drift from the bottom of the 120-foot shaft of the Quartzite, adjoining the Swansea, owned by A. Baxter.——A 3-foot vein of copper and lead ore has been cut in a crosscut from the 100 level of the El Rey. The shaft is down 140 feet.——Assays from a winze on the ore body of the May Day show 47.5% lead, 9.5 ounces silver and $2.30 gold.——The Lilly mine on the Tintic east slope have made their first shipment of ore, which netted between $2000 and $3000. The ore body was struck two weeks ago and a vein 4 feet wide is being followed on the 200-foot level. The owners are T. Barrett, president; W. M. McKenrick, secretary; H. and S. Barrett, P. P. Hindmarsh, I. Collins, E. Peck, J. T. Clark, Mrs. M. E. McGraw of Provo.——For a half interest in the South and West Mammoth, the Black Jack and Trail mining claims at Mammoth, Tintic district, J. Knight of Provo paid $45,000 to D. Evans, the original purchaser of the group. The territory in the transaction adjoins the Ajax M. Co. and Star Consolidated, lying to the south, owned by Mr. Evans. Mr. Knight has joined him in establishing a co-partnership under which development will commence. A three-compartment shaft will be sunk.

WASHINGTON.

The Warren G. M. Co. at Republic has bought the claims owned by the Union G. M. Co. and the D. D. G. M. Co. These are the D. D., Union, Finger Board, Hunter and Evening Star and the Warren and D. D. fractions, and form a group north of the Iron Mask and Flag Hill claims in the west belt of Republic.

Loomis *Prospector*: The Little Falls Co. are sacking ore and expect to ship a car within the next two weeks.——J. J. Enright of the Grand Summit No. 2 reports the work showing up good ore.——At 75 feet in the shaft on the Wehe property rich ore carrying gray copper has been struck. Parties from British Columbia have been looking over the property in the interest of Toronto people.——In the Utica, at a depth of 12 feet on Douglas mountain, a 5-foot vein has been struck, reported to assay $81 in gold. The shaft will be continued on the vein 100 feet.

WYOMING.

Grand Encampment *Herald*: The shaft on the Daisies mine is down 45 feet and machinery is necessary for further work. Upon his return, in ten days, Mr. Powell will let a contract for sinking the Daisies shaft to water level.——A copper discovery has been made two miles west of Grand Encampment by J. Smith. The discovery is a 2-foot vein of white quartz streaked with bornite and copper glance. The claim is located on the plain half a mile from the hills.——A train of eight six-horse teams is employed hauling copper ore from the Ferris-Haggerty mine to the railroad; 600 tons are to be shipped.

FOREIGN.

AUSTRALIA.

The semi-annual report of the Mount Lyell M. & R. Co., Limited, shows a net profit of £110,000, due largely to advance in price of copper, as other conditions have not changed materially.

Melbourne *Standard*: The Prince of Wales gravel mine at Sebastopol, Victoria, after being shut down for two years, has been reopened by tributers. Irrespective of a good area of reef wash, 1800 feet of the old gutter remains unworked.

Coolgardie *Pioneer*: Mr. Merton has discovered a vein 100 feet wide, 9 miles north of the Flying Pig mine, in Western Australia. Within a few days he had ninety-nine tons crushed at the Waitekauri battery, from which 634 ozs. of gold was obtained. He has since had a crushing of eight tons at the Leonora battery which has averaged 10 ozs. per ton.

BRITISH COLUMBIA.

Several mines in the Slocan and Nelson districts have raised miners' wages to $3.50 per day for a shift of eight hours.

Fort Steele *Prospector*: Twelve men are at work on the Big Chief, near Fort Steele.——A. Banks has made a strike on his claim in Victoria Gulch. A perpendicular ledge of quartz 15 feet in width has been exposed. Assays across the ledge give $6 per ton.——The management of the Tracy Creek M. Co. will be in charge of N. A. Wallinger of Fort Steele.

Victoria *Times*: A strike is reported on the Black Hussar, Slocan City.——The Slocan Star shipped 120 tons of ore last week, and the Whitewater 115 tons.——Work on the Fisher Maiden is to be resumed. C. F. Lee has made an examination of the property.——The Rain Bow group, Slocan City, has been sold for $10,000.——The Noonday mine, above Silverton, is working a jig that saves from otherwise worthless rock, concentrates that run 90 ounces silver and 40% lead to the ton.——A strike was made on the Hartney, on Silver mountain, last week, 500 feet below the tunnel, and was covered by 3 feet of wash.——A new find on the Silverton Boy, one of the Emily Edith group, is reported. The work of ground sluicing for the vein started some time ago and a ledge has been uncovered that carries a 2-foot streak of quartz and galena.——Preparations are being made by the Coin Development Co. to do development work on the Coin Fraction, near Cody. A flume 1000 feet long will bring water from Carpenter creek for ground sluicing to expose the lead.

LOWER CALIFORNIA.

The placer mines at Cerro Pintado are not proving as rich as first reported. Gold is to be found in the alluvial of the gulches heading around the mineral colored hill called Cerro Pintado, but the diggings are low grade and have thus far proved disappointing to American miners who stampeded into the region. Many are already leaving the field and returning to the United States.

Seventy-five miners have returned to San Diego from the Cerro Pintado placers. All say the placers are poor, the average yield being not over $1.50 per day to the man. H. L. Swain, a representative of the Chamber of Commerce of San Diego, says in a letter: "The placers cover ten miles square, but the workings are confined to the river beds (dry). Prospectors are finding new fields, but their extent and richness seem limited. This will never be a rich placer country. Many are prospecting for quartz ledges, and some claim to have found veins carrying gold, but I have been unable to substantiate these statements."

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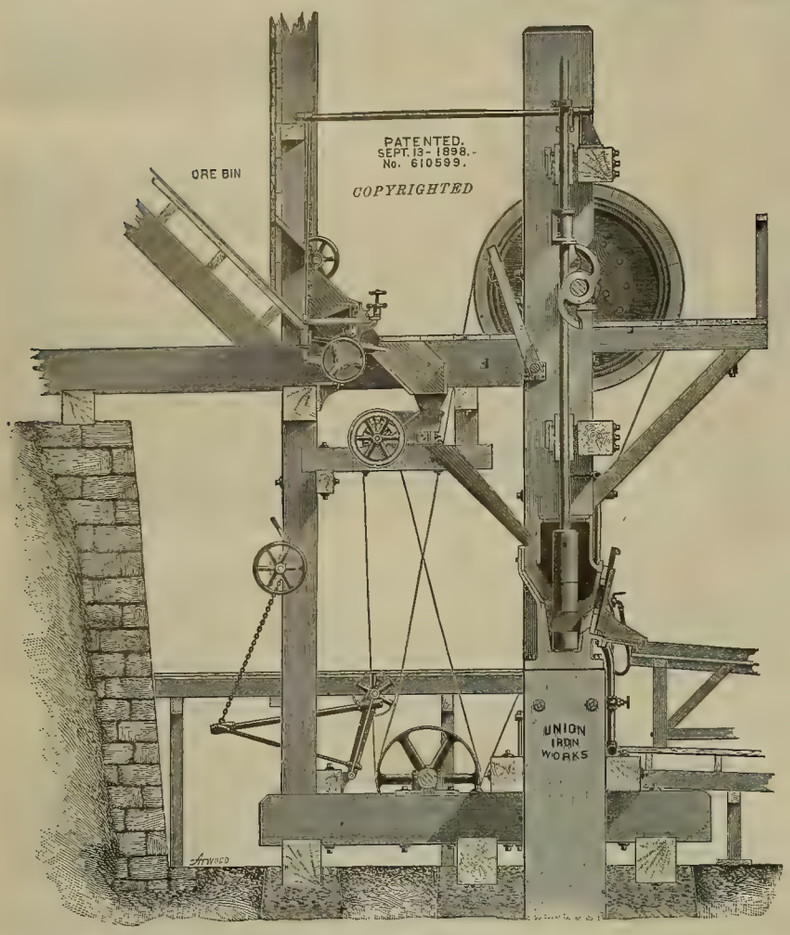

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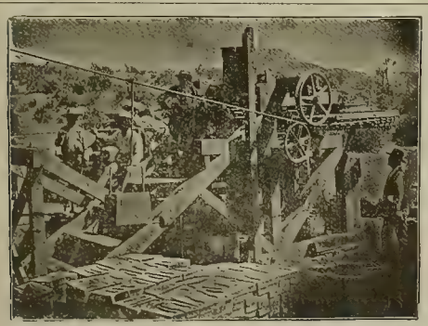

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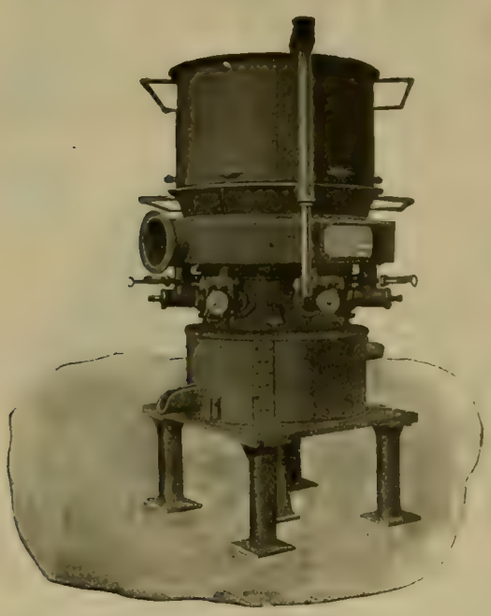

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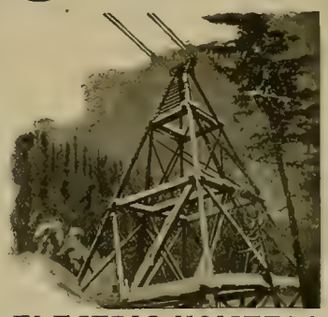

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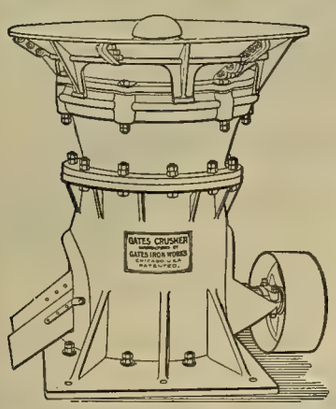

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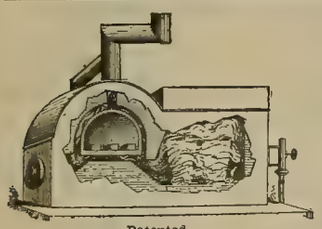
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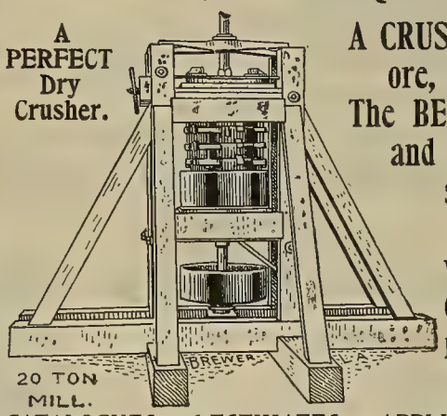

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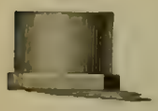

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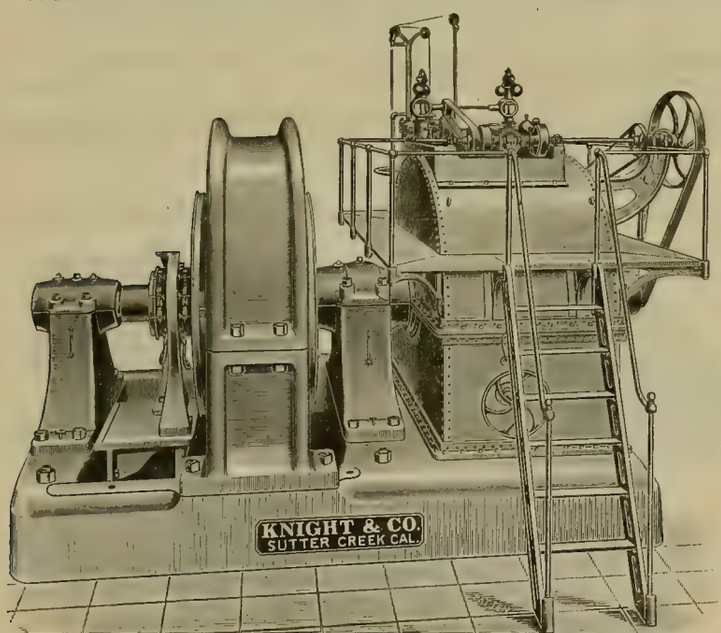

The accompanying cut shows the general arrangement of **The Knight Water Wheel**, direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
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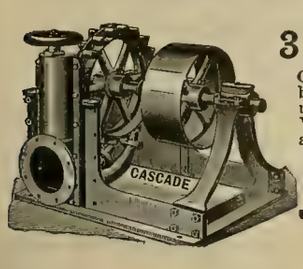

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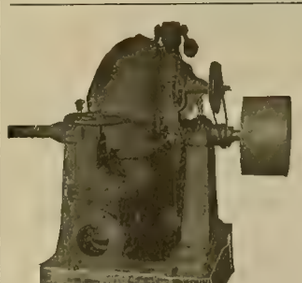

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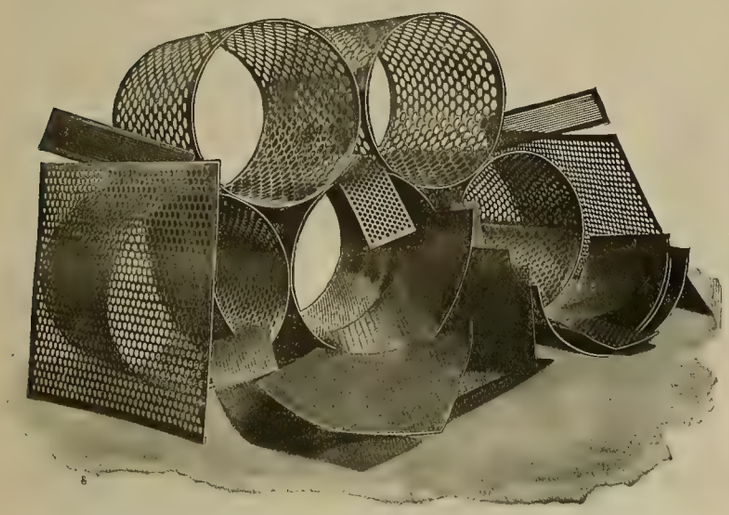

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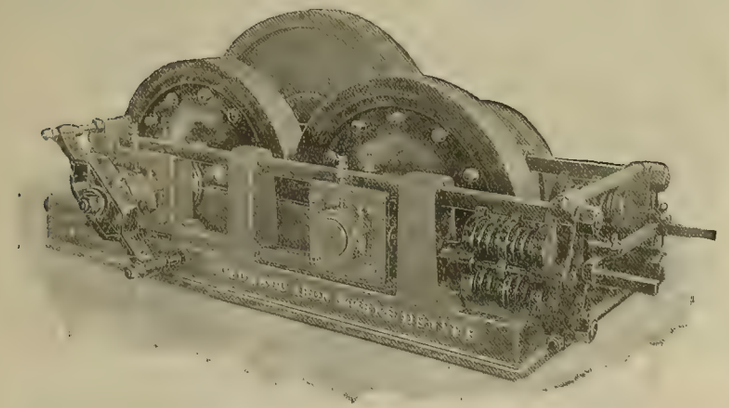

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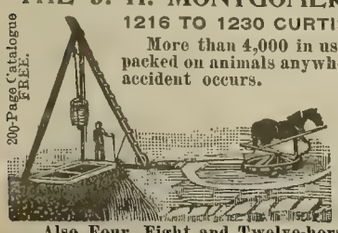

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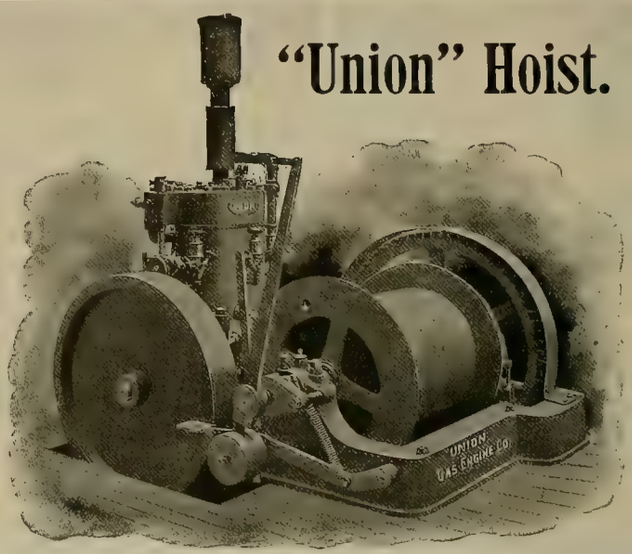

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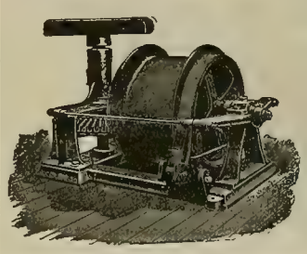

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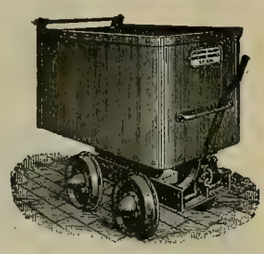

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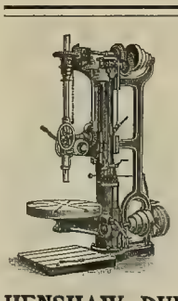

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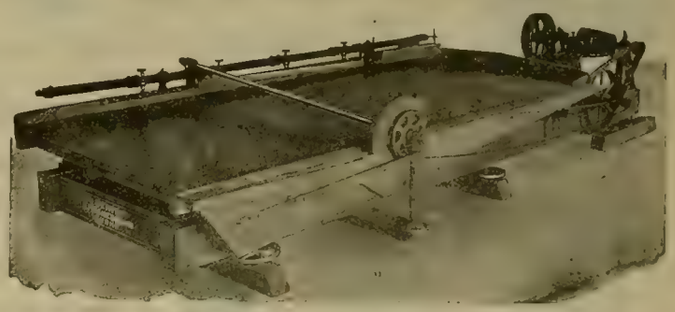

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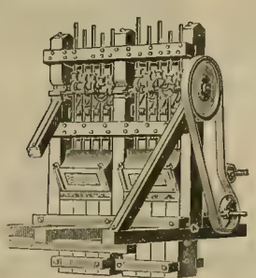

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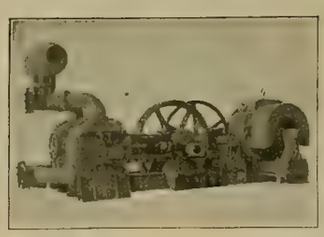

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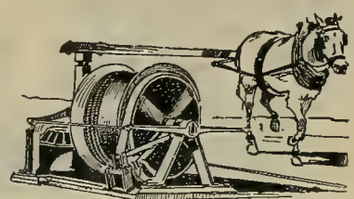

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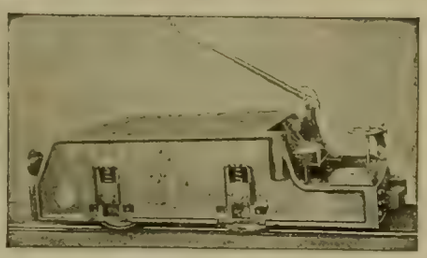

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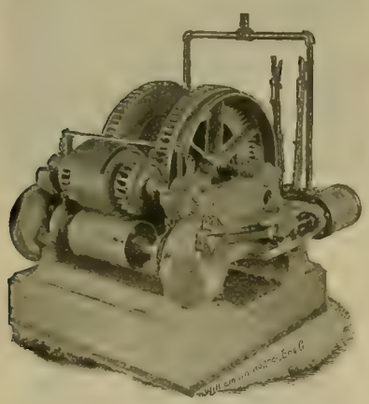

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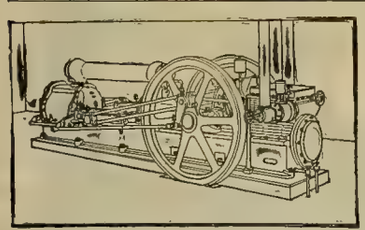

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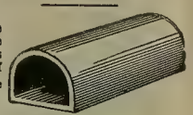

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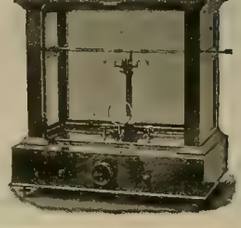

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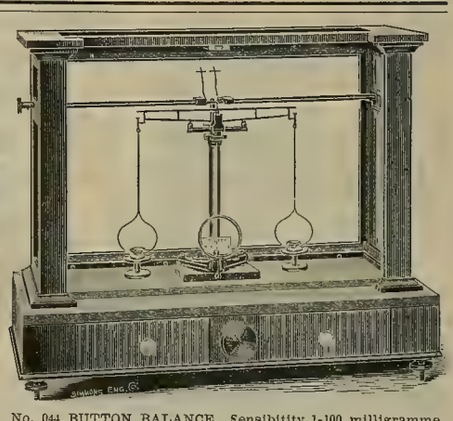

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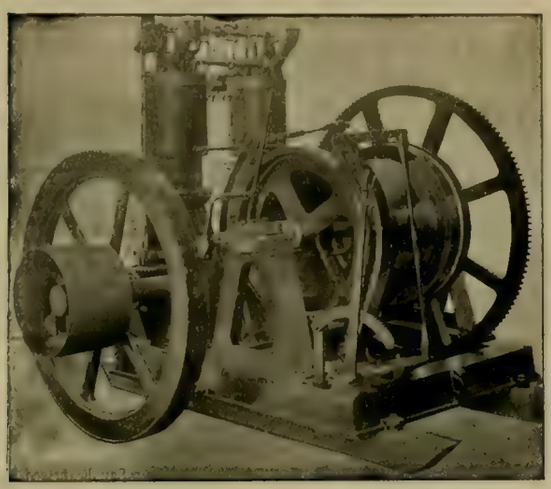

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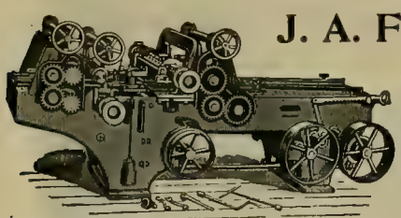

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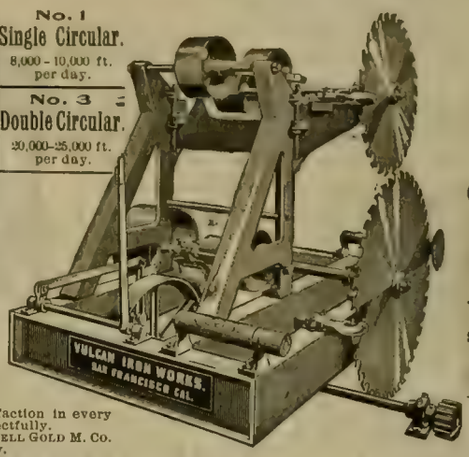

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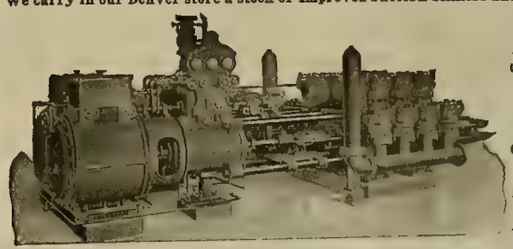

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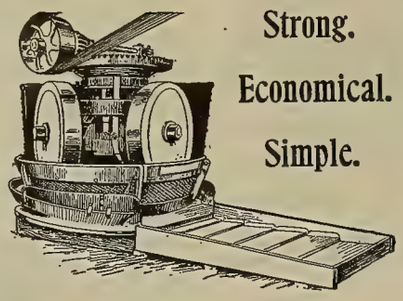

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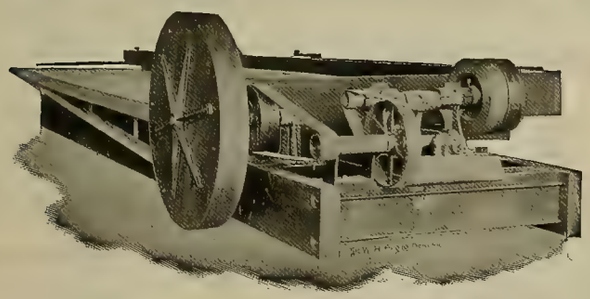

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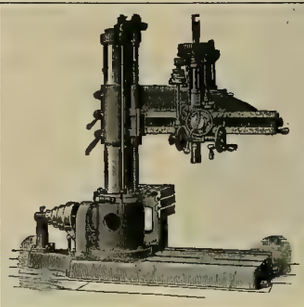

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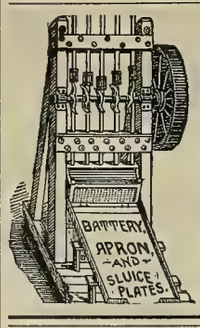

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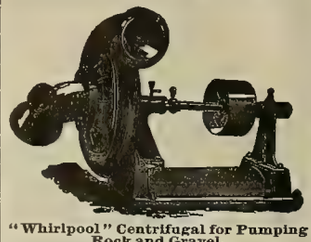


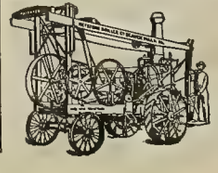
"Whirlpool" Centrifugal Pumps
—FOR—

DREDGING, MINING, IRRIGATING, and RECLAMATION.

Will pump rocks as large as will pass through the pipes. Also Compound Centrifugal Pump for 200 feet or more lift.

"Whirlpool" Centrifugal for Pumping Rock and Gravel.

OIL, GAS OR GASOLINE ENGINES, COMPOUND STEAM ENGINES, HARVESTING MACHINERY, ETC.



For Testing Placer Ground.

Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes.

Write for Catalogue and full information.

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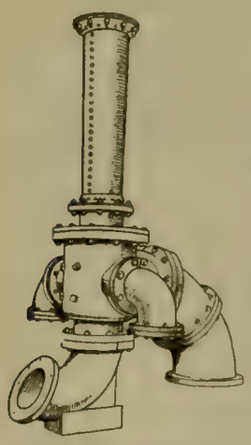

The Evans Hydraulic Elevator,

—MANUFACTURED BY—

RISDON IRON WORKS, San Francisco.

Used in Unwatering the Comstock Lode.

Send for Catalogue No. 5.

The cheapest and most efficient Water Elevator made.

It will do more and better work than any other Gravel Elevator.

It is fully protected by United States and Canadian letters patent.

The Bleichert Wire Rope Tramway,

BLEICHERT TRAMWAY AT THE CHILKOOT PASS.

AND OTHER SYSTEMS OF AERIAL TRANSPORTATION,

MANUFACTURED BY

The Trenton Iron Co.,

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Engineers and Contractors, and sole licensees in North America for the Bleichert System.

Also, Wire Rope Equipments for Surface and Underground Haulage, etc.

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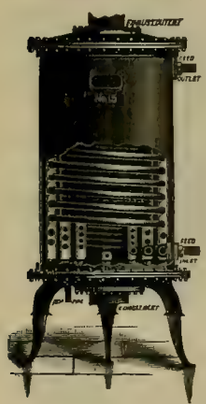
For Particulars, Address

Newton M. Bell, Agent,

109 CALIFORNIA ST., SAN FRANCISCO.

A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

THE NATIONAL



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800,000 Horse Power Sold.

Delivering Water to the Boiler at 210 degrees F. Thirty Sizes from 5 to 4000 Horse Power. Made of the Best Seamless Drawn Brass or Copper Tube, with Hard Brazed Joints. Unsurpassed for SIMPLICITY, EFFECTIVENESS and RELIABILITY. Send for Catalogue.

HENSHAW, BULKLEY & CO., Agents,
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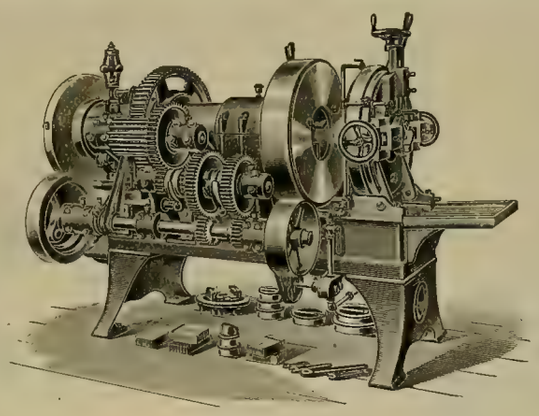

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THREADING

MACHINES.

- MANUFACTURED BY -

The Eaton, Cole & Burnham Company,

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Mining, Mill, Driving,
—AND—
Locomotive Headlights.

SIZES ON HAND:

24-inch,	
20	"
17	"
14	"
12	"
10	"
8	"
6	"

Boesch Lamp Co.,

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C. H. EVANS & CO.

HAVE REMOVED THEIR

Machine Works

TO 183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc.,
Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

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Engines, Boilers, Saw Mills, Hoe Saws, Mill Supplies.

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CAPITAL, - $550,000.

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SIMPLE. RELIABLE. ECONOMICAL.

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(M'ARTHUR-FORREST PROCESS.)

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Samples assayed and fully reported upon. Particulars upon application.

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Jena Normal Glass,

THE BEST LABORATORY WARE MADE.

Everything necessary for the

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SAN FRANCISCO Pioneer Screen Works,
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Improved Facilities! Finest Work! Lowest Prices.

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

—MINING SCREENS A SPECIALTY.—
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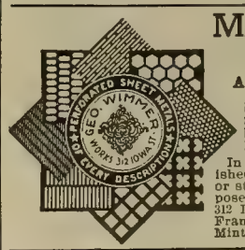

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Diagonal Slot,
Straight "
Burred "
Round Holes.

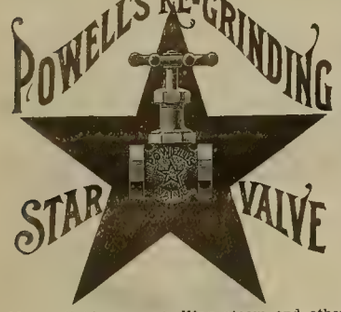
In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc. Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St. S. F.

MICHIGAN COLLEGE OF MINES.

A State Technical School. Practical work. Elective System. Summer term. Every graduate employed. For catalogues, showing occupation of graduates, address *Michigan College of Mines*, Houghton, Mich.



Most reliable for controlling steam and other fluids. Can be reground, if necessary, while valve is in position on steam pipe.

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Carried in stock by Miller, Sloss & Scott, San Francisco.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.

ROOM 1, · 426 CALIFORNIA STREET,
SAN FRANCISCO.

Assessment Notices.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of June, 1899, an assessment (No. 19) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels' Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 29th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—No. 1209 Claus Spreckels' Building, San Francisco, Cal.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of May, 1899, an assessment (No. 12) of two cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3d day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary.

Office—Room 9, 320 Sansome street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of June, 1899, an assessment (No. 7) of five (5) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of May, 1899, an assessment (No. 2) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

BOULDER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1899, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 27th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale, by order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of June, 1899, an assessment (No. 21) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 8th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Mines and Machinery for Sale at Public Auction.

The Harqua Hala (Arizona) Gold Mining Company will on Monday, August 14th, 1899, at 12 o'clock noon of that day, at the Court House door at Yuma, Arizona, offer for sale to the highest bidder all its mines, mill site, pumping plant, 40-stamp mill, cyanide plant, engines, boilers, machinery (fixed and movable), and stock of merchandise situated at Harqua Hala, Yuma Co., Arizona. Inventories and information may be obtained from C. Dallman, agent at Harqua Hala, or Lindley & Eickhoff, attorneys, 530 California St., San Francisco. Terms of sale: Cash, U. S. gold coin, payable twenty per cent on acceptance of bids, balance on delivery of possession. Title to mines U. S. patents. By order of the Board of Directors.

Stockholders' Meeting.

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines.—In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated mines, a meeting of the stockholders of this company will be held at 11 o'clock in the forenoon on WEDNESDAY, the 12th day of July, 1899, at its principal office, 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Hundred Thousand ($200,000.00) Dollars in 200,000 shares at the par value of One Dollar each.

Dated: San Francisco, May 25th, 1899.

JOSEPH H. MOOSER, Secretary.

MINING PROPERTIES.

Capital wanted to continue development on partially developed, promising mine. Will give an interest or bond, with option for purchase. Near good ore market. Also a group of six claims, developed, ready for mill. Likewise a partially developed prospect containing eight ledges, smelting character, near ore market.

J. N. ROSA, BOX 5,.....SHASTA, CAL.

TUBBS CORDAGE CO.
(A CORPORATION.)

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. Extra sizes and lengths made to order on short notice
611 and 613 Front St., San Francisco, Cal.

DELINQUENT SALE NOTICE.

HEAD CENTRE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tombstone Mining District, Cochise County, Arizona.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 20th day of March, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
H. B. Parsons, Trustee	108	100	$20 00
H. B. Parsons, Trustee	112	100	20 00
H. B. Parsons, Trustee	116	100	20 00
H. B. Parsons, Trustee	145	100	20 00
H. B. Parsons, Trustee	152	100	20 00
J. W. Pew, Trustee	348	500	100 00
S. B. Wakefield	361	3	60
J. W. Pew, Trustee	384	100	20 00
J. W. Pew, Trustee	389	100	20 00
J. W. Pew, Trustee	390	50	10 00
J. W. Pew, Trustee	463	100	20 00
J. W. Pew, Trustee	504	5	1 00
J. W. Pew, Trustee	536	50	10 00
G. B. Root, Trustee	564	20	4 00
G. B. Bayley, Trustee	674	50	10 00
J. W. Pew, Trustee	710	100	20 00
J. W. Pew, Trustee	711	100	20 00
J. W. Pew, Trustee	712	100	20 00
E. B. Deane, Trustee	717	100	20 00
S. Iglauer, Trustee	820	100	20 00
H. H. Shinn, Trustee	873	700	140 00
F. A. Benjamin	875	5	1 00
W. Steele, Trustee	890	500	100 00
J. W. Pew, Trustee	895	50	10 00
J. W. Pew, Trustee	905	100	20 00
H. W. Hasselgren	908	100	20 00
H. W. Hasselgren	909	100	20 00
Peter Lane	910	630	126 00
M. Rehfisch, Trustee	917	1,250	250 00
M. Rehfisch, Trustee	918	1,250	250 00
M. Rehfisch, Trustee	922	300	60 00
M. Rehfisch, Trustee	923	200	40 00
M. Rehfisch, Trustee	924	400	80 00
J. W. Pew	946	1,333	266 60
John Sinclair	951	500	100 00
A. W. Foster	957	8,000	160 00
A. W. Foster	958	4,000	80 00
Rehfisch & Co., Trustees	960	100	20 00
Jas. Rolph, Trustee	968	500	100 00
S. B. Wakefield & Co., Trust's	969	1,500	300 00
S. B. Wakefield & Co., Trust's	971	3,833	766 60
J. W. Pew, Trustee	975	400	80 00
J. W. Pew, Trustee	989	40	8 00
A. W. Foster	1010	3,000	600 00

And in accordance with law, and an order of the Board of Directors, made on the 20th day of March, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California, on MONDAY, the 29th day of May, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

POSTPONEMENT.

The day of sale of the delinquent stock of the above named company is hereby postponed to MONDAY, June 12th, 1899, at the same time and place. By order of the Board of Directors.

J. W. PEW, Secretary.

POSTPONEMENT.

The day of sale of the delinquent stock of the above named company is hereby postponed to MONDAY, June 26th, 1899, at the same time and place. By order of the Board of Directors.

J. W. PEW, Secretary.

DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 19) levied on the 13th day of May, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
G. A. Hinckelbein	2	10	50
G. A. Hinckelbein, Trustee	9	1000	50 00
G. A. Hinckelbein, Trustee	10	1000	50 00
G. A. Hinckelbein, Trustee	11	1000	50 00
G. A. Hinckelbein, Trustee	12	1000	50 00
G. A. Hinckelbein, Trustee	13	80	4 00
G. A. Hinckelbein, Trustee	20	500	25 00
G. A. Hinckelbein, Trustee	21	500	25 00
G. A. Hinckelbein, Trustee	22	500	25 00
G. A. Hinckelbein, Trustee	23	500	25 00
G. A. Hinckelbein, Trustee	24	200	10 00
G. A. Hinckelbein, Trustee	25	200	10 00
G. A. Hinckelbein, Trustee	26	200	10 00
G. A. Hinckelbein, Trustee	27	200	10 00
G. A. Hinckelbein, Trustee	28	200	10 00
G. A. Hinckelbein, Trustee	29	200	10 00
G. A. Hinckelbein, Trustee	30	200	10 00
G. A. Hinckelbein, Trustee	31	200	10 00
G. A. Hinckelbein, Trustee	32	200	10 00
G. A. Hinckelbein, Trustee	33	200	10 00
G. A. Hinckelbein, Trustee	44	100	5 00
G. A. Hinckelbein, Trustee	45	100	5 00
G. A. Hinckelbein, Trustee	46	100	5 00
G. A. Hinckelbein, Trustee	47	100	5 00
G. A. Hinckelbein, Trustee	48	100	5 00
G. A. Hinckelbein, Trustee	49	100	5 00
G. A. Hinckelbein, Trustee	50	100	5 00
G. A. Hinckelbein, Trustee	51	100	5 00
G. A. Hinckelbein, Trustee	52	100	5 00
P. A. Wagner	53	10	50
P. A. Wagner, Trustee	90	980	49 00
P. A. Wagner, Trustee	91	1000	50 00
P. A. Wagner, Trustee	92	1000	50 00
P. A. Wagner, Trustee	93	1000	50 00
F. X. La Bonte	75	10	50
Louis Audet	89	10	50

And in accordance with law, and an order from the Board of Directors, made on the 13th day of May, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 3rd day of July, 1899, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHARLES BOVONE, Secretary

Office—217 Sacramento street, San Francisco, California.

AMERICAN AND FOREIGN TRADE MARKS

SCIENTIFIC PATENT PRESS AGENCY

PATENTS

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INVENTORS, Take Notice!

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Cost to Run, 1c per hour per H. P.

All Latest Improvements.
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Market Reports.

SAN FRANCISCO, June 22, 1899.

SILVER.—London, 27 13-16d; New York, 60⅝; San Francisco, 60⅝; Mexican Dollars, 49¼@50¼; New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.—New York reports easier, $4.45 bid, $4.50 asked; brokers' price, $4.25.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6½c; bar, 6.50c.

COPPER.—New York reports Lake dull at $18 bid, $18.50 asked; brokers' price, $18 25; mill copper plates, 23¼c.

The Chinese are said to be smelting their copper coins and exchanging the product for silver. The Oriental races seem to prefer the white metal to the yellow.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12¼@13c per pound.

TIN.—Steady, $25.65 bid, $25.70 asked; pig, 31c per lb.; Bar, 35c. New York weak, $23.85 bid, $25.50 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 8, 8¾c.

QUICKSILVER.—Local, $43; export, $39.00 @39.50; carload lots, special rates.

The visible supply of quicksilver in London is diminishing. While exports were regular for four months ending May 1st, '99, the supply was reduced over the corresponding period of '98 by 11,000 flasks. It is thought the slight advance in the price of silver will stimulate silver mining, which in turn would create a larger demand for quicksilver, with a corresponding advance in price.

PLATINUM.—London, 63½s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¼c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@3¾c per lb.; blue vitriol, 4½@5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 22, 1899.

9:30 A. M. SESSION.

100 Best & Belcher	36c	100 Gould & Curry	21c
100 Challenge	33c	300 Mexican	42c
100 Chollar	26c	300 Ophir	84c
400 Con. Cal. & Va.	$1 20	100 Potosi	38c
100 Confidence	95c	100 Yellow Jacket	35c
100 Crown Point	26c		

2:30 P. M. SESSION.

800 Ophir	91c	800 Yellow Jacket	38c
600 Occidental	47c	300 Sierra Nevada	64c
300 Best & Belcher	39c	300 Utah	12c
200 Con. Cal. & Va.	$1 35	1000 Bullion	7c
1200 Savage	23c	400 Overman	17c
1000 Potosi	40c	400 Union Con	36c
200 Hale & Norc's	35c	350 Caledonia	61c

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed. MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

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with eighteen years' practical experience in all branches of mining work, wants position as superintendent, assayer, surveyor or bookkeeper. Address "Cupel," care Mining and Scientific Press.

Mining and Mechanical Engineer of twenty years' experience desires engagement, for family reasons, in locality below an altitude of 6500 feet. Mining and concentration a specialty. Address "Concentrator," care Mining and Scientific Press.

WANTED,

Position as Assayer and Bookkeeper.

References: Abbot A. Hanks, Baldwin & Howell, S. F. Address W. B. HOAG, Berkeley, Cal.

AN ACCOUNTANT

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DELINQUENT SALE NOTICE.

THE MARGUERITE GOLD MINING AND MILLing Company.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 18) levied on the 9th day of May, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Nams.	No. Cert.	No. Shares.	Amt.
F. Breg	28	1,250	$125 00
Marcus Schwab	64	500	50 00
Kath. Emhoff	93	500	50 00
H. Helfrich	186	250	25 00
Mrs. M. L. Faas	209	5	50
Peter Kruckel	232	62½	6 25
J. Beck	233	62½	6 25
Andreas Kruckel	251	100	10 00
John C. Lutz	265	200	20 00
Chas. Riegert	274	100	10 00
H. Helfrich	295	100	10 00
John C. Lutz	318	100	10 00
John C. Lutz	335	100	10 60
Adam Miller	350	125	12 50
C. Kayser	360	25	2 50

And in accordance with law, and an order from the Board of Directors, made on the 9th day of May, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the company's office 237 Twelfth St., San Francisco, California, on MONDAY, the 10th day of July, 1899, at the hour of 5 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

F. METTMANN, Secretary.

Office—237 Twelfth St., San Francisco, California.

DELINQUENT SALE NOTICE.

ARRASTRAVILLE MINING COMPANY.—LOCAtion of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 16th day of May, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
A. E. Sayre	627	4,400	$440 00

And in accordance with law, and an order from the Board of Directors, made on the 16th day of May, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, 213 Jackson St., San Francisco, California, on TUESDAY, the 11th day of July, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. MIDDLETON, Secretary.

Office—213 Jackson St., San Francisco, California.

Tenders for Placer Mining Claims on Dominion Creek, in the Yukon Territory.

SEALED Tenders addressed to the undersigned and marked on the envelope "Tender for placer mining claim" will be received at this Department until noon on Friday, the 1st day of September, 1899, for placer claims and fractions of claims on Dominion Creek reserved for the Crown.

The following is a list of the numbers of the claims and fractions and the approximate frontage thereof as surveyed by Messrs. James Gibson and R. W. Cautley Dominion Land Surveyors.

BELOW UPPER DISCOVERY.

No.	Length in ft.	No.	Length in ft.
1A	5	10A	33.3
2A	19	15A	42.25
3A	30.5	31A	43
8A	87.4		

ABOVE LOWER DISCOVERY.

No.	Length in ft.	No.	Length in ft.
1A	12	6A	35.00
2A	59 1	10A	146.25
4A	1.25		

BELOW LOWER DISCOVERY.

No.	Length in ft.	No.	Length in ft.
1A	56.3	73A	24.7
2A	7.2	76	500.
2C	20.3	77	449.8
8A	34.00	16C	733.8
9A	39.25	18A	164.7
11A	98 4	78A	3.6
15A	68.5	80	431.3
16A	40.25	81A	15 3
20	202.1	83	501.
21A	71.9	84	500.
22	500.	85	500.
22A	60.7	86	500.
23	449.2	87	500.
25	500.	87A	500.
26	120.66	87B	387.9
31	350.5	89A	35.1
33	500.	91	500.
34	500.	92	500.
36	500.	93	500.
37	500.	94	500.
38	352.	95	500.
68A	94.7	96	500.
69A	40.5	97	500.
70A	72.6	98	500.
71	414.4	99	500.
73A	12.3	100	478.7
74A	21.3	101	119.

Each tender shall specify the numbers of the claims and fractions tendered for and also the amount of bonus offered for each claim and fraction. The tender may be for the whole lot or any one or more of the claims and fractions and must be accompanied by an accepted cheque in favour of the Minister of the Interior for ten per cent of the amount offered, one-half of the remainder to be paid into the Department of the Interior at Ottawa or to the Commissioner of the Yukon Territory at Dawson within thirty days from notice of acceptance of tender, and the balance within six months thereafter with interest at the rate of four per cent per annum.

Entries for the claims and fractions will be granted in accordance with the Placer Mining Regulations on acceptance of tender.

The entries will be subject to the usual royalty and the provisions of the said Regulations from time to time in force, except as to representation provided for by Clause 39, which will not be required.

The claims and fractional claims for which entries may be granted shall not include any portion of the bench or hill claims for which entry may have been previously granted.

The highest or any tender not necessarily accepted. JOHN R. HALL, Secretary.

Department of the Interior,
Ottawa, 27th May, 1899.

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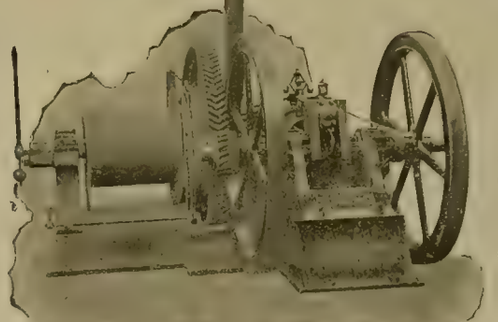

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